CERTAIN ASPECTS OF INDUSTRIAL AGING

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

by

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Approved by

[Signature]
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CERTAIN ASPECTS OF INDUSTRIAL AGING

Chapter I

THE GENERAL PROBLEM OF

THE OLDER WORKER IN INDUSTRY

Population Trends Leading to the Development of an Older Worker Problem in Industry

During World War II, American industry found itself dipping deep into its marginal labor reserve. By various means (training programs, re-tooling, etc.) it was able to utilize this labor force so well that all-time highs of production were reached.

This "marginal" labor reserve came to a great extent from the ranks of youth, previously unemployed women, and older workers of both sexes. A Bureau of Labor Statistics publication \(^67\) gives evidence that much of this additional worker supply came from the older population. In April of 1945, for instance, there were almost two and a half million more workers of ages forty-five and over than were to be found under "normal" pre-war conditions. About one and a half million of these extra older workers were women.

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The above show that industry has been able to utilize older workers during a time when that group is sorely needed. More recent Bureau of Labor Statistics data, however, illustrate both the general problem of industry's ability to maintain these forces, once an emergency period is over as well as the more personal, economic problems of the older worker himself. Thus, the above source indicates that the labor force participation rate for both men and women, and especially for the sixty-five and over segment of the population, has dropped rather substantially since 1945. In April of 1945, 51.2 per cent of men sixty-five years of age and over were in the labor force. By April of 1952, only 41.8 per cent of the men in that age group were in the labor force. And there has been a similar trend for women of the same age group, i.e., in April of 1945, 9.6 per cent were labor force participants, but by April of 1952 only 8.2 per cent would be so classified.

Trends of population as well as estimated population projections make it evident, moreover, that much of industry's manpower supply of the future, perhaps for "normal" as well as for emergency periods, will have to come from the ranks of the older age groups. In 1900, for instance, about three million persons (about one in twenty-five) were aged sixty-five and over. In 1950,
those aged sixty-five and over totaled almost twelve and a half million, or about one in twelve. For persons aged forty-five to sixty-four (a group often found unemployable either by official company policy or by employment officials and first-line supervision), there is a similar picture. In 1900, they numbered ten and a half million or fourteen per cent of the total population. By 1950, the group had risen to thirty and a half million or about twenty per cent of the population. Underlying these population trends are a number of factors, i.e., long-term decline of the birth rate, immigration legislation, and longevity gains resulting from improved living standards as well as medical discoveries, particularly in the area of control of epidemic, infectious diseases.

What of the future? Can these shifts toward an older population be expected to continue. The answer, based albeit on extrapolation beyond existing data, would appear to be in the affirmative. The same report of the Bureau of Labor Statistics\(^6^7\) foresees the number of persons aged forty-five and over increasing to about sixty-three million by 1975, when they may constitute nearly half of all persons over 20 years of age. Persons sixty-five and over are seen as numbering about twenty-one million, an increase of sixty-nine per cent over the present twelve million.
The Present Problem - Evaluation of Older Workers and of the Criteria by Which They are Judged

The above seems to indicate, therefore, that many studies bearing on the older worker are needed if industry is to utilize him effectively either in emergency periods or in "normal operations". The present study is only one of several such investigations being carried out under the auspices of a gerontology unit headed by Dr. Sidney L. Pressey at the Ohio State University.

Briefly, the aims of the study are twofold. In the first place, the need is seen to examine the relative assets and liabilities of older workers in a number of occupations and according to a number of worker characteristics. Secondly, the writer has seen the need to evaluate, wherever possible, the criteria by which older workers and others are judged.

The study, to some extent, represents a novelty in industrial-gerontological investigation in that it is confined entirely to an examination of the age problem as it affects a single Company. The advantage to this approach would appear to be one of thus being able to investigate occupational patterns of age-efficiency relationships without having other unknowns related to Company or Industry differences operating in such a way as
to obscure those relationships. Another advantage accrues from this method of investigation. The investigator was connected with the concern studied for eight years. He has thus been able to bring to the interpretation of the data a personal knowledge of how those data operated in the everyday work situation.

The orientation to the problems presented here has been a very general one, i.e., to investigate the abilities of older workers in the Company in terms of criteria actually used by the Company to evaluate its workers of all ages. As a corollary problem, there has been an attempt to investigate, where possible, the adequacy of those criteria as applied specifically to the older worker.

What might be termed a general orientation has been followed. Briefly, that orientation says that age per se is not a very meaningful construct. It is believed, however, that age-efficiency relationships will be relative to a number of specific elements. Thus they may be affected by the type of work performed. Virtually all of the major occupational groupings in the Company are here examined in this
connection. And, where possible, so are any other age concomitants which may lead to more insightful findings.
CHAPTER II
HISTORY OF THE OLDER WORKER PROBLEM

This chapter, as its title indicates, is intended to deal primarily with the literature concerned with the ability of the older worker in his everyday work life. Laboratory investigations are listed only where, in the opinion of the investigator, they add measurably to data actually taken from the business and industrial scene. This treatment would appear relevant to the present problem, i.e., industrial aspects of aging.

Attendance at Work and Age

One of the criteria employed for the examination of the worth of older workers in this dissertation, is an absenteeism measurement. Findings of other investigators become pertinent to permit comparisons with our own findings.

It would appear, from the number of investigations reported in the literature, that this perhaps is the most investigated of all industrial age-efficiency relationships. The general conclusions to be drawn from these studies would appear to be that absenteeism frequency (number of absences) tends to decrease with age whereas absenteeism severity (amount of time lost)
tends to show an increase with age, i.e., older workers, once ill, are out for longer periods of time. This finding was established even in very early studies. In one of the most intensive of these, Brundage in 1927 studied various absence records for 2,233 male employees of the Boston Edison Electric Illumination Company. For a two-year period, yearly illness absence frequency dropped from 82 per thousand employees at age 20 to 64 at age 60. In terms of severity, however, a reverse course was found, days lost per illness ranging from an average of 4.8 at age 20 to 33 at age 60.

In a still earlier investigation, however, Epstein in 1921 found even absenteeism frequency increasing with age, number of days lost in illness absence per year increasing from 5.2 per hundred employees at age 20 to 13.8 per hundred at age 65. A more recent investigation by Gafafer of the absences of 3,000 employees shows agreement with the Brundage report, i.e., a decrease is found in the number of illness absences with increasing age although an increase in the severity figure is noted. And the most recent and comprehensive of all absenteeism studies shows the same relationship. Thus Kossoris in a study of 109 industrial plants finds that, for all causes and for both sexes, absenteeism frequency declines steadily with age. Females are found to have slightly
more frequent absences with age and, finally, absenteeism severity is found to increase with age. Stanton, studying the employee force in a department store, also comes up with the lower frequency, higher severity for the older finding, although in her study there is only slight evidence for longer absences on the part of the older worker.

Related discoveries have been made by Perrott, Goldstein, and Collins in public health, non-industrial surveys reported in 1952. In a national health survey as well as in an intensively sampled Baltimore area survey, the investigators report increasing severity of illness for the family units surveyed with advancing age. The findings relative to frequency of illness tend to suggest a conscientiousness factor on the part of the older industrial worker. Thus in both the national and the Baltimore survey, incidence of illness both disabling and non-disabling, tends to increase with age, whereas we have already seen in a number of good industrial studies a tendency for frequency of industrial absence to decrease with age. In the national survey reported, disabling illness (seven days or more) was 279 per thousand in the 65 year and over group or 63 per cent higher than that for the total population. And the comparable incidence for the Baltimore group was found to
be 382 per thousand. In both of the groups the major incidence of these illnesses was attributable to chronic diseases. Finally, the investigators report that for the 65 year and over groups, illnesses lasting for twenty days or over were twice as frequent as in the general population and even short-term illnesses were three times as frequent as in the general population.

The above studies would tend to indicate one area of advantage for the older worker, i.e., he would appear to be absent less frequently. But before we leave the matter of absenteeism, another type of absenteeism study should be referred to, namely, that which demonstrates something of the nature of absenteeism itself. It will be recalled that one of the aims of the present study is thus to examine not only age differences but the criteria of efficiency by which older workers are judged. The writer knows of three studies which deal with the extra-age aspects of absenteeism. In one of these, Covner, studying absences of three weeks or more among 868 employees, finds absenteeism related to size of department, quality of supervision, the status of jobs, skill requirements, wages, and physical aspects of the job. Similarly, Kerr finds absenteeism related to various indices of job satisfaction. Finally, Walker, doing a social-psychological study of 180 automobile
assembly line workers, finds major motivating factors in freedom from absence to exist in terms of pay and security. He observes, moreover, that workers on jobs having high mass production characteristics tend to have higher absenteeism rates than those on jobs not so mechanized. Accompanying higher absenteeism on production line jobs Walker concludes is a lower worker morale. The findings of these studies, for our present purposes would appear to lead to the implication that variables such as the above may be as important if not more important to the study of absenteeism than age itself. Interpretation of any age-absenteeism data should be made, therefore, in the presence of as many of the above variables as possible.

**Accidents and Age**

Related in outcome to absenteeism are industrial accidents, i.e., as a result of the latter, workmen lose time from their jobs. And related in finding are the age-absenteeism and age-accident studies. Thus most studies agree that the older worker is less apt to have accidents, but, once having them he suffers more in extent of injury and in days needed for recovery. As early as 1921, Hewes had reported a study of the accident experiences of 2,891 textile mill employees.
He found frequency of all types of industrial accident to decline from 61 per hundred men at age 20 to 11 at age 65. And Newbold, in 1926 using frequency of accidents as his measurement, investigated the possibility that the better record of the older man might have been occasioned by the fact that his work environment exposed him to fewer accidents. Holding work environment constant, however, he still found advantage for the older subjects.

Brundage, in the study previously reported in connection with absenteeism, also studied accident records. For the years 1922 to 1924, he found frequency of accidents to decline from 84 per thousand workers at age 20 to 56 per thousand at age 60. Having had accidents, however, the younger men required only twelve days on the average to get back on the job whereas the older ones required thirty-three. Slocombe and Bingham in 1926 also found decreasing accident frequency with age. In their study of Boston bus drivers those with twenty-five years or more of experience had only one-fourth as many accidents as those with less than a year of experience. Stevens, however, in an investigation of industrial accidents in 1929 found a different relationship, i.e., older workers having more as well as longer accidents. This he seemed to feel may have arisen from the fact
that the older men may have been on jobs involving more accident exposure. Shrosbree in 1933 came up with a similar finding. He, however, attributed it to the fact that older workers had been around accident situations longer; consequently, had become more accustomed to danger and more careless.

Most other accident studies support the lower frequency rate for older persons. Palmer and Brownell reporting data from two New England plants claim to have found frequencies of absence so low among older persons as to balance out their higher severities, thus making them better economic risks than the younger. Kossoris analyzing data reported from Switzerland, Austria, New York, and Wisconsin as well as for four large, unidentified industrial concerns also reports declining accident frequencies with age. In the four companies, for instance, he finds accident frequency per thousand hours worked to be 21 for employees under 21 years of age and only 15 for those over 65. The Swiss and Austrian experience is even more remarkable however. In terms of frequency of accidents per thousand years of work life, the rate is seen to be 179 for the under 21 group as compared with 50 for an over 70 group. As for severity of accidents, however, Kossoris interprets all of his data as indicating the longer recuperative times needed for
the older age groups. In addition to these longer healing times, he also notes higher death rates as resulting from accidents among older workmen. For instance, in his Wisconsin industrial group, he finds death rates among workers over 60 to be three times that of workers in the age ranges from 21 to 25 years.

In his more recent study of 109 American plants Kossoris makes greater distinctions as to the nature of the age-accident relationship. Thus he reports frequency of lost-time accidents to rise slightly with age. Average days lost per accident is seen as rising considerably with age. However, frequency of non-disabling injuries shows the usual decline with age. Presumably, therefore, older workers don't have as many accidents but where they have them they have "good" ones.

Finally, Vernon and Bedford report an interesting qualification of the age relationship. They report accident rates generally low among older workers but find disproportionately greater rises in accident rates among older workers with increases in temperature of the working environment. Once again, evidence is given that the age-efficiency relationship is not a simple one but is, rather, affected by factors other than age per se.

As an addendum to the industrial accident data, there is here offered data on the relationship of highway
safety to age. Workers do after all lose time if they suffer an accident in the family car or are hit by trucks while crossing Main Street. For drivers of vehicles, at least, the results are rather clear, showing a lower rate for older drivers. Thus Lauer, in a recent review, in terms of accidents per thousand miles driven by Iowa drivers, finds the highest accident rate at age 20 and a steady decline thereafter through the 60's. A Bureau of Public Roads investigation of the problem in the years 1931 to 1936 finds much the same relationship to fatalities on our highways. Thus there was an increase in fatal accidents per thousand drivers from the age of 17 to the age of 21 years. There then occurred a steady decline until with the group of drivers aged between 46 and 50 years there were only one third of the accidents of the 21 year old group. Beyond 50, a slight increase occurred which was not consistent, however, for succeeding semi-decade groups. And Thordike, in an excellent summary of the highway findings as a background for aircraft accident studies, reports much the same relationships as found in these Bureau of Public Roads Studies. Ford, however, notes that another picture may obtain for the older pedestrian. He finds pedestrian deaths at the lowest point in the 15
to 25 age range with the highest point being reached in the 65 year and older group.

**Rated Efficiency and Age**

The material just presented deals with objective criteria and their trends with age. Frequently in industry, however, subjective methods must be used to judge the worth of employees. But few of the age-efficiency studies known to the investigator have employed merit ratings as the measurement of efficiency.

One of the earlier age-merit rating findings was listed by Tiffin who presented an age trend in ratings for 9,000 steel workers. Tiffin finds the highest point on the curve to exist at age 35 with a sharp decline after this age. He attributes the relationship to "failure to consider individual cases", but doesn't make it clear as to whether or not he would correct the curve by setting up separate age norms. Stanton, in the previously mentioned study, finds that older part-time workers obtain more merit increases than do younger, indicating higher ratings on the informal retail sales rating system analyzed. Bowers discovered older employees of a large organization to be rated as slower and not able to learn as fast. This is counterbalanced, however, by ratings describing the older workers as superior in terms of
attendance, "steadiness", and conscientiousness. Moreover, Bowers finds net rating scores not differing significantly between younger and older employees.

Smith has studied age-rating relationships for 5,000 industrial employees and 84 retail sales managers. In the former situation, he finds favorable ratings for older skilled and unskilled production-type workers as well as for clerical employees. Ratings for steadiness, attendance, and ability to work without supervision were higher for older personnel. Little difference was found on net evaluation scores.

In the group of retail sales managers, Smith analyzed the age-rating trends with a forced-choice rating scale. He finds the younger managers to have, mainly, promissary strength, i.e., they exceed older workers in ratings of potential. In that the older are also rated lower on another, perhaps inapplicable area (trainability), Smith cites the need for differential age scoring. He finds, however, that older workers have higher overall forced-choice scores. The data are especially valuable to the present investigation in that ours and Smith's forced-choice items came from a common pool, thus permitting rating area comparisons.
Physical Characteristics and Age

Several of the variables in one of our present studies are concerned with the physical characteristics of jobs as well as of personnel occupying those jobs. A number of studies relating to these characteristics have been made. Simonson, for instance, reports Quetelet's work with Belgian workers in 1836 where it was found that maximum back strength occurred at age 27. However, 82% of the maximal back strength remained at age 50. Simonson also reports that another such investigation a century later noted a slower decline, 92% of back strength being retained at age 50. And Ruger reports general muscle strength decline to be differential, with back muscle strength declining more rapidly than hand and other muscle strength. This decline in strength of various muscle groups has also been reported by Cathcart, Fisher and Birren, Arthur, and others. And a corresponding slowing of simple motor responses has also been shown to occur by Bellis, Goldfarb, Miles, and Birren and Botwinick. Brown, however, has demonstrated that this speed loss appears to be compensated for in tasks involving accuracy of movement. Finally, Miles has shown that accuracy in manual skills may well be preserved for those activities in which the older have
earlier become skilled.

But all discussions of decline of physical skills must remain relative to the occupational demand placed on the older worker. A number of studies have yielded evidence as to the occupations in which the older workers may be found. MacHaver, for instance, studying employees at the Ithaca Gun Company, finds 43% of workers over fifty years of age, unfortunately, on jobs rated above average in physical effort requirement. Moreover, 45% of such workers are found on jobs characterized by above average health hazards. Barkin also notes that, although the number of workers on machine production work declines after the age of sixty, nevertheless more older workers are found on unskilled laboring jobs than is true for younger workers. A somewhat similar finding is reported by Welford and Speakman who note that fewest oldsters are found on "time-stress" job classifications as compared to 60 per cent of men aged 31 to 40 years. They, too, find considerable numbers of older workers on heavy physical labor jobs. Wentworth analyzing Census data, reports persons over 65 under-represented, however, in such generally heavy industries as mining, manufacturing, and mechanical industries. That this may be a
matter of compulsory retirement practices is shown by the fact that they are also under-represented in the lighter, clerical occupations. In addition, where they are over-represented, the work would also appear to be heavy, e.g., agriculture, forestry, and animal husbandry - areas relatively free from enforced retirement provisions. In general, therefore, it would perhaps be indicated that older workers may find themselves in occupations and industries where, as a direct result of their ages, they are rather poorly suited to the physical demands of the situation.

Miscellaneous Age-Efficiency Studies

A number of miscellaneous studies shed light on the abilities of the older worker. Some of these have been concerned with the attitudes of employers toward their older employees. Thus Abrams\(^1\) reports that 73 per cent of industries surveyed report older workers to be as productive as younger ones. Abrams also reports that another questionnaire study of large industrial concerns reveals that executives believe older workers better at quality work. Moreover, one-third of these executives believed the older to be better in quantity of work.
Breckinridge, surveying 93 companies, reports employers' reasons for not hiring older workers. The primary reason given was in terms of the work being too heavy for older men. Secondly, the employers listed the fact that older personnel recently hired cannot accumulate enough in pension contributions to retire at an adequate income. Again, increased insurance rates and the blocking of promotion channels for younger workers received major mention.

A few studies have been aimed directly at an age and production relationship. Thus Palmer and Brownell report for textile and metal industries "no pronounced tendency for production to vary with age". The Department of Labor has come to a similar conclusion for skilled work operations, a finding reported in a W. P. A. study of skilled workers in which the average age of high producers was found to be 48 years as compared with 41 years for low producers. And Wackwitz reports production trends to rise to age 30, remaining relatively constant thereafter.

In contrast to these, however, are the above-mentioned findings that few older personnel are to be found on speeded production operations - the type of production the businessman usually speaks of.
Various other miscellaneous studies of age and efficiency have appeared in the literature. Stanton\textsuperscript{58} finds older salespeople more readily available for call as "extra" workers. Brown and Ghiselli\textsuperscript{10} in laboratory studies find test performance patterns with age tending to indicate that older men should perform well on semi-skilled tasks not involving complex, abstract relationships. Cover and Pressey\textsuperscript{16} find older route bakery salesmen better at truck handling and at customer relationships. These studies and a great many of the above show that in various areas of industrial performance, the older worker is often the peer of his juniors.

The Older Worker, Fixed Retirement, and Pensions

This last review area becomes important to our present purposes for several reasons:

1. One of the studies to follow involves, among other variables, a study of pension-joining behavior.

2. Links have been established between pension plans and fixed retirement practices.

3. As a consequence, knowledge of both pension plans and fixed retirement becomes important to the older worker problem.
Three studies demonstrate the tendency for pension plans to accompany fixed retirement regulations. In 1948, S. Avery Raube of the National Industrial Conference Board published a survey of Conference Board companies showing that 70 per cent of these companies had some form of compulsory retirement plan. And all but 3 per cent had pension plans. Fox in a more recent survey of 168 companies in the Minneapolis area establishes the same finding. Of the non-pension companies surveyed, 93 per cent had no fixed retirement age for wage employees and 87% had none for salaried employees. The respective figures for pension companies are 33 per cent and 26 per cent. Fox also reports that as size of company varies so do pension plans and compulsory retirement systems. And McClancey, in a survey of Cleveland firms, finds the majority of companies having neither pension plans nor compulsory retirement.

Breckinridge, furthermore, it will be recalled, has established the presence of a pension plan as one of the reasons given by executives for not hiring older workers, i.e., they do not have opportunity to accumulate enough pension credits to retire with a respectable income. O'Donnell cites another, i.e.,
the Company may wind up with heavier contributory charges for the pension plan if it wants to provide adequately for recently hired, older employees. Breckinridge\(^7\) suggests, however, two possibilities. In one of these, the UAW-Toledo Plan, workers transfer credits as they change employment. In the other, she suggests non-mandatory retirement, keeping the older worker until he has accumulated sufficient pension credits.

What of the extent of present-day pension coverage? Breckinridge\(^7\) cites surveys showing that only limited proportions of workers are covered. In April of 1950, 59 million workers were employed. Of these, 5.1 millions were covered by industrial pension plans and an additional 2.3 millions by the Railroad Retirement Act. The total covered by all of some 14,000 pension plans was estimated to be in the neighborhood of 9.6 millions - a limited proportion of the total number of employed workers.

Brown\(^11\) has listed reasons why employers who provide the benefit of pension plans prefer a fixed retirement age. Thus he shows that employer contributions usually have no fixed ceiling where workers remain indefinitely with the Company. Again, employees who are not able to continue work are penalized in the
amount of pension received by comparison with the "super-pensions" drawn by those who stay on. Brown offers what appears to be an effective solution; retain efficient older workers but break off seniority, additional pension benefits, and the other expensive "fringe" benefits presently militating against selective retention of older workers.

To what extent are fixed or selective retirement plans in operation? The previously mentioned surveys by Raube, Fox, and McClancey show that the extent of such plans is in doubt, probably varying according to size of company and other factors. It is probable that for larger companies fixed retirement is a rather usual practice. A survey by Tuckman and Lorge* shows a possible reason. One-half of the large industries surveyed favored chronological age as an "objective" criterion for retirement, to other more subjective criteria permitting of selective retirement. A survey by the Railroad Retirement Board, however, shows that workers themselves do not appear to favor fixed retirement, at least as early as age 65. For 36,000 retirements in 1949, 23,000 took the form of age annuities. Of these, in turn, 99 per cent occurred at or beyond the usual industrial retirement age of 65.
In summary, since both pension plans and fixed retirement concepts, have relevance to our study, there have been presented here what appear to the writer to be the important findings in regard to both. It has been seen that the presence of a pension plan, possibly as a result of another concomitant factor such as Company size, would go hand in glove with fixed, rather than selective, retirement. The pension plan would appear to militate, moreover, against the hiring of older workers. The suggestions given by Breckinridge and Brown would appear to handle the issue successfully. Lastly, we have presented evidence that, given the choice, workers would appear to want to remain active past the usual retirement age.
Chapter III

DESCRIPTION OF THE COMPANY

In an attempt to give the reader the "feel" of the setting in which the following data were collected, an attempt will be made, in this chapter, to describe the Company solely used in the analyses. Company A is a large, pharmaceutical-biological manufacturing concern located in Eastern United States. Founded in the merger of two drugstores in the middle 1800's, the Company has shown remarkable growth to the point where it presently enjoys a gross income in the neighborhood of fifty million dollars annually.

Company A's non-management personnel range from porters at the lowest level to several of the country's more talented scientific research personnel at the upper level. Its products, nearly 1,000 in number, range from the simplest of proprietary medicines to the more complex, synthetic "wonder drugs" and glandular preparations. Although many of these products are proprietary or "across-the-counter" in nature, recent emphasis in the Company (as described more fully in a
later chapter) has been placed on the so-called "ethic-al" or prescription item. The controversy over ethical vs. proprietary drugs boiled away in the concern during the 1920's and 1930's, involving at one point no less a personage than a famous behavioristic psychologist on leave from an advertising concern. Even the extremely graphic advertisements concocted by the latter could not carry the issue. A book dedicated to the interests of consumers described one of Company A's leading mouthwash preparations in the terms: "If a germ is thrown in a bathtub full of it, he'll eventually drown." The day was presently lost for proponents of the proprietary drug.

Approximately 3500 employees constitute the "hourly" or wage force of Company A. This force is comprised of both production and clerical employees, the former in some cases being on measured or bonus production, in other cases on non-measured or "indirect" work. These make up the population for one of the studies reported here.

The executive force of the Company is composed of supervisory, administrative, and scientific personnel. This last group consists of approximately
150 persons, the former two groups of better than 200 employees. The executive group has been, within recent years, considered to be the "critical" group in the thinking of higher Company officials. As explained in a later chapter, this fact has resulted from the rapidly approaching end of the term of office of a capable Top Management staff. In an attempt to select and train adequate replacements for this staff, the Company has set up scientific selection and training programs. It also has led Company officials to a perhaps somewhat exaggerated view of the importance of potentiality as a factor in selection, promotion, and training, a state of affairs, as we shall see, not designed for the best interests of older, long service executive personnel.

The third group of employees, with which we shall be concerned, is the sales force of the Company. This group numbers about 500 employees employed in seventeen sales districts throughout the country. In each of these sales districts, each man is assigned his own territory which he works in competition with rival drug salesmen. As described later, these territories are felt to be at least roughly equivalent in sales potential.
The salesman in Company A (or "creative man" or "detailman", as he is often known) is more directly affected by the "ethical" vs. proprietary squabble than are other personnel. The current emphasis on the "ethical" approach has removed his bonus, putting him on a straight salary basis. This change occurred in 1945, through the belief of Company officials that such a procedure would eliminate the tendency to "push" for immediate sales orders. Thus the salesman's primary responsibility at the present time is seen to be one of "creating" reputation through the "detailing" of physicians on the advantages, uses, contraindications, etc., of the many products listed in the catalogue. It is believed, in other words, that the salesman is more a disseminator of information than a "drummer". That he may have to maintain a balance between these two positions, however, is seen by the fact that men have been "let go" where production potentials of their territories have not been realized.

The studies here presented cover the above three work groups, the entire personnel of the Company with the exception of nearly 500 personnel employed in warehouses, branches, and subsidiary companies in this country and abroad. We have thus been able to analyze
efficiency data for approximately 4500 of the Company's 5,000 employees. For the remaining 500 individuals few personnel records of any kind exist, let alone those dealing with efficiency. The following data may well represent, therefore, one of the more extensive analyses of the age-efficiency relationship for any single industrial concern.
Chapter IV

AGE AND EXECUTIVE PERSONNEL OF THE COMPANY

Description of the Executive Group Efficiency Measurements

The executive payroll of Company A is composed of 328 supervisory and administrative personnel and an additional 88 scientific research personnel. The former group ranges all the way from individuals finding themselves barely within the wage-hour exempt level of salaried personnel to positions just below the top management (usually, vice presidential) levels. The research group, composed mostly of research men with advanced degrees in such subject fields as bacteriology, chemistry, physiology, etc., is a narrower group in level and pay; it neither ranges so far down the job scale nor with one or two exceptions does it rise as high as the top of the supervisory-administrative group.

Company A has been most concerned with the valid measurement of efficiency among its executive personnel for a long time. The writer has discovered among the Company's archives graphic rating devices dating back...
to the early 1920's. These and following graphic scales never quite seemed to satisfy Management in that they were loaded with the usual deficiencies of such scales, i.e., halo, leniency, central tendency, etc. The situation reached a climax in the 1943 version of the graphic scale when, it was discovered, ratings had crept up to such a point (in spite of the Employment Department's scraping the bottom of the manpower barrel) that at one rating period only one of four hundred executive personnel was rated below the mid-point of the scale.

Some type of good efficiency measure was needed as the following "critical incidents" will demonstrate:

a. Scientist A worked for two years on a penicillin designed to retain its presence in the bloodstream for longer periods of time. When this retaining agent was finally added to penicillin, after two years of research, the resulting mixture was too viscous to be forced through any but the largest (and most painful) needle gauges. A rival company developed a retainer with anaesthetic properties in a few weeks.

b. Executive B blocked the manufacture of vitamins
in that he felt they were a "fad". A rival company quickly took leadership in the field.

c. Scientist C, on the other hand, developed four of the six basic sulfa formulae in less than a year.

d. Executive D blocked experimentation on penicillin because he believed it wouldn't hold up in sales in the long run.

Many other examples could be presented to illustrate the need that Company A's officials saw for an effective means of evaluating executive personnel. After a thorough review of all existing rating methods the forced-choice system was decided upon. Coupled with this scale was a graphic system which was intended as a counseling and descriptive device in the event that the forced-choice system, regarded primarily as a quantitative device, failed to provide for more qualitative distinctions within and among individuals. Two more or less distinct measuring devices are thus available for our age analyses.

**Method of Constructing the Forced-Choice System**

The work on the project started with the identification of criterion cases needed for construction of the forced-choice scale. The nominating technique was used to accomplish this purpose. No peer or
underling nominations were obtained, the project workers agreeing with management that the technique was radical enough without subjecting a conservative staff to a reversal of the usual industrial procedure of rating from above. Accordingly, nominating lists were made by level, the top fourteen men in the Company (division directors) being presented with the names of the 402 semi-monthly employees at lower levels. All together there were 103 nominators, all but the above-mentioned fourteen division directors serving also as nominees at one level or another.

All of the 103 nominators were called together in scheduled meetings, the purpose of the project being explained in terms of both research and administrative uses of the final scale. The actual nominations were accomplished as follows:

1. Nominators first went over the lists of names presented them crossing off the names of those with whom they had not had sufficient contact. The only guide given at this time was the statement: "If you have an opinion of a person based on some contacts with him, you know him well enough for the purpose of this rating. In such cases, do not cross his name off the list."

2. In that some men in the Company had supervision duties, others administrative duties, and others were research scientists it was decided that some distinction was necessary. Job descriptions revealed that the former two
"families" could be combined in that they covered quite overlapping functions. The research scientist classification, however, it was felt, could only safely be handled as a separate nominating category. In that 88 research men were also supervisors they were placed on both the Research and Supervision lists to be considered separately for each of these two aspects of their jobs.

3. The remainder of the procedure consisted of having nominators pick alternately the "best" and "poorest" men remaining on their lists until a complete selection had been made. The only definitions of "good" and "poor" were given to the raters in terms of "overall ability", or "overall value to the Company". When objections to the lack of definition were encountered, it was explained to the nominators that the Company was merely interested in identifying "good" and "poor" men unanimously nominated on any and all bases.

There were a total of 103 nominators and 402 nominees. A great variability was found in the number of judgments these 103 nominators were able or willing to make. The number of men ranked by the various nominators ranged from 3 to 145. The mean number of rankings made was 46.5, S.D. = 30.82. It is doubtful that a man can adequately judge 145 people (even though this particular judge was a member of the Personnel Department). Nothing was done, however, to check the reliability of the rankings at this stage of the game, it being felt that this could be handled if too few of the cases studied were unanimously chosen for the upper and lower criterion groups.
For the purpose of selecting the criterion groups as well as for other statistical evaluations to be explained later, the ranks were converted to standard scores in order that both position of a nominee in a list as well as the size of the list might be taken into account. These standard scores were so obtained that the mean was placed at thirty with a standard deviation of ten.

Somewhat arbitrarily, but mainly by examination of the number of cases that could be included in the higher (H) and lower (L) criterion groups by setting various standard score cutting points, it was finally decided that standard scores of 33 and over and 28 and less would clearly define the H and L cases and would still provide enough cases to allow for item analysis of the rating forms. Table 1 shows the resulting N's and the percentages of their respective populations.

It will be seen, from Table 1, that for the combined group 27.4% of the men judged were placed unanimously in the categories delimited by the above-mentioned breaking points. Scientists were better agreed on than were supervisors and administrators, 41% of the former being agreed on as opposed to 24% of the latter. Two speculations may be made as to the
TABLE I

NUMBER OF HIGH (H), LOW (L), AND TOTAL (T) CRITERION CASES ($N_c$), AND PERCENTAGES ($%_p$) OF THE PARENT POPULATION ($N_p$) OF SUPERVISORY AND SCIENTIFIC PERSONNEL

<table>
<thead>
<tr>
<th></th>
<th>$N_c$</th>
<th>$N_p$</th>
<th>$%_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>78</td>
<td>328</td>
<td>23.8</td>
</tr>
<tr>
<td>Scientific</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>36</td>
<td>88</td>
<td>40.9</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>114</td>
<td>416</td>
<td>27.4</td>
</tr>
</tbody>
</table>
reason for this. In the first place, the research man's job appears to be a more tangible one, and his production more easily seen. As an example, one of the top chosen men is the inventor of four of the basic sulfa compounds. Again, other men who were known to have "botched" certain research projects, i.e., delayed until competitors had placed products on the market, came up with unstable or impractical compounds, etc., were consistently listed in the low group. In the second place, the scientists were separated from other personnel of the Company and, working closely with each other, were probably better known to one another. The supervisors, on the other hand, had contact with each other less frequently, and were geographically more separated from each other, carrying on their work in one of three of the Company's main plants which were separated from each other by about twenty miles.

It will be seen, therefore, that workable reliability was arrived at in the selection of criterion cases. It was decided, at this stage, that no attempt would be made to compute the actual reliabilities in that: (1) such a procedure would involve an extreme amount of work; (2) no method was known that would
give accurate reliability coefficients but would, instead, involve doubtful procedures such as correlation of average standard nomination scores; (3) sufficient cases were to be had, unanimously agreed on for the extreme criterion groups; (4) that if the reliability and validity of the final instruments were satisfactory the criterion of itself could be considered reliable.

The second step in the construction of the forced-choice rating scale was the collection and analysis of items. Better than twenty-four hundred items were collected from a number of sources calculated to yield items in the language of the raters. The great majority of these items were solicited from the eventual raters by having them write paragraph descriptions of behavior they considered significant among anonymous but actual good, average, and poor personnel they had known. Another extensive source of items was arrived at by searching old merit rating forms for comments made in a "Remarks" section at the end of the forms. Others came from semi-monthly job descriptions, company policy manuals, and supervisors' news letters.
All items were typed on 3 x 5 cards and were sorted into categories, this latter step serving to facilitate removal of overlapped statements. Following this a number of items were either eliminated (or were rewritten in a few cases) in that they were either double-barrelled ("Gets to work on time but doesn't do anything when he gets there") or vague. Items apparently applying only to small groups ("He is a good accountant") were also eliminated. Finally, 1190 of the original 2400 items remained for inclusion in rating sheets. Six hundred of these were finally selected for inclusion at random in two rating forms. Half of the statements were positive in appearance, half were negative. The characteristics of these items in each of the forms are shown in Table 2.

The $N_c$ (number collected) column of Table 2 reveals some interesting characteristics of the behavior of judges left to their own devices in describing the behavior of their underlings. Note that their comments, as collected above, center mainly in the personal habits, inter-personal relations, responsibility handling, and research ability areas. Note also that although there is not a point-to-point correspondence between the items selected for the rating scales and
<table>
<thead>
<tr>
<th>Category</th>
<th>Form A</th>
<th>Form B</th>
<th>Total</th>
<th>$N_C$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Administrative Traits</td>
<td>24</td>
<td>30</td>
<td>54</td>
<td>157</td>
</tr>
<tr>
<td>2. Attitude toward Company and Job</td>
<td>17</td>
<td>21</td>
<td>38</td>
<td>168</td>
</tr>
<tr>
<td>3. Personal Habits</td>
<td>43</td>
<td>50</td>
<td>93</td>
<td>483</td>
</tr>
<tr>
<td>4. Relations with Others</td>
<td>56</td>
<td>59</td>
<td>115</td>
<td>365</td>
</tr>
<tr>
<td>5. Judgment and Initiative</td>
<td>35</td>
<td>24</td>
<td>59</td>
<td>305</td>
</tr>
<tr>
<td>6. Handling of Responsibility</td>
<td>29</td>
<td>25</td>
<td>54</td>
<td>376</td>
</tr>
<tr>
<td>7. Progress in Company</td>
<td>11</td>
<td>3</td>
<td>14</td>
<td>73</td>
</tr>
<tr>
<td>8. Energy Output</td>
<td>9</td>
<td>2</td>
<td>11</td>
<td>69</td>
</tr>
<tr>
<td>9. Psychoneurotic Characteristics</td>
<td>13</td>
<td>15</td>
<td>28</td>
<td>63</td>
</tr>
<tr>
<td>10. Potentiality</td>
<td>14</td>
<td>13</td>
<td>27</td>
<td>77</td>
</tr>
<tr>
<td>11. Research Ability</td>
<td>35</td>
<td>36</td>
<td>71</td>
<td>207</td>
</tr>
<tr>
<td>12. Output of Work</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>37</td>
</tr>
<tr>
<td>13. Miscellaneous</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>14. Sales Administration Items</td>
<td>8</td>
<td>13</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>300</td>
<td>600</td>
<td>2421</td>
</tr>
</tbody>
</table>
the number of items originally collected there is a rough agreement.

The purpose of the rating sheets can be seen in the nature of the final forced-choice forms, where items are match-paired in terms of preference values (or "favorability") but paired unequally in terms of their discrimination values. This, of course, is the essence of the "controls" exerted on rating in the forced-choice form. The purpose of the above-mentioned rating sheets, therefore, is to determine the preference and discrimination values of the items through a rating of the criterion cases selected.

The nature of the rating job was as follows: Raters were told that this was a preliminary form but necessary to the construction of the final form. Each item was to be considered separately for the man they were rating. Ratings were to be assigned according to the following code:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Nature of the Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Fits the man exactly</td>
</tr>
<tr>
<td>4</td>
<td>Fits the man well</td>
</tr>
<tr>
<td>3</td>
<td>The item or its opposite could fit the man equally well</td>
</tr>
<tr>
<td>2</td>
<td>Rather poor fit for the man</td>
</tr>
<tr>
<td>1</td>
<td>Does not at all fit the man</td>
</tr>
<tr>
<td>NA</td>
<td>The item is not applicable to the man's job</td>
</tr>
<tr>
<td>U</td>
<td>The man's qualities are not know in respect to the item</td>
</tr>
</tbody>
</table>
Table 3 shows the ratings obtained for the 114 criterion cases. It will be seen that for all groups taken together, slightly better than two ratings per man were obtained. The raters used in all cases were the first, second, and/or third line supervisors of the man. The reason for doubling up on the ratings was, of course, a desire to increase the stability of the preferences and validities of the individual items. That this may have resulted also in some over-stabilizing through a false N is recognized. However, it is felt that the final result alone can determine this outcome.

When all 247 ratings had been accomplished, they were entered on analysis sheets by work group (supervisory or scientific) as well as by criterion group. Items having too many NA ratings (101 of the 600) or too many U's (4 of the 600) were discarded without further analysis. (NA's or U's were considered too many when 10% or more of the raters so marked the item.)

As a final step in the analysis, the preference and discrimination values were computed separately for the scientific, supervisory, and combined groups. The preference value is computed as the mean score for


<table>
<thead>
<tr>
<th></th>
<th>N_C</th>
<th>N_R</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supervisory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>41</td>
<td>82</td>
</tr>
<tr>
<td>L</td>
<td>37</td>
<td>61</td>
</tr>
<tr>
<td>T</td>
<td>78</td>
<td>143</td>
</tr>
<tr>
<td><strong>Scientific</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>20</td>
<td>59</td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td>45</td>
</tr>
<tr>
<td>T</td>
<td>36</td>
<td>104</td>
</tr>
<tr>
<td><strong>Combined</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>61</td>
<td>141</td>
</tr>
<tr>
<td>L</td>
<td>53</td>
<td>106</td>
</tr>
<tr>
<td>T</td>
<td>114</td>
<td>247</td>
</tr>
</tbody>
</table>

**TABLE 3**

NUMBER OF CRITERION CASES \((N_C)\) AND NUMBER OF RATINGS \((N_R)\) OBTAINED ON THE CASES IN EACH CRITERION GROUP.
the combined high and low criterion groups. As such, therefore, it can vary from 1.0 to 5.0 as a characteristic of the scale used by the raters. The discrimination index on the other hand amounts to the difference in mean ratings of the high and low groups and will vary as ± 0.0 to 4.0.

An interesting finding appeared at this point in the analysis. It was found that, for the great majority of the items, little or no difference could be found between scientific and supervisory personnel in terms of either preference or discrimination values of the items. Consequently, it was decided that the final forced-choice scale could be composed of items universal to both groups with the exception of a few strictly scientific items, unscored and placed in the scale only for their face appeal to research personnel.

As an aid to the pairing of items in the forced-choice pattern, the items were plotted on a scattergram at points corresponding to their preference values on the abscissa and their discrimination values on the ordinate. It thus became a relatively simple matter to pick five items for each block of items according to the following plan:
Characteristics of items:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV</td>
<td><strong>Favorable Valid Item</strong>, i.e., positive discrimination</td>
</tr>
<tr>
<td>FN</td>
<td><strong>Favorable Non-Valid Item</strong>, i.e., lower positive discrimination than FV or zero discrimination; preference value same as FV or higher than FV preference</td>
</tr>
<tr>
<td>UV</td>
<td><strong>Unfavorable Valid Item</strong>, i.e., negative discrimination</td>
</tr>
<tr>
<td>UN</td>
<td><strong>Unfavorable Non-Valid Item</strong>, i.e., lower negative discrimination than UV; preference value same or lower than preference value of UV</td>
</tr>
<tr>
<td>N</td>
<td><strong>Neutral Item</strong> - items of zero or low discrimination and median preference. The rationale is that of an additional distractor, i.e., &quot;drawing fire&quot; from either FV or UV items.</td>
</tr>
</tbody>
</table>

This plan defines the nature of the forced-choice instrument used. It is not, however, a rigidly confined system as far as scoring is concerned. In other words, the scoring weights are determined empirically from a further rating of men on the forced-choice system itself. It was found, however, that almost invariably the FV items carried the highest positive weights following this second administration and the other items also retained their anticipated proposed values. An additional characteristic of the N (neutral) items should be mentioned at this point, however. Many of them, in their final weightings, have a "suppression" effect, i.e., where they are favorable in appearance they actually get, empirically, a negative weight. It may be inferred, therefore, that there are
some things that may be said favorably of people that really detract from, rather than add to, their net worth. Usually, these items were in the nature of non-critical descriptions, i.e., "is a loyal employee", "gets to work on time every day", "tries hard", etc.

At this point, items were grouped into blocks of five items each, according to the above scheme. Sixty-four blocks were so assembled and sorted at random into two piles of thirty-four blocks, each pile constituting one of two alternate forms which were tested for equivalence once the forced-choice ratings had been accomplished. The FV and UV values of the two piles were examined and balanced by shuffling a few blocks from one pile to the other in order to have the validities of the final forms as close as possible. Both forms were finally composed of blocks whose FV items had an average discrimination index value of 1.3 and whose UV items had an average discrimination index value of -1.1. Finally, items within blocks were randomized to prevent patterning.

A graphic scale was appended to the forced-choice one. This graphic scale was constructed so as to contain what appeared to be both the general valid and non-valid patterns found in the forced-choice scale.
For instance, a "Promotability" pattern of items was discovered in the forced-choice scales, this pattern generally appearing to have high FV or UV weights. Consequently, a "Promotion Potential" area was designed for the graphic scale. Again, in order to disguise these patterns so that raters would not be able to "break" the forced-choice key, a number of non-valid graphic scales corresponding to non-valid forced-choice patterns were also included.

Results Supporting the Value of the Forced-Choice and Graphic Scale Efficiency Measurements

The forced-choice and graphic rating scales were at this point submitted to the first line supervisors of 369 men as well as, for purposes of determining reliability, to the second line supervisors of 77 of these same men. The task of these raters was as follows: In the case of the forced-choice scale they were to check the one most and one least descriptive of the five items in each block. In the case of the graphic rating scale, they were to assign a number from 1 to 5, a rating of 1 indicating that the rating area under consideration was a poor description of the ratee with a five indicating the best description.
Validity of the Efficiency Measures

Two measures of validity were computed for the forced-choice scale. One of these was the biserial correlation coefficient between raw score on the forced-choice instrument and criterion group standing, i.e., high group vs. low group. The other was the point-biserial coefficient, in which the high group was coded as 1, the low group as 0, and the product-moment coefficient computed against raw forced-choice scores. The resulting coefficients were as follows: Form A had a biserial validity of .86 and a point-biserial validity of .68 for the 150 ratings obtained. It will be recognized that the former value, especially, is inflated in terms of the fact that extreme groups constitute the criterion variable.

For the second of the forms, Form B, the biserial coefficient was found to be .88 and the point-biserial .71. Thus substantial validity may be seen in the forms even discounting for the extreme groups. And counteracting these extreme values somewhat, is the fact that this "run" of the scale was the "for-keeps" run, i.e., raters were aware of the fact that their decisions would have administrative significance.

One other validity coefficient was computed, this one deliberately intended to minimize the coefficients.
Under this procedure, the nomination standard scores earlier described were averaged for each man and for all of the judgements made by all of his nominators. It will be recognized that this procedure will, to some extent, "stack the cards" against a favorable finding in that all sorts of disagreements are being averaged into a single score. Even so, for the 369 cases involved, the validity coefficient obtained was $r = .50$ for Form A. A like figure was not computed for Form D in the belief that, in view of the above-mentioned relationships of Forms A and B, the coefficient would be at least this high.

As for the open-end scale, no such side checks were made, i.e., the only validity coefficient was the biserial coefficient between scores on the five-point scale described above and criterion group standing. This proved to be $r = .65$. Thus while some shrinkage could be expected with a product-moment or point-biserial coefficient, the validity would appear, at least, to be a workable one for age-comparison purposes.

**Reliability of the Efficiency Measures**

Three measures of reliability of the forced-choice scale were employed, odd-even block, inter-form, and
inter-rater correlation. Each of these coefficients, of course, represents a different type of reliability, the odd-even coefficient giving a measurement of consistency within the forms, the interform coefficient a measurement of consistency of judgment between forms, and the inter-rater coefficient a measurement of the extent of agreement between independently judging first and second line supervision. This last coefficient, of course, may be subject to other contaminating factors such as lack of opportunity for the second line supervisors, who are more removed from the ratees' work, to adequately know the ability of the ratees.

The odd-even coefficient was computed for both forms A and B. The coefficients (product-moment) were found to be \( r = .87 \) and \( .90 \) respectively. When these were extrapolated to full-length correlation via the Spearman-Brown formula there resulted \( r \)'s of \( .93 \) and \( .95 \) respectively. For thirty-item forms, these coefficients would appear to be quite good. A total of 365 ratings went into the Form A computation and 271 were available for the Form B rating.

For a total of 277 ratings, scores were available for both of the two forms. The resulting inter-form product-moment correlation was found to be \( r = .92, \)
once again a very high degree of stability being indicated.

For seventy-seven cases on Form A and for thirty-six on Form B, there were available both first and second line raters. These small N's may have something to do with the results of the inter-rater correlation. So may the aforementioned lack of opportunity for firsthand observation of the ratee's work on the part of the second line supervisor. At any event, the resulting correlations found both for forms A and B were \( r = .76 \) and \( .73 \) respectively.

Some indication of the reliability of the graphic scale ratings should be given at this point. Two types of measurement were obtained, the odd-even scale and the inter-rater correlations. The former, extrapolated by Spearman-Brown formula was found to be \( r = .90 \), perhaps inflated by halo effect. The second, as in the case of the forced-choice scale, shows considerably less inter-rater agreement, i.e., \( r = .47 \). Reliance will have to be placed on the former, therefore, as an indication of the stability of the age differences to be treated later. Also, as we shall see later, there is good evidence for high agreement of certain age characteristics found on the two types of scales.
Central Tendency and Variability

One other evidence of the worth of the criterion measures employed will now be presented, i.e., the extent to which later findings might be affected by skewness of the measurements obtained. For the forced-choice distribution, at least on the one administration of the scales available for this study, the results are quite good.

For Form A, there is a possible range of raw score points from 69 to 286. The midpoint of this range is 178 points. The mean obtained for the 376 cases studied was found to be 192.7 points. The standard deviation obtained was 36.27. When skewness was tested by means of the t test, the value was found to be $t = .92$, a not significant departure from normality.

Similar findings were obtained with Form B where the mean was found to be 184.2 with a standard deviation of 48.82 (possible range being 70 to 284 with a range midpoint of 177). When tested for skewness, $t$ was found to be .27, also, of course, indicating not significant skew for the 273 cases available for analysis.

With the graphic scale, however, results are not
so happy. Although no actual test for significance of skewness was performed, the degree of displacement is considerable i.e., Mn. = 3.9, S.D. = .66. There is thus exhibited a rather typical conformity to many graphic scale findings, i.e., displacement through leniency of rating. These findings, akin to those reported by Taylor and Wherry⁶¹, must be taken into account for their implications for any age findings.

Other Evidences for the Value of the Efficiency Measures

At the risk of expanding unnecessarily on the matter of the value of the measures used in this study, the writer will present a few more such findings. He believes this justified in that he is after all dealing with subjective measurements and any tie-in with important executive behavior will aid in removing a certain portion of this subjectivity.

One of these side studies concerned an attempt to discover whether merit salary increases made on a committee recommendation basis the year following the installation of the forced-choice system had gone to individuals scoring high on the forced-choice scale. There are of course limitations to the study such as the fact that such increases are not always given
strictly according to merit. Often economic needs or the fact that an individual has not recently had such an increase will influence the committee's decisions.

The data, handled by analysis of variance among Company divisions and the two pay groups (receiving vs. not receiving increases), showed significant differences for the latter variable but not for the former. In other words, but little complicated by divisional variances there is found a significant tendency for merit increases to go to high rated individuals; the mean raw score for the "receiving" group was 196.7 while that for the "not receiving" group was 178.0. The F ratio, corrected for disproportionality, was found to be $F = 21.45$ which with the one degree of freedom available is highly significant beyond the .01 level. The F ratio for divisions, on the other hand, is barely significant (.05 level) with a value of 2.07. Degrees of freedom are one less than the eight divisions of the Company. The ratings obtained thus agree with important (pay) action taken by Company executives.

Another side-study is suggestive of further value to the forced-choice rating system. In the year following the installation of the system, ten supervisory
personnel left the Company. One of these had a converted forced-choice standard score of 38, where the mean score is 30 with a standard deviation of 10. This man left to take a vice-presidency in another company. The other nine were discharged from the Company. Their scores ranged from a low of 7 (−2.3 S.D.'s) to a high of 24. All in all, one individual had a score of 7, two stood at 8, there were three 12's, one 13, and finally two 24's. Note that not one of these individuals stood as high as the mean score, i.e., 30. There is thus evidenced for a small group of individuals, a valid prediction of another type arising from the scale. And, in no case did the "firing" agent know the score of the departing employee. Moreover, the resistance to "beating" shown by forced-choice instruments makes it unlikely that scores could be placed by raters at a level so markedly corresponding to contemplated administrative action.

In contrast to the above discharge figures are ones found for groups promoted within the Company. Discharges are apt to be a more absolute measurement than are promotions. The latter are quite a matter of degree, often being little more than title changes. Often, too, a man may be promoted not because he is particularly good but because he is the only one
available with a particular background. These and many other factors undoubtedly complicate the data. However, the following were found in regard to promotions made during the same period as the above discharges. During the year, there were fourteen promotions. Two of these promotions were below the general mean of 30 standard score points, both in the range of 20-24 points. Two more were in the range 30-34 and another two in the 35-39 range. Six scores fell within the 40-44 range and, finally, two were in the ranges above 45 points or 2.5 S.D. above the mean. Again, we have another evidence that the forced-choice rating scores are indeed related to important administrative action. Although the number of cases for the promotion and discharge studies are small, the results are clearly enough in the right direction to form valuable, additional evidence of the worth of the criteria used in our age studies.

Age on Age Relationships - The Question of Bias in the Nomination Data

A few articles concerning the attitudes of younger toward older workers have appeared in the literature. Tuckman and Lorge\textsuperscript{64}, for instance, found older workers reporting being made sport of by younger ones and
feeling that younger workers wanted them to step down so that they might have a chance at promotion. Kirchner, Lindbom, and Paterson, using a scale of attitudes toward older workers, found significantly and increasingly favorable attitudes toward older workers with an increase in age of respondent groups. Rich through sociometric analysis found clique alignments of "Oldtimers" vs. "Newcomers". Following a series of training conferences the "Newcomers" tended to break ranks and choose as friends members of the "Oldtimer" group. The latter group, however, tended to maintain their clique group in their own voting.

Some of the attitudes found in these studies may be expressed in important, overt behavior. One way of investigating the matter is through the ratings assigned younger and older workers by raters of various ages. This becomes an important behavior especially where the ratings are to be used for administrative action such as promotions, wage and salary increases, etc.

Such an investigation was undertaken as the first of the age studies using data from the nomination procedure earlier described whereby higher level personnel ranked the technical and supervisory personnel below
their job level in terms of an overall judgment. It will be recalled that these rankings cut across divisional lines, i.e., judgments were made on any man whose performance was known to the ranker regardless of whether or not he was supervised by the ranker. In this way, the system provided a great number of individual judgments made by nominators of various ages upon nominees of various ages.

In analyzing these data for age bias purposes, no attempt was made to average the standard scores to get either an average for a ranking person or a ranked person. Thus we are here concerned with the individual judgments made by a nominator of a certain age upon a nominee of a certain age.

Specifically, four separate age groups of nominators were studied, as shown in Table 4. For each of these nominator age groups the correlation was obtained between the age of the nominee and the standard scores assigned him. Under this design, if older nominators are favoring older nominees the behavior should be reflected in decreasing negative correlations or increasing positive correlations as one ascends the nominator age column.

The last two columns of Table 4 are concerned with this relationship. The Epsilon column is the one
<table>
<thead>
<tr>
<th>Ranker Age Group</th>
<th>Number of Rankings</th>
<th>Age of Ranked M</th>
<th>S.D.</th>
<th>r</th>
<th>e</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-64</td>
<td>1380</td>
<td>43.7</td>
<td>10.30</td>
<td>-.08</td>
<td>-.17</td>
</tr>
<tr>
<td>45-54</td>
<td>1902</td>
<td>43.2</td>
<td>10.20</td>
<td>-.10</td>
<td>-.18</td>
</tr>
<tr>
<td>35-44</td>
<td>3557</td>
<td>41.6</td>
<td>10.10</td>
<td>-.14</td>
<td>-.21</td>
</tr>
<tr>
<td>25-34</td>
<td>702</td>
<td>41.2</td>
<td>10.05</td>
<td>-.08</td>
<td>-.17</td>
</tr>
</tbody>
</table>
with which we should be concerned in that for all four nominator groups, relationships are significantly curvilinear at the one percent level. But for both the Pearsonian coefficients and the epsilons, no consistent direction of relationship is found among the four groups. The youngest and oldest nominators assign scores in such a way that there is slightly less decline of nominees' scores with age than with the scores assigned by the middle-aged nominators. Even this relationship is not a reliable one, however. When the epsilons were submitted to a chi squared test, the resulting value was found to stand between the .50 and .30 levels. As far as these data are concerned, therefore, they do not demonstrate any reliable or consistent relationship between the age of the nominator and the scores he assigns nominees of various ages.

One other aspect of the data shown in Table 4 is worthy of brief mention. There is a slight trend, even though not one of practical significance, for nominators to make judgments on the work of people near their own age groups. Thus nominators in the 25-34 year group judged men whose average age was 41.2 years whereas nominators in the 55-64 year group were judging men who were slightly older (43.7 years).
Moreover, there is a similar trend toward greater variability in the ages of men judged, standard deviations of nominee age ranging from 10.05 years for the youngest nominator group through 10.30 years for the oldest nominator group. Although these relationships are not of practical significance, they may have arisen from the facts of greater acquaintance with workers of one's own age group and a narrower range of acquaintanceship among younger, shorter-service nominators. They may also have been occasioned by the "superior to inferior" direction of rating, i.e., younger nominators having mainly younger employees below their job levels.

**Comparison of Younger and Older Executives on the Forced-Choice Rating Scale**

Forced choice rating techniques are among the newer and more promising of all rating techniques. Their main advantages, as cited by Richardson, are that they are "machine-tooled", each item having been fitted into a block of items according to its validity and favorableness of appearance in such a way that it tends to overcome many of the disturbances found in "free-choice" scales, e.g., skewness of distributions, rater bias, etc. As such, these scales would appear
well suited to the study of characteristics of ratees. In that "correct" answers are not apparent to the rater, the system may force raters to describe rather than to attempt to assign qualitative scores. If this is true, the items checked should be better descriptions of ratee characteristics than other scales would provide.

One characteristic of forced choice scales, however, might weaken the descriptive power of the items. In the forced-choice setup here described, the rater's assignment is to check the most descriptive and least descriptive of the alternatives in a particular block of five items. Two problems emerge from the procedure:

1. An item may be chosen from the block by eliminating, i.e., it is picked because it does the least violence to a description of the ratee. It is felt, however, that this is no serious handicap to this study in that, if age differences emerge, they are real age differences, regardless of the exactness of the fit of a particular item to a particular individual.

2. Differences may emerge through a draw-off phenomenon, i.e., the item checked may not be really the most or least descriptive of a
younger or older group but simply because a proportion of the younger or older group have been described through one or more of the other items. This, too, is not believed to present any difficulty to this study in that the draw-off itself may be of interest to age group differences.

The forced-choice scale, as previously described, is composed of 160 items arranged in thirty-two blocks of five items each, the raters being asked to check the most descriptive and least descriptive items in each block. For the purposes of age comparison, all of the subjects aged 50 or more were compared with all subjects less than 35 years of age. There were 87 of the former and 114 of the latter. The most descriptive and least descriptive choices for each of these groups were tabulated separately and percentage responses computed. A nomograph for the significance of difference of the percentages of the older and younger groups was established and the significance level of each of the items was determined. Items were considered to be significant at or beyond the 5% level.

When the items were so studied for age relationship, it was found that 71 responses showed significant
differences, for the young and old groups, at or beyond the .05 level. There are 320 possible responses on the scale (32 blocks, 5 alternatives, Most and Least Descriptive as responses). Thus, 22.9 per cent of the total possible number of responses show age differences and, of course, 77.1 per cent of the responses do not discriminate between younger and older workers.

Of the 71 responses that do discriminate, 25 have zero weight on the validity key of the scale, yielding a total of 274 of the 320 possible responses either showing no discrimination between young and old or no validity where such age discrimination does exist. It may be contended, therefore, that the extent of age difference is rather small.

Where these age differences do exist, however, they show interesting and logical patterns. Table 5 shows these patterns. They were obtained by summing the validity weights of the scale to show the totals favoring and against young and old. The weights "for" and "against" were then summed algebraically to get net scores for the two groups. The last row of the table shows the difference between the "net young" and "net old" groups, thus giving a picture of the relative strengths and weaknesses of the two groups.
### TABLE 5

**SCORES OF YOUNGER AND OLDER WORKERS ON "FACTORS" OF A FORCED-CHOICE SCALE**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Favoring Young</strong></td>
<td>+4</td>
<td>0</td>
<td>+3</td>
<td>+1</td>
<td>+13</td>
<td>+16</td>
<td>+2</td>
</tr>
<tr>
<td><strong>Against Young</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Favoring Old</strong></td>
<td>+1</td>
<td>-1</td>
<td>0</td>
<td>-2</td>
<td>+2</td>
<td>0</td>
<td>+5</td>
</tr>
<tr>
<td><strong>Against Old</strong></td>
<td>-2</td>
<td>-2</td>
<td>-7</td>
<td>-1</td>
<td>0</td>
<td>-9</td>
<td>0</td>
</tr>
<tr>
<td><strong>Net Young</strong></td>
<td>+4</td>
<td>0</td>
<td>+3</td>
<td>+1</td>
<td>+13</td>
<td>+16</td>
<td>+2</td>
</tr>
<tr>
<td><strong>Net Old</strong></td>
<td>-1</td>
<td>-3</td>
<td>-7</td>
<td>-3</td>
<td>+2</td>
<td>-9</td>
<td>+5</td>
</tr>
<tr>
<td><strong>Net Difference</strong></td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>11</td>
<td>25</td>
<td>3</td>
</tr>
</tbody>
</table>
of workers. The "factors" shown in Table 5 were obtained by having three industrial psychologists and three personnel managers sort the forced-choice alternatives into "logical" categories. The main defense that can be made for their meaningfulness is that they were found useful for breaking down the total score for the purpose of counseling employees.

It will be seen that the older supervisor has an advantage only in the "Education, Training, and Experience" area. An examination of the items comprising this area reduces pretty well to training and experience, the older worker being characterized as having better job knowledge, training, and experience.

It will also be seen that the older executive has net positive value on the Initiative items. And, although he has slightly negative net scores on Organization and Planning, General Attitude, and Routine Performance, he would appear to be in something of a competitive position on these areas. Generally, however, he is otherwise in a relatively poorer position, than the younger worker on all items except the training and experience ones. And, of some consequence may be his rather poor position in the area of Relationships with Others.
But of greatest significance with this scale, as well as with the graphic one as we shall see later, is the net difference in the Promotability area. Examination of the items in this area reveals that the older worker will be handicapped mainly in terms of his remaining years of service. Items such as "would he make a good executive", "wants to advance", "can develop along any line", "hasn't turned out the way we expected" (after all these years?), "will become more and more valuable", "well worth training for the future", and others will probably be avoided by the rater of the older worker.

And yet, we are here placed in a dilemma. Examination of the validity weights of the Potentiality items reveals them to be the most valid items in the scale. The matter probably comes down to this: the older executive is perhaps just unfortunate to be working in Company A where promotability is such an important issue. The recent history of the Company illustrates the reason for this importance. A top management team which rescued the Company from a difficult position during the depression is coming to the end of its term of office. Consequently, for several years the advancement of younger men to key positions has been of
paramount concern. To the extent, therefore, that this represents an important area of work performance the older executive must be seen as a less valuable employee. On terms of adequate performance in extra-promotion areas, however, some form of allowance might be needed for the effect of this area on the total scale score. For when the correlation between age and total forced-choice score is computed, it is found to be $r = -0.20$. This coefficient, for the 309 cases upon which it is computed, is significant at the .01 level. And this is a minimal limit of the relationship, for, when the non-linear coefficient $\eta$ is computed, the extent of relationship increases to .29. By Blakeman's test the difference is significant at the .05 level. Although no attempt has been made to eliminate Promotability items from the total forced-choice score, being a rather meaningless procedure where items are so interlocked, examination of the individual Promotability item weights indicates that a considerable portion of the negative age-forced choice score relationships can be traced to this one area.

Table 6 shows the mean graphic scale scores for each age group and for each of the nine, five-point
TABLE 6
MEAN SCORES OF DECADE AGE GROUPS ON EACH OF NINE GRAPHIC SCALES AND THE TOTAL GRAPHIC SCALE

<table>
<thead>
<tr>
<th>Scale</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25-34</td>
</tr>
<tr>
<td>Quality of Work</td>
<td>4.2</td>
</tr>
<tr>
<td>Cost Control</td>
<td>3.9</td>
</tr>
<tr>
<td>Planning and Organizing Work</td>
<td>4.0</td>
</tr>
<tr>
<td>Interpretation and Decision Making</td>
<td>4.1</td>
</tr>
<tr>
<td>Initiative</td>
<td>3.8</td>
</tr>
<tr>
<td>Cooperation</td>
<td>4.1</td>
</tr>
<tr>
<td>Delegation</td>
<td>3.3</td>
</tr>
<tr>
<td>Ability to Advance</td>
<td>3.7</td>
</tr>
<tr>
<td>Education and Experience</td>
<td>4.1</td>
</tr>
<tr>
<td>Total Score</td>
<td>3.9</td>
</tr>
</tbody>
</table>
scales previously described. In addition, conforming to administrative use of the scale in Company A, the average total score for all nine scales taken together is also shown. The population used for this analysis is the entire group of 388 supervisors for whom ratings were obtained.

It must be recalled from previous findings relative to the skewed distribution obtained with this scale that age differences may be minimized. Thus a rater may move up the scores of older or younger workers on one or more scales, disguising the differences between them. Where such differences do exist, moreover, they may be minimized ones.

Examination of Table 6 shows the older executive as not differentiated from younger ones on several characteristics. And on some they would appear to even surpass the younger. Thus on "Cooperation", the oldest decade age group has a higher mean score. This higher rating of older personnel on cooperation has been found by several other investigators including the finding by Smith\textsuperscript{57} who used both forced-choice and graphic scales similar to the ones employed here. It would thus appear to be a rather consistent finding.

It may also be seen that the older executives are
also rated somewhat higher on ability to control their budgets, to use men and materials efficiently, and in the other performances entering into the Cost Control rating scale. In fact, in this Cost Control scale the older executive would appear to enjoy the greatest advantage over younger ones.

But the remaining characteristics would appear to have either mixed trends or to operate to the disadvantage of the older man. And, frequently, it will be seen that a part of this mixed trend operates through the 45-54 age group. The generally low rating for this group, in fact, leads one to speculate upon the motivational problems in a group having passed the point of active competition for advancement. Although nothing in these data reveal the source of the disturbance, it may well point out the need for the investigation of work attitudes in this as compared to the other age groups.

The most serious decline found among the graphic scales, as with the forced-choice scale, is in terms of the older man's ability to advance, i.e., his promotability. From the age of 25 through 44 the scores remain level, dropping sharply for the 45-54 age group and continuing to an even lower point for the 55-64 age group.
Summary and Implications of Executive Age-Efficiency Studies

An investigation of efficiency ratings in 416 supervisory and scientific personnel of Company A has been made. The instruments used to measure efficiency were a forced-choice rating scale and a graphic scale. Especially for the former there is here demonstrated, in a number of side-studies, "validity" and reliability. The skewed results yielded by the latter may have minimized age trend findings, however.

As a corollary to the actual age-efficiency studies, it was decided to investigate, in an actual operating situation, the age-toward-age biases found in attitude studies by other investigators. Using nomination data, no age bias as here defined, was found, i.e., correlations between age of those nominated and nomination standard scores did not differ significantly among four nominator age groups.

On the forced-choice scale, although valid age differences were found to be few, older executives were found at net disadvantage in the areas of interpersonal relations and, most markedly, in the promotability area. And this last area, probably as a result of recent conditions within Company A, is the
most valid area on the scale. Examination of the items in this scale poses, however, an applicability vs. validity problem, the items appearing to lack application to the older worker.

A similar finding arises from analysis of the graphic scale data, i.e., older executives are rated lowest on potentiality items. To offset this, they appear to excell younger workers on Cooperation and Cost Control subscales. Not explainable by the present data is the finding that the 45-54 age group is generally at a disadvantage on the rating scales analyzed.

What are the implications of the studies? In the first place, the findings on promotability are not intended as a criticism of the validity of such items. To the extent that a company considers promotability as an important work characteristic, the older worker is to be realistically considered a less valuable employee. However, important promotions are often few and far between and the greatest worth of most men may well be in their ability to do their present jobs. Moreover, where either the nature of a criterion, or a priori selection results in the heavy weighting of a scale with items not applicable to certain groups of workers, disturbances may arise. Total scores may be influenced for older workers. Rater disturbances result
over having to consider men on inapplicable items. Above all, if rating is carried to the point of use in counselling employees, the employee himself may reject certain profile points which he considers no realistic part of his job. To try to improve the older worker on his promotability may be equivalent to telling him that he could alter his I.Q. by having been born to different parents. There is little, in other words, that he can do about training himself for the future, which under the present system is more in terms of retirement than promotion.

The implications therefore should mainly be in terms of this disturbance. Where forced-choice scales are to be used they might well be built via factor analysis, so that realistic and separate factor measurements could be obtained. An intelligent management would be able to make allowances for the one low point on an otherwise good "profile". Or, if management were intelligent enough, informal discounting of a portion of the total scale score for older workers might be enough. The implication is even more pertinent for graphic scales, of course. Here the evils are much greater, considering the fact that these are usually not validated and, in short, have many other deficiencies. Specifically, however, before such an item
as "promotability" is included as one of the graphic scales, attention should be given to the groups and purposes for which the scale is to be used.
Description of the Sales Job

Company A's salesmen are known in the industry as "creative men" or "detailmen", the terms being largely synonymous. The title arises from the emphasis in the ethical drug industry (prescription practice rather than wholesale trade or across the counter retail trade) on the "creating" of reputation among those who write drug prescriptions, e.g., the physicians. Consequently, the salesman's job primarily consists in the accurate and complete dissemination of information ("detailing") on the Company's products. Such information includes research done on the drug, indications, contraindications, dosages, etc.

Each salesman is assigned to a territory, the territory size being determined in terms of its sales potential. The potential is in turn derived from reports from the Bureau of the Census, which currently show a national ethical drug potential in the neighborhood of 240 million dollars. This figure is broken into potentials for each territory based on the number of doctors, hospitals, and drugstores in the territory. Where possible, territories are kept equal one to the
other in their potentials. In some areas of the country, however, this is impossible in that the equal potential principle would establish territories geographically too large for a single detailman to cover. The Company's sales analysts, however, feel that they are roughly equivalent. That this may be so is shown by the great geographical variation in territory extent. In the Far West, one creative man may cover hundreds of miles in his assignment. One man in New York City, however, has as his entire territory a medical tower. His travel expenses are almost nil, consisting of subway rides and elevator trips.

These geographical differences might make for interesting age comparisons. The physical difficulties in covering Rocky Mountain territories might make it difficult for older salesmen to operate in this area, whereas they might operate with no physical strain in the cities of the Atlantic Seaboard. Unfortunately, data on the physical makeup of territories were not available for analysis.

Each of the Company's 525 salesmen is assigned to one of these territories. The 525 territories, for administrative purposes are grouped into 17 districts, each headed by a district manager and his assistants, the district supervisors. The latter vary in number
according to the number of salesmen to be supervised.

In addition to his detailing duties, the creative man has others. He "contacts" druggists. The extent to which he attempts to sell his wares to the druggist is unknown to the writer. From personal observations of detailmen in action, he would suspect that a fair amount of high pressure work goes on in the drugstore. The Company insists, however, that the concentration should be on the physician and that the creative man's job with the druggist consists of stock checking, advisement of the druggist on the products detailed to the nearby physicians, etc. At the same time, however, the Company provides for special discounts to druggists who are willing to display the across-the-counter items in a prominent position in the store. The dilemma represents an important one in the drug industry, i.e., should the concentration be with the ethical, prescription business providing for long-range stability or with the immediately more profitable across-the-counter item. Company A at present appears to be compromising the situation in that it carries a small number of the latter products which have great sales value. It has, however, moved more and more to the long-range theory, to the extent of attempting to remove the temptation to
concentrate on the druggist. This was done by removing the bonus compensation plan and substituting a straight salary plan. Some observers in the Company claim, however, that the heavy production pressure is still present in the job in the form of merit increases and promotions. Conversely, some men are "let go" when territory potentials are not realized.

The foregoing is more than a mere word picture of a sales operation; it may have an important bearing on the results of this study. To the extent that production pressures have been removed and replaced by a non-speeded, high quality job of detailing and customer relations, age relationships may be affected. Certainly, the "drummer" type of sales operation so well depicted in Arthur Miller's "Death of a Salesman" with its difficulties for older men would be considerably reduced under the detail plan. The best guess would be, therefore, that Company A's sales operation involves some production pressure but considerably less than many other sales jobs.

The Criteria of Efficiency

Of the three employee groups covered in this study, the greatest amount of efficiency recording is done with the sales force. The records kept fall
mainly in three categories — efficiency ratings, production records, and turnover analysis. Of these, the most elaborate are the production records. These may be described as:

1. Total Production — in terms of total dollar sales arising from drugstores, hospitals, and dispensing physicians' offices in each salesman's territory.

2. The ratio of total production to the total production in the district. This ratio, expressed as a percentage figure, would seem to be an attempt to control for district variances in production.

3. Direct Sales in the territory — being a dollar value of sales arising directly from druggists' orders of stock from the detailer.

4. Prorated Sales in the Territory — sales attributed to the salesman only through druggists' purchases from a wholesale supply-house.

5. Prorated sales as a percentage of the district average.

6. Sales of Specialty Products — this is a separate record of that part of the total sales a man makes which are sales of products exclusive to Company A. These sales are important in that specialty products usually represent a higher margin of profit to the Company.

7. Specialty product sales as a percentage of the district.

8. Bulk Sales — or sales of bulk, non-specialty materials.

9. Bulk Sales as a percentage of the district average.

10. Average number of days at work each month — i.e., the reverse of an absenteeism figure.
11. Number of drugstore calls made - since the number of such calls is not specified for the salesman, it becomes a measure to some extent of "drive".

12. Percentage of the required physician calls made - there is a strict requirement in regard to the number of doctor calls a man must make. Consequently, this becomes a measurement closely watched by management.

13. Number of days of supervision required - this and the following three figures constitute a measurement of the salesman's cost to the company.

14. Percentage of salary to total sales.

15. Percentage of travel expenses to total sales.

16. Percentage of combined salary and travel expenses to total sales.

17. Percentage of sales objective attained - this measurement, another production one is listed separately in that it is based on what may be termed a management objective basis. At the end of each sales year, top management officials review all cost, production, sales, and profit figures and determine what they can expect or need to produce and sell in the following year. From this review, an overall, total sales objective is set for the Company. Sales management apportions this goal among the districts and, finally, district supervision assigns an individual goal to each salesman. The percentage of this individual objective obtained becomes, therefore, still another production figure.

18. As previously explained, each territory has a potential, the value being derived from Census estimates of the national drug industry and the number of outlets in the particular territory. The Sales Division uses this potential figure for another comparison, i.e., percentage of the man's total sales to the estimated potential of his territory.
It has been indicated above that Company A also maintains qualitative (rating) records of the performance of its creative men. The rating scale used is composed of twenty-four subscales which were selected by vote of the Company's district managers and supervisors as to their importance in sales performance. Each subscale has five divisions indicating in descriptive terms the extent to which the characteristic is true of the ratee's performance. The twenty-four subscales are arranged into five major areas, Production, Detailing, Routine Work, Planning and Appraisal, and Miscellaneous.

The Production area is composed of subscales relating to performance on special sales drives or programs, sales of new products, specialty sales, sales directly to dispensing physicians, and overall sales. The Detailing area has four subscales concerning ability at detailing physicians, druggists, hospital personnel, and nurses. The Routine Work area has six subscales: stock checking, drugstore display work, record keeping, care of equipment (car, literature, samples, etc.), conformity to the established route, and time spent on the job. It is felt that this area is deemed "routine" not in the sense of
"unimportant" but more in terms of being required for all salesmen even though not of a direct selling nature.

The fourth major area, Planning and Appraisal, has three subscales concerned with planning and delivery of the sales detail, the ability to judge proper items for detailing to individual physicians (for instance, according to the physician's specialty), and the ability to detect market needs. In the last area (Miscellaneous), appear five subscales concerned with customer relations, product knowledge, territory transferability, educational and training background for the detail job, and physical stamina.

Another rating, one of overall value to the Company was available for analysis. This rating was accomplished with a view toward establishing the relative value of the above production and rating scale items as well as to select a population of salesmen for use in this study. Under this procedure, of the total of 525 salesmen, 472 who had been with the Company for one or more years were judged by their district supervisors as well as by their top management sales superiors. Of the 472 rated, 87 were unanimously agreed on by their superiors as being "good" salesmen and 89 as being "poor" salesmen. The technique used to
select these cases was the same nominating technique described for the supervisory cases described previously. These 176 cases form the sample upon which the analysis of relationship of rated efficiency to age is made. Of the 176 cases, it was possible to obtain full-year production records for only 129 men. These 129 men, therefore, form the group upon which the production analyses are made.

In addition to the above efficiency indices still another type of measurement exists in the Company. This one is composed of stability of employment, e.g., turnover analysis. Termination of salesmen in the Company is a serious problem in that it is high in relation to turnover of other salaried personnel. The great majority of the Company's salesmen hold pharmacy degrees. Many of these stay only until they have saved enough money to open up their own drugstores. Others, the better salesmen, are "spirited away" by other companies. Others don't make the grade or leave for other reasons.

Turnover, therefore, becomes a practical, important criterion. It is here examined in terms of age, reason for leaving, and other important data breaks.
Results

1. **Nomination Data** (Overall Ability Rankings)

   As indicated in the preceding section, an overall judgment of the ability of 472 of the total number of 525 salesmen was available for analysis. Once sales supervision had ranked the men reporting to them in order of their "general sales ability" the ranks were converted to the standard score system with a mean of thirty and standard deviation of ten used to study the executive personnel of the Company. The data were then utilized in two ways. In one of these, standard scores were averaged for all nominators to yield an average nomination score for each salesman. In the other, two discrete criterion groups were established by selecting all cases unanimously placed by nominators above a standard score of 35 (hereafter called the "high" group) and below a standard score of 25 (the "low" group). Each man so selected for the criterion group was considered by a minimum of five management nominators, i.e., the district supervisor and the district manager as well as three home office executives, the vice president in charge of sales, the sales manager, and the sales research director. In some of the larger districts, other nominators were obtained by using the
one or two additional district supervisors who were available.

At the time of the study, the Company made no attempts to study the adequacy of the criterion groups. As with the supervisory group nominations, no attempt was made to study its reliability. In fact, reliance was placed on the reliability of instruments built from the criterion as an indication of the reliability of the criterion itself. Although this procedure does not satisfy the best experimental technique, it must be repeated at this time, that the aims of the present studies were to use whatever measurements of efficiency the Company used in the way the Company used them.

These nomination criterion groups will be returned to later in connection with data on the validity of the various sales efficiency indices. For the present age problem, our concern is more with the nomination averages mentioned earlier. These, of course, increase the total number of cases (N = 472) available for the age-efficiency analysis, not being discrete groups but mere averages of nomination scores assigned to each nominee.

The age-nomination relationship, it was decided, should be handled in terms of both the Pearsonian
correlation coefficient as well as with mean scores for each age group. In terms of the former, the correlation between age and nomination score was found to be $r = .29$, (significant at the .01 level). With this group, there appears to be a generally linear increase in rated efficiency with age.

Table 7 shows the age-efficiency relationship in terms of mean nomination scores for three groups of employees of Company A. The salesman group is, of course, the group of 472 men nominated. The sales supervisor group is made up of the fifty-nine district managers and supervisors who direct the activities of the salesmen. The non-sales supervisor group is the group we were concerned with in the previous study, exclusive of the district managers and supervisors.

It will be seen that the scores for salesmen continue upward with advancing age in the more or less linear manner previously described. Scores of the supervisory groups, on the other hand, are curvilinear, i.e., break off at certain age ranges. The break it will be seen is earlier for non-sales supervision than for sales supervision, the highest rated efficiency point for the former group occurring later in life (45-49 years) than with non-sales supervisors (35-39
<table>
<thead>
<tr>
<th>Group</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salesmen</td>
<td>25.4</td>
<td>26.4</td>
<td>29.4</td>
<td>31.2</td>
<td>32.8</td>
<td>33.1</td>
<td>33.9</td>
<td>34.3</td>
</tr>
<tr>
<td>Sales Supervisors</td>
<td>23.5</td>
<td>27.3</td>
<td>28.6</td>
<td>29.5</td>
<td>31.1</td>
<td>30.1</td>
<td>23.0</td>
<td>22.6</td>
</tr>
<tr>
<td>Non-Sales Supervisors</td>
<td>27.9</td>
<td>30.5</td>
<td>32.1</td>
<td>31.9</td>
<td>30.9</td>
<td>28.2</td>
<td>28.1</td>
<td>26.1</td>
</tr>
</tbody>
</table>
It would appear, therefore, that the age—efficiency relationship is highest with the sales operation and lowest with the non-sales operation. The finding illustrates an earlier contention, i.e., the age—efficiency relationship will vary in terms of the occupation and that in some occupations, older workers will be found to have significantly higher performance than will younger ones.

One question occurs at this point. Is this positive age—sales efficiency relationship a condition of age itself or is efficiency more related to a concomitant longer service and greater experience of older salesmen. This longer service record could be conceived of as longer service with the Company or longer service in the drug industry. Either one might make for larger sales through more product experience, long—standing contacts with physicians and druggists, etc. Unfortunately, data on the latter (i.e., service with other drug companies) were not available to the writer. However, the former were available and it was decided to investigate the comparative age—efficiency and company—service efficiency relationships.

The method used, in an attempt to estimate the net correlation between age and efficiency with
company service held constant, was that of partial correlation. To obtain this coefficient, three inter-correlations are necessary, those between age and efficiency, age and length of service, and length of service and efficiency. The first of these has already been reported, i.e., age and efficiency = .29. The correlation between age and length of service was found to be \( r = .71 \). This correlation is of some interest in and of itself being considerably lower than the \( r \)'s of .80 to .90 usually found with other employee groups in the Company and reflecting perhaps the higher turnover of older, experienced salesmen and the willingness to hire older, experienced sales personnel of other firms in the industry.

The third coefficient, that between length of service and efficiency rating, was found to be \( r = .13 \), indicating a lesser relationship between company service and efficiency than between age and efficiency. Age, therefore, would appear to be the more significant relationship. And when this service relationship is controlled in the age-efficiency relationship, the partial correlation turns out to be \( r = .28 \). In other words, controlling the age and efficiency correlation for amount of service in the Company merely reduces that relationship from \( r = .29 \) to \( r = .28 \).
the latter coefficient remaining significant at the one percent level.

This cannot be interpreted to mean, however, that experience variables have been fully controlled and that age per se is the significant variable. It must be reiterated that experience with other companies has not been controlled. How much additional reduction of the age-efficiency coefficient might occur if we were to do so cannot be determined. The resulting conclusion (to be more fully treated later) would be that of being able to argue for the longer retention of older salesmen but not able to argue for the actual hiring of older salesmen.

2. **Sales Production Data**

The sales production data here treated are those earlier described in some detail. They were studied in terms of two characteristics:

(1) The extent to which they show agreement with another criterion, i.e., the criterion groups established under the nomination procedure.

(2) The extent of their relationship to age of the salesmen.

The population used for both analyses was composed of the 129 men for whom full-year production records
were available and who were also in one of the criterion groups. Seventy-four of the men so studied were in the high criterion group; fifty-five were in the low group. Since we are here concerned with clear-cut, widespread and separate groups, an attempt was made to obtain more realistic extents of relationship than would be possible with the biserial coefficient of correlation. Consequently, point-biserial coefficients were calculated between production indices and criterion standing to arrive at a "validity" estimate for each production index. Another reason for the choice of the point-biserial was that it was believed to be a coefficient more comparable to the product-moment coefficients computed between age and production. Since the point-biserial may be computed as a product-moment coefficient for dichotomous groups (high coded as 1; low coded as 0), this would appear to be the better comparison coefficient.

Table 8 shows the age and criterion correlations of each of the production indices as well as the means and standard deviations for each of the production figures. Also shown are the units in which the production data are measured, in dollars sold, calls made, days of training, etc.
Table 8
THE "VALIDITY" ($r_c$) AND CORRELATION WITH AGE ($r_{age}$) OF EACH OF TWENTY-ONE, FULL-YEAR PRODUCTION MEASURES, AND THE UNITS OF MEASUREMENT AND MEANS AND STANDARD DEVIATIONS OF THE MEASURES
(N = 129)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>$r_c$</th>
<th>$r_{age}$</th>
<th>Mn.</th>
<th>S.D.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sales</td>
<td>.68</td>
<td>.28</td>
<td>71.4</td>
<td>25.65</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>Total as % of District</td>
<td>.82</td>
<td>.33</td>
<td>114.6</td>
<td>34.78</td>
<td>%</td>
</tr>
<tr>
<td>Total Specialty Sales</td>
<td>.63</td>
<td>.24</td>
<td>53.0</td>
<td>19.25</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>Specialty as % of District</td>
<td>.74</td>
<td>.30</td>
<td>113.7</td>
<td>36.16</td>
<td>%</td>
</tr>
<tr>
<td>Bulk Material Sales</td>
<td>.62</td>
<td>.29</td>
<td>18.7</td>
<td>8.52</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>Bulk as % of District</td>
<td>.70</td>
<td>.27</td>
<td>117.6</td>
<td>46.71</td>
<td>%</td>
</tr>
<tr>
<td>Prorated Sales</td>
<td>.12</td>
<td>.22</td>
<td>17.0</td>
<td>12.39</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>Prorated as % of District</td>
<td>.06</td>
<td>.20</td>
<td>110.3</td>
<td>62.43</td>
<td>%</td>
</tr>
<tr>
<td>Av. per Drugstore call</td>
<td>.46</td>
<td>.07</td>
<td>45.6</td>
<td>26.32</td>
<td>Dollars</td>
</tr>
<tr>
<td>Total Drugstore Sales</td>
<td>.58</td>
<td>.25</td>
<td>54.3</td>
<td>26.43</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>No. Drugstore Calls</td>
<td>.13</td>
<td>.18</td>
<td>13.0</td>
<td>3.94</td>
<td>Calls in Hundreds</td>
</tr>
<tr>
<td>No. Doctor Calls Required</td>
<td>-.13</td>
<td>-.17</td>
<td>13.9</td>
<td>.36</td>
<td>Calls in Hundreds</td>
</tr>
<tr>
<td>No. Doctor Calls</td>
<td>.10</td>
<td>.29</td>
<td>14.1</td>
<td>1.04</td>
<td>Calls in Hundreds</td>
</tr>
<tr>
<td>% Required Doctor Calls</td>
<td>.16</td>
<td>.20</td>
<td>102.4</td>
<td>7.02</td>
<td>%</td>
</tr>
<tr>
<td>Av. Days Worked</td>
<td>.16</td>
<td>.06</td>
<td>19.8</td>
<td>1.10</td>
<td>Days per Month</td>
</tr>
<tr>
<td>Supervision Required</td>
<td>-.31</td>
<td>-.22</td>
<td>3.9</td>
<td>4.10</td>
<td>Days per Year</td>
</tr>
<tr>
<td>% Salary to Sales</td>
<td>-.47</td>
<td>-.06</td>
<td>7.3</td>
<td>1.79</td>
<td>%</td>
</tr>
<tr>
<td>% Travel Expense to Sales</td>
<td>-.37</td>
<td>-.16</td>
<td>2.0</td>
<td>.88</td>
<td>%</td>
</tr>
<tr>
<td>% Sales to Potential</td>
<td>.42</td>
<td>.22</td>
<td>17.3</td>
<td>9.79</td>
<td>%</td>
</tr>
<tr>
<td>Objective Set</td>
<td>.58</td>
<td>.41</td>
<td>75.4</td>
<td>26.88</td>
<td>Thousands of Dollars</td>
</tr>
<tr>
<td>% Objective Met</td>
<td>.34</td>
<td>.31</td>
<td>93.4</td>
<td>31.91</td>
<td>%</td>
</tr>
</tbody>
</table>
It is perhaps better to treat the production-criterion relationships first. In this way, the importance of the various production indices may be determined before the age-production relationship is treated.

For the 129 cases at hand, a correlation coefficient of .228 is significantly different from zero at the .01 level; a correlation coefficient of .174 is significant at the .05 level. It will be seen that of the twenty-one measurements employed, seven of them do not have a significant relationship to criterion standing. And the picture is a somewhat comprehensible one from the standpoint of the measurements themselves. Note that two of them have to do with prorated sales. It will be recalled that these prorated data are but little controlled by the salesman. They may occur more from the activities of the wholesaler in the territory than from anything the salesman can do to effect purchases by the druggist. Often the arrangements with the wholesaler are in the nature of preference discount ones, i.e., Company A gives substantial discounts to preferred wholesalers who will in turn "push" Company A's products wherever a particular brand is not specified by the druggist. From the present data, therefore, it would appear that prorated sales either
as a gross figure or as a percentage of the district average of prorated sales has little to do with ability of the individual salesman.

The remaining correlation coefficients failing to meet the .05 significance level have to do with what appears to be a "drive" or "conformity to schedule" measurement. Three of these five measurements have to do with the much prized doctor-call activity area. Another concerns the number of drugstore calls made. The last has to do with the number of days the salesman has put in per month. At first glance it might appear that doctor calls are really not important and that the task is truly a non-speeded one calling for but little of the "drive" of the usual sales operation.

However, inspection of the sigma column of the table offers another hypothesis. It will be seen that all five of these measurements are extremely restricted in range, curtailing the resulting correlation coefficients; and this restriction is rather easily understood. The number of doctor calls required is rigidly (mean = 1390 per year) and narrowly (S.D. = .36 per year) prescribed. It will also be seen that the salesmen play it on the safe side making 102.4% of the required calls with, once again, little variation (S.D. = 7.02%). And of course the number of doctor calls
made shows the same relationship.

Note also that presence on the job (number of days worked) shows the same restriction of range. As with the above this is probably also another variable little related to critical abilities but merely requiring enough "horse sense" to make one conform socially to minimal or known-to-be-important levels. Consequently, everyone, the good and the poor alike, meet the requirement, the real discrimination coming on other aspects of the job.

The last variable having no significant relationship to the criterion has to do with the number of drugstore calls made per year. This one is not particularly restricted in range so we must look elsewhere for an explanation of its lack of significance. Since both of the other drugstore activity measurements (i.e., total drugstore sales and average sales per call) are quite significant, the conclusion appears justified that the mere making of a call has little to do with sales success. The three drugstore figures taken together would rather appear to demonstrate that what he does once he gets into the store would be the important determiner of the salesman's ability.

It will be seen from Table 8 that three significantly-negative coefficients were obtained. One of
these, number of days of supervision required, represents a clearly favorable condition, i.e., good men should require less supervision. The other negative coefficients, per cent of salary to total sales and per cent of travel expenses to total sales demonstrate that good salesmen cost the Company less relative to what they produce. From the standpoint of the individual salesman, however, one wonders if the relationship should not be $r = .00$, i.e., to have salary keep pace proportionately with what he produces for the Company. At any event, these two cost figures would appear to be valid ones.

All of the remaining measures have significant validity for the criterion used. Of these, the highest relationship occurs with total sales as a percentage of the district average ($r = .82$). It can be concluded, in fact, that the major judgment of Company A's salesmen is made in terms of their total production, with the two parts of the total production measurement, i.e., specialty production and bulk material production having next highest correlation with the criterion. It is interesting to note, moreover, that "correction" of these production figures by calculating them as a percentage of the district average increases the criterion prediction in each case and by
an important amount.

Of the remaining coefficients, it is interesting to note, first of all, that the correction of total sales for the potential of the territory is not as valid \( (r = .42) \) as is either uncorrected total production \( (r = .68) \) or total production corrected for district variance \( (r = .82) \). Territory potential may not be well estimated; at least sales management did not make substantial use of it in picking criterion cases. A similar situation is found with the figure correcting total sales in terms of the sales objective set by management \( (r = .34) \). It is difficult to see how either of these last corrected figures would add to the prediction of the sales criterion obtained. In fact, the total sales objective set by management yields a higher relationship \( (r = .58) \). This coefficient would demonstrate mainly that sales management tends to assign greater portions of the objective to good men. In that they in turn stand responsible to top management for the attainment of the objective (and note from the mean column that only 93% of the objective is attained, on the average) they will doubtless assign higher objectives to those men and territories with the greatest chance of obtaining them.
Now that the relative importance of each of the production variables has been estimated, there remains the question of the extent of relationship between age and production. Generally, but not always, Table 8 shows, the age correlations follow the validity coefficients rather closely in direction and relative magnitude. Some loading of the criterion with age is to be suspected. That this is so, is shown by the fact that the median age for the high group is 43.3 years, while that for the low is 39.8 years. The extent to which positive age bias is shown by nominators is unknown for this population, too few nominators being available for such an analysis. The writer, however, from the results of the age-in-age analysis made on the supervisory nomination data would tend to discount the possibility of such bias contaminating the criterion. However, some age loading of the criterion does exist and will tend to promote a degree of correspondence between the age-production and criterion-production coefficients.

It will be seen, nevertheless, that such correspondence is far from perfect. For instance the highest correlation between age and any production variable is .41 correlation found for Total Sales Objective Set.
We have seen (above) that there is a tendency on the part of sales management to assign the objective to the good men. The present analysis suggests also a tendency to set higher objectives for the older, more experienced salesmen. There is positive evidence that management, rather than taking it easy on the older salesmen, is actually setting a higher goal for him to accomplish. The finding is further expanded in terms of another of the higher age-production correlations, i.e., $r = .31$ between age and the percentage of the sales objective attained. In brief, therefore, management requires more of the older salesman and he, in turn, is more apt than his younger counterpart to meet more of the objective.

In that the number of cases for the present age analysis is the same as with the validity analysis, the same correlation significance levels exist, i.e., $\alpha = .01 = .228; .05 = 1.74$. It is thus found that four of the twenty-one production variables are not significantly related to age. Two of these coefficients are found in the cost area, i.e., older salesmen have about the same salary $(r = -.06)$ and travel expense $(r = -.16)$ relative to total sales as do younger men. Another of the coefficients has to do with the number of days salesmen "put in" per month. The coefficient $(r = .06)$
shows no significant tendency for older men to work either more or fewer days than do younger ones.

The remaining age-production relationship \( r = .07 \) with average drugstore sales per call) demands comparison with two other coefficients. It will be seen that older men make more total drugstore sales \( r = .25 \) than do younger men. On the other hand, there is also a tendency for the older man to make more calls to the druggist \( r = .18 \); significant at the .05 level). He thus tends to have higher sales, but in making more calls comes up with a lower average per call. And as we have seen in the validity analysis the former two measurements have significant relationship to the criterion; the latter does not.

Of the remaining production variables, six show marginal correspondence with age, i.e., are significant at the .05 level. There is, first of all, some tendency for the Company to require fewer doctor calls of the older man \( r = .17 \). Why this might be so, the writer cannot determine from either experience with the sales operation or from the present data. In any event, it should be remembered also that the variable is not of significant relationship to the criterion. In the same area, there is also a tendency for the older
salesman to make a larger percentage of the doctor calls required \((r = .20, \text{ significant at } .05)\) and, in total, to make more doctor calls \((r = .29, \text{ significant at } .01)\). Thus, although all three of these production variables lack validity, older men have fewer doctor calls required, but make both a greater number of calls as well as a greater percentage of the required number.

Of the remaining .05 level coefficients, two of them also concern a non-valid area, i.e., prorated sales. The age relationship with prorated sales per se stands at \(r = .22\); with prorated sales as a percentage of the district average at \(r = .20\). It is to be expected that, if our hypothesis concerning prorated sales is correct, older salesmen would have no more influence over the activities of the wholesaler than would any other salesman.

The other .05 age coefficients occur on valid production variables. Thus there is some tendency for older salesmen to realize through their total sales a higher percentage of the estimated potentials of their territories \((r = .22)\). There is also a tendency \((r = -.22)\) for older salesmen to require fewer days of follow-up supervision from the district management. It might be expected that the relationship should be
higher than this, older experienced men being able theoretically to function more on their own. That this is not so, may have been occasioned by the nature of Company A's operation. With the introduction of a score or so of new compounds every year, the experienced man may require almost as much supervision as the younger, less experienced one.

The remaining coefficients all show significant advantage for the older worker. Moreover, the variables concerned are all direct production variables, i.e., total sales and its two components consisting of specialty and bulk sales. Of these, the highest age relationship is found with total sales \( r = .33 \), next with specialty sales \( r = .30 \) - where both figures are corrected for district variance. Note that, once again, correcting the data for district variance has a slight positive effect on the age relationship as it did with the criterion relationship, although, in regard to the former, there might even be some loss through correction of the bulk sales data.

In summary of the above, therefore, it has been found that older men generally outproduce younger men on all production measurements and especially on the more valid ones. Correlation coefficients, however, reveal little of the dollar and cents value of these
groups of salesmen. Table 9 shows the actual total dollar sales medians for the year in which the study was made for various age groups. It may be seen that the highest producing age group is the one in the 50-54 year range. On the average, men in this age range are producing $97,000. in total sales during the year. Men between the ages of 55-59 were producing about $79,500. per year and men aged 60-64 were turning $82,000. per year in sales. Contrast this with the best of the "Young" group (age 45-49) which produced about $67,000. total sales per man. And the 30-34 year group was only producing in the neighborhood of $56,000. per year. The production of the 30-34 year group is, consequently, only forty-two per cent of the production of the 50-54 year group. In another sense, the latter age group is producing almost $41,000. more per man per year than the 30-34 year group.

Even more remarkable in terms of dollar and cents value is the picture of sales loss to the Company through retirement. Nine men are found in the 60-64 year age group. These men will have been forcibly retired in any time from a few months to five years. The Company might be said to be "losing" somewhere in the neighborhood of $738,000. through retirement of these men. It is quite possible that, should the Company
Table 9

MEDIANs AND RANGES OF TOTAL SALES IN
THOUSANDS OF DOLLARS PER YEAR FOR
SEMI–DECADE AGE GROUPS

<table>
<thead>
<tr>
<th>Age</th>
<th>Median</th>
<th>Range</th>
<th>Number of Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-64</td>
<td>82.0</td>
<td>38-115</td>
<td>9</td>
</tr>
<tr>
<td>55-59</td>
<td>79.5</td>
<td>40-161</td>
<td>14</td>
</tr>
<tr>
<td>50-54</td>
<td>97.0</td>
<td>55-116</td>
<td>9</td>
</tr>
<tr>
<td>45-49</td>
<td>70.8</td>
<td>31-108</td>
<td>23</td>
</tr>
<tr>
<td>40-44</td>
<td>66.6</td>
<td>32-155</td>
<td>26</td>
</tr>
<tr>
<td>35-39</td>
<td>62.0</td>
<td>30-112</td>
<td>25</td>
</tr>
<tr>
<td>30-34</td>
<td>56.2</td>
<td>31-119</td>
<td>18</td>
</tr>
<tr>
<td>25-29</td>
<td>64.5</td>
<td>41-88</td>
<td>5</td>
</tr>
</tbody>
</table>
retain these men another five years that their production might remain above that of newer, less experienced men who, under the present system will replace them in their territories. Although the figure is speculative it illustrates the problem of replacing these about-to-be-retired sales personnel, i.e., it would require thirteen, thirty-year olds operating at their average yearly production of $56,000. to replace the $738,000. loss represented in the retirement of these "nine old men".

The foregoing analysis has demonstrated the considerable value of older, more experienced sales personnel to Company A. It has, moreover, tended to point up the areas of production in which these older employees are of most value. What, however, are the characteristics of these employees leading to their value to the Company. In an attempt to discover such characteristics, the following rating scale analysis is presented.

3. **Sales Ratings and Age**

It will be recalled that we were limited, in the foregoing analysis, to the 129 salesmen for whom full-year production records were available. In the case of the earlier described sales rating plan, however, complete rating data were available for the full
contingent of 176 criterion cases (87 high cases; 89 low cases).

The rating scale employed, it should also be remembered, is composed of twenty-four subscales, each subscale having values from one to five, with a score of five representing the maximum fit of the characteristic represented on the subscale to the individual being considered. Conversely, a rating of one on a scale would indicate that the characteristic does not represent a good description of the man.

The same procedure is followed here as with the production data analysis, i.e., the individual rating areas are treated in respect to both criterion (point biserial coefficients) and age correlation (product moment coefficients). Table 10 shows the results of the analysis. It may be seen, in Table 10, that the individual rating subscales are presented in the major groupings previously described, i.e., Production, Detailing, Routine Work, etc. Examination of the table indicates somewhat higher validity for the first of these groupings (Production area). In a sense, this rating area is a reiteration of the production data. Note, for instance, that highest validity is obtained from the rating subscale "overall" production (r = .85). This would appear to correspond with either the total
Table 10
THE VALIDITY ($r_c$) AND CORRELATION WITH AGE ($r_{age}$) OF EACH OF TWENTY-FOUR RATING SCALES AND MEANS AND STANDARD DEVIATIONS OF THE RATINGS FOR 176 SALESMEN

<table>
<thead>
<tr>
<th>Sales Description</th>
<th>$r_c$</th>
<th>$r_{age}$</th>
<th>Mh.</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Drives</td>
<td>.79</td>
<td>.24</td>
<td>3.0</td>
<td>1.38</td>
</tr>
<tr>
<td>New Products</td>
<td>.65</td>
<td>.00</td>
<td>3.5</td>
<td>.79</td>
</tr>
<tr>
<td>Specialty Sales</td>
<td>.81</td>
<td>.19</td>
<td>3.1</td>
<td>1.44</td>
</tr>
<tr>
<td>Dispensing Physicians</td>
<td>.52</td>
<td>.25</td>
<td>3.0</td>
<td>1.14</td>
</tr>
<tr>
<td>Size of Orders</td>
<td>.79</td>
<td>.26</td>
<td>3.4</td>
<td>1.43</td>
</tr>
<tr>
<td>Over-all</td>
<td>.85</td>
<td>.28</td>
<td>3.4</td>
<td>1.49</td>
</tr>
<tr>
<td><strong>Detailing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physicians</td>
<td>.59</td>
<td>.14</td>
<td>3.9</td>
<td>.89</td>
</tr>
<tr>
<td>Drug Stores</td>
<td>.49</td>
<td>.22</td>
<td>3.4</td>
<td>1.00</td>
</tr>
<tr>
<td>Hospitals</td>
<td>.47</td>
<td>.21</td>
<td>3.6</td>
<td>.95</td>
</tr>
<tr>
<td>Nurses</td>
<td>.43</td>
<td>.15</td>
<td>3.8</td>
<td>.87</td>
</tr>
<tr>
<td><strong>Routine Work</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock Inventory</td>
<td>.57</td>
<td>.22</td>
<td>3.7</td>
<td>.86</td>
</tr>
<tr>
<td>Drug Store Displays</td>
<td>.52</td>
<td>.27</td>
<td>3.4</td>
<td>.99</td>
</tr>
<tr>
<td>Record Keeping</td>
<td>.73</td>
<td>.20</td>
<td>3.5</td>
<td>1.17</td>
</tr>
<tr>
<td>Equipment Care</td>
<td>.10</td>
<td>.01</td>
<td>3.3</td>
<td>1.09</td>
</tr>
<tr>
<td>Route Conformity</td>
<td>.31</td>
<td>-.09</td>
<td>4.1</td>
<td>.60</td>
</tr>
<tr>
<td>Time Spent on Job</td>
<td>.52</td>
<td>.22</td>
<td>3.9</td>
<td>.99</td>
</tr>
<tr>
<td><strong>Planning Work</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning Detail Presentation</td>
<td>.58</td>
<td>.09</td>
<td>3.7</td>
<td>1.03</td>
</tr>
<tr>
<td>Selection of &quot;Push&quot; Items</td>
<td>.49</td>
<td>.07</td>
<td>3.9</td>
<td>.90</td>
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<tr>
<td>Market Need Appraisal</td>
<td>.56</td>
<td>.22</td>
<td>3.2</td>
<td>1.15</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Relations</td>
<td>.55</td>
<td>.30</td>
<td>4.0</td>
<td>.85</td>
</tr>
<tr>
<td>Product Knowledge</td>
<td>.67</td>
<td>.59</td>
<td>3.3</td>
<td>1.12</td>
</tr>
<tr>
<td>Territory Transferability</td>
<td>.73</td>
<td>.19</td>
<td>3.2</td>
<td>1.27</td>
</tr>
<tr>
<td>Background</td>
<td>.59</td>
<td>.26</td>
<td>3.7</td>
<td>.98</td>
</tr>
<tr>
<td>Physical Stamina</td>
<td>.51</td>
<td>-.23</td>
<td>3.6</td>
<td>.93</td>
</tr>
</tbody>
</table>
sales validity ($r = .68$) or total sales corrected for
district variance ($r = .82$) as found with the produc-
tion data. It would appear that with the rating data
also total production is more related to criterion
group standing than is any other variable.

In the Production rating scale grouping are
other highly "valid" scales. Thus the Specialty rat-
ing correlates .81 with criterion standing. This
would appear to correspond with the $r$'s of .63 and
.74 found with actual, gross, and corrected specialty
sales. We thus have comparable validities for two rat-
ing scale and production areas concerned with the same
measurement.

The other, remaining production rating subscales
break away from any resemblance to our previously
treated production measurements, becoming more specif-
ic to how men actually perform certain duties. And it
will be seen that all of these remaining areas are
highly and significantly related to the criterion.
Thus ratings of leadership on individuals' drives,
sales of new products, sales to dispensing physicians
(those who supply patients with own medicines), and
large order sales all discriminate between good and
poor salesmen.

The criterion relationships with the second rating
grouping (Detailing) are all somewhat lower than those found with the Production area. The finding is of interest in and of itself for, in spite of Management's insistence that the important duties of the detailmen are concerned with detailing rather than production, the actual choice and rating of the criterion groups would appear to deny somewhat this contention. It is, however, of interest that for the detailing area itself the most valid scale is that concerned with Physician detailing, drugstore and hospital detailing appearing to be of somewhat lesser consequence, with detailing of nurses appearing to have least significance. It must be pointed out, however, that all coefficients are significant beyond the .01 level and that, as inspection of the mean and standard deviation column will reveal, some curtailment of extent of criterion relationship may have occurred through skewness and narrowed rating ranges in this as compared to the Production rating area.

The next rating area treated in Table 10 (Routine Work) contains the only scale with non-significant criterion correlation. Company A's salesmen drive cars, they are supplied with sample kits, and they carry with them literature abstracts, research reports,
posters, blotters, and all sorts of equipment. How they treat this equipment doesn't seem to matter. In spite of a large standard deviation, the correlation with criterion standing is only $r = .10$. This is not significant at either the .05 or .01 levels.

In the same area, the validity of the Route Conformity rating, although significant at the .01 level, is not substantial ($r = .31$). This may be, with respect to the small standard deviation, another of these areas so rigidly prescribed by supervision that both good and poor conform almost equally. One of Company A's salesmen, in 1949, was "let go" because he was plying one leg of a triangular route to the exclusion of the others, i.e., Tompkins Corners to Dry Gulch to Tompkins Corners to Central City, rather than Tompkins Corners to Dry Gulch to Central City. (1)

The other scales in the area would appear to be of substantial validity. Thus better salesmen would seem to do stock inventory and display work well and to spend more time on the job than do poor salesmen. Of some interest in this area would appear to be the very high relationship ($r = .78$) between rated record

(1) He later married a girl in Tompkins Corners.
keeping ability (filling orders, keeping expense accounts, filing inventory reports, etc.) and criterion standing, an apparent contradiction to the old saw depicting good salesmen as being poor clerical detail people.

All of the remaining coefficients are significant ones. In the Planning area, high criterion salesmen are rated as better at planning detail, at determining what medicinals should be emphasized for any particular detail operation, and at determining what products will best meet immediate market needs (cough syrups in February, poison ivy lotion in August). In similar fashion, in the Miscellaneous area, good salesmen are characterized as transferable from one territory to another \( r = .73 \), as having good product knowledge \( r = .67 \), as having better experience and education for the job \( r = .59 \), obtaining better customer relations \( r = .55 \) and, finally, as having more physical stamina.

All in all, it will be seen that more significant relationships exist between rated ability and criterion standing than between actual production and criterion standing. Undoubtedly the production measures are more objective and discrete. The ratings may contain,
in fact, considerable halo in the sense that high producers are rated high on characteristics which are not descriptive of them to any outstanding extent. However, the above analysis does indicate that, with the exception of ratings on equipment care, they do have relationship to a criterion thus making for more certain interpretation of the age correlations to follow.

Generally, the age-rating relationships found are of lesser statistical significance than were the age-production relationships. To this extent, the ability to diagnose production strengths of older salesmen in terms of rated characteristics will be lessened. In terms of the age-rating correlations, seven of the twenty-four scales yield relationship at less than the .05 level. And an additional eight of the correlations are of doubtful significance, i.e., at the .05 level. The other nine are significant at the .01 level. This finding may be contrasted with the relationships discovered between age and production where eight of the twenty-one scales used were significant at the .01 level with only four failing to meet even the .05 level of significance.

In the Production rating area, only one of the age-rating relationships fails to meet the .05 level, i.e., older salesmen have no advantage over younger
ones in sales of new products. The finding would appear to be a logical one, older salesmen having had much experience with items well-entrenched in the Company catalogue but starting from scratch on new items. But the "old hands" would appear to have the advantage in all other production rating areas. Thus, they do better than the younger on individual drives, on specialty production (at .05 level), in selling to dispensing physicians, in getting larger-sized orders, and in general overall production.

In terms of Detailing skills, however, they would generally appear to hold no particular advantage. Two of the areas are not of statistically significant relationship with age, i.e., physician detailing and nurse detailing. The other two scales, concerning drugstore and hospital detailing, are significant at the .05 level. It would appear that if the older salesmen have a strength at all in this area it would tend to be in the places where detailing results more immediately in sales orders, i.e., the drugstore and the hospital pharmacy room. Certainly, they have no advantage as long-range builders of reputation with the physician.

Neither does the Routine Work grouping explain very much about the ability of the older salesman.
One of the correlations here is significant at the .01 level. Thus the older person would tend to be better at drugstore display work (getting poster and sample display approval, arranging in strategic areas of the store, checking to make sure displays are kept dusted, etc.). Once again, he appears to be giving attention to **immediate** production (the displays usually concern across-the-counter items) rather than long range aspects. Into this immediate production area also would fall his advantage on Stock Inventory work. Record keeping also might have a similar meaning in that it concerns sales orders, inventory orders, etc. Time Spent on Job as an area also tends to be significant and to the advantage of the older worker. In that all men would appear to be spending about the same amount of time with the doctor, it is probable that the older man is spending his time where immediate orders are forthcoming, i.e., in the drugstore. The remaining scales, Equipment Care and Route Conformity, have little or nothing to do with the immediate production concept, have slight or no validity, and show no significant relationship to age.

In the Planning Work area only one of the three scales approaches significance. Thus there is some tendency for the older salesman to be better at
appraising market needs. In planning of detail work and in selecting "push" items he would appear to have no advantage over the younger worker.

The Miscellaneous scale grouping shows, generally, significant age relationships. Only one of the scales fails to meet the .01 level. This scale, Territory Transferability \((r = .19)\) shows little or no advantage to the older worker. The finding would appear to be a logical one. It may well be that the older salesman has been on his territory for a considerable length of time, has come to know all or most of its characteristics, and would enjoy no particular advantage if placed on a new territory. It will be recalled that a similar relationship was discovered in the New Products scale of the production rating grouping. In both cases, older salesmen would not be able to take advantage of strengths occurring through long service and specific to a particular situation.

One other scale in the Miscellaneous area shows the only significantly unfavorable relationship discovered among the rating variables. Thus older salesmen are rated as having significantly less physical stamina than younger ones \((r = -.23)\). This in spite
of his having been elsewhere described as spending more time on the job, making more calls, etc. He might therefore be considered as being capable of long and hard work but incapable perhaps of other specific tasks as speculated earlier, i.e., incapable of handling certain territories or assignments.

The remaining scales show significant value for the older salesman. He is depicted, for instance, as having better customer relations ($r = .30$). Above all, his product knowledge is seen as superior to that of the younger man ($r = .59$), a finding that once again would suggest the greater experience he has had with the nearly 1,000 items in his catalogue. And he has some advantage ($r = .26$) over his younger numbers in the background he has for his work. Presumably, once again, this would refer to his long experience rather than his education. Although the majority of Company A's salesmen have pharmacy or pre-medical degrees, most of those who do not are the older, long service salesmen. And even where they have such degrees, they often fall short of present standards, i.e., two year pharmacy courses or even degrees in pharmacy based mainly on apprenticeship to druggists.

In summary of the rating scale data, although
many of the relationships found fall short of statistical significance, a few concepts regarding the strengths behind the slightly superior production of the older salesmen would appear to emerge. As an example, the older salesmen may well be making their mark by concentrating on immediate production opportunities rather than in the much prized area of building for the future. The concept would appear to be a logical one. For one thing, the older man has no future, at least beyond age 65. For another, he may well have built for the future some years ago when he first took over his present territory. Again, it is likely that he will be concentrating on immediate production in that the immediate profit was being emphasized back in the days when he started with the Company. It was only with the change in Management in 1935 that the two goals of research and long-term profits were instituted. And it was only as recently as 1945 that teeth were put into the latter goal by removing the sales bonus and substituting the "straight salary" plan. There are thus a number of observations to support the hypothesis. And, above all, it is interesting to note that it is not just the older salesman who appears interested in immediate production. The validity coefficients for production variables would
tend to indicate some interest in the matter on the part of sales management, who, after all, picked the men for the criterion groups.

Another possible hypothesis would appear to emerge from the findings on the New Products scale and the Territory Transferability scale. It would seem that where the older salesman cannot take advantage of his experience he holds no particular edge over the younger one. And the finding is apparently verified in a positive direction through the information obtained from other scales. Thus, experience would appear to provide for the higher ratings the older salesman enjoys on such scales as Background, and Product Knowledge.

These two "factors" would appear to be the most logical explanation for the higher production of the older salesman. From them a picture may be obtained of a man heading directly toward a production goal and being aided in this by his greater experience in his territory including, probably, benefiting from groundwork done in previous years. This picture is such as, in the writer's opinion, to overrule the partial correlation earlier cited. It would appear more and more probable that experience is a strong factor in the
success of the older salesman and that controlling for length of service with the Company is an inadequate control. The main factors of success may just not have emerged from this analysis, but at least in terms of the present analysis, the two conditions cited would appear to be the important ones.

4. **Turnover of Salesmen and Age**

It has been previously mentioned that termination of salesmen is one of the greater problems of the sales management of Company A. The accumulated, yearly turnover rate for salesmen averages approximately fifteen per cent as compared to approximately five per cent for the non-sales supervisory force, the closest comparable group in terms of salary, amount of training, and nature of work. Several factors lie behind this turnover rate. Many of the younger salesmen, having pharmacy degrees, work until they have accumulated enough money to open their own drugstores. Secondly, another portion of the turnover occurs through "pirating" by other companies; this turnover would appear to be mainly among the better employees and is, consequently, a serious form of turnover. Again, others resign for various reasons. Finally, some are discharged and a few die or are pensioned.

In order to answer the question as to the nature
of turnover in respect to age and other conditions, a survey of all termination files of the Company was instituted for the period January 1, 1946 to March 15, 1949, which appeared to be the longest period of time during which complete termination records were maintained by the Sales Division.

During the 39 month period under consideration, 211 of the sales force terminated for one reason or another. The average number of salesmen on the payroll for the period was 500. Consequently, there was an accumulated turnover of 42.2% of the average sales force for the period. On a yearly basis this would amount to a monthly rate of 1.1% and a yearly rate of 13.2%.

In terms of reason for terminating, as shown in Table 11, eighty-six, or forty-one per cent of the group leaving, left to take positions with other drug companies. This is the largest termination reason category, indicating the seriousness of the situation in terms of loss of personnel to competitors. And, as Table 11 shows, this type of turnover is not confined only to the youngest age groups, being the biggest reason for departure for all age groups up to age 49. It is only with the 50 year and over category
Table 11

NUMBER OF TERMINATIONS FOR VARIOUS REASONS
AND AGE GROUPS IN A THIRTY-NINE MONTH PERIOD

<table>
<thead>
<tr>
<th>Age</th>
<th>Discharge</th>
<th>Another Position</th>
<th>Own Business</th>
<th>Pensioned</th>
<th>Deceased</th>
<th>Other Resignation</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>50+</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>7</td>
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<td>3</td>
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<td>45-49</td>
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<tr>
<td>40-44</td>
<td>2</td>
<td>15</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>36</td>
<td>17.0</td>
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<tr>
<td>35-39</td>
<td>2</td>
<td>20</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>48</td>
<td>22.8</td>
</tr>
<tr>
<td>30-34</td>
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<td>20</td>
<td>49</td>
<td>23.2</td>
</tr>
<tr>
<td>25-29</td>
<td>1</td>
<td>23</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>19</td>
<td>48</td>
<td>22.8</td>
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<tr>
<td>Total</td>
<td>8</td>
<td>86</td>
<td>32</td>
<td>7</td>
<td>6</td>
<td>72</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>3.8</td>
<td>40.8</td>
<td>15.3</td>
<td>3.3</td>
<td>2.8</td>
<td>34.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
that it ceases to be the single primary cause for leaving.

Table 11 also shows that the second biggest reason for termination lies in the "other resignation" area. Here are found seventy-two or thirty-four per cent of the terminations. The category, unfortunately, is not specific including all resignations other than those in which the individual leaves to take up work with a rival company. It is very probable also that it includes a number of discharges and near-discharges where, by common consent, the employee and management "agree" that he should resign in order to "better himself" elsewhere.

The third largest termination category is that concerned with resignation for purposes of establishing one's own business. It will be seen that this area makes up fifteen per cent of all resignations. Note also that this type of resignation occurs most heavily in the 35-39 age group, twenty-seven per cent of the resignations for the group occurring for this reason. Presumably, it takes some time for men to save enough money for the initial expense of opening a drugstore so that attrition is most apt to occur in this particular age range. And by the age of forty-five, only one of the fifteen terminations in the age range occurs for
this reason.

Recorded discharge accounts for very few of Company A's terminations (four per cent). As mentioned above, a considerable number of these are probably entered in the "Other Resignation" category. And the two remaining categories, more objective to be sure, also account for a small portion of the total number of terminations, retirement accounting for three per cent and death for another three per cent of the terminations. Retirement and death together, however, account for two-thirds of the terminations in the fifty years of age and over group.

The distinction is sometimes made between "avoidable" (discharge and resignation) turnover and "unavoidable" turnover. In these terms, interesting age comparisons come to light in the data. Retirement and death are the "unavoidable" categories in our data. These categories together account for only six per cent of the terminations. As noted above, however, they account for two-thirds of the reasons for termination in the fifty-plus age group. And "avoidable" turnover accounting for ninety-four per cent of all turnover accounts for only one-third of the turnover of the fifty-plus group. There is thus good indication that where
older men do leave, they leave unavoidably, i.e., are not discharged and do not resign. Conversely, for this Company at least, men under fifty are contributing heavily to avoidable turnover.

The above handles the question of turnover in terms of age and reason for leaving within the terminated group. There still remains the question of the terminating proportions of various age groups in the total population of salesmen. Table 12 shows this analysis. The percentages used are based upon the only distribution of ages available to the writer, i.e., the distribution for the 472 cases drawn up as of January 1952 and used in the previously reported sales analyses. Although younger age groups will be eliminated to some extent, i.e., only men who had been with the Company for at least a year were included, they may be balanced by the fact that considerable hiring of younger men had occurred from the end of the period under present consideration through 1950.

The most significant finding to be taken from Table 12, is the percentage of the age groups terminating for all reasons. It may be seen that as one moves from the higher age brackets to the lower, there is an ever increasing percentage of the age bracket terminating.
Table 12
PERCENTAGES OF AGE GROUPS TERMINATING FOR
VARIOUS REASONS IN THIRTY-NINE MONTHS

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Discharge</th>
<th>Another Position</th>
<th>Own Business</th>
<th>Pensioned</th>
<th>Deceased</th>
<th>Other Resignation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>50+</td>
<td>86</td>
<td>1.2</td>
<td>1.2</td>
<td>0.0</td>
<td>8.1</td>
<td>3.5</td>
<td>3.5</td>
<td>17.5</td>
</tr>
<tr>
<td>45-49</td>
<td>78</td>
<td>0.0</td>
<td>10.2</td>
<td>1.3</td>
<td>0.0</td>
<td>2.6</td>
<td>5.1</td>
<td>19.2</td>
</tr>
<tr>
<td>40-44</td>
<td>89</td>
<td>2.2</td>
<td>16.9</td>
<td>6.7</td>
<td>0.0</td>
<td>0.0</td>
<td>14.6</td>
<td>40.4</td>
</tr>
<tr>
<td>35-39</td>
<td>94</td>
<td>2.1</td>
<td>21.3</td>
<td>13.8</td>
<td>0.0</td>
<td>0.0</td>
<td>13.8</td>
<td>51.4</td>
</tr>
<tr>
<td>30-34</td>
<td>94</td>
<td>2.1</td>
<td>20.2</td>
<td>8.5</td>
<td>0.0</td>
<td>0.0</td>
<td>21.3</td>
<td>52.1</td>
</tr>
<tr>
<td>25-29</td>
<td>31</td>
<td>3.2</td>
<td>74.4</td>
<td>12.8</td>
<td>0.0</td>
<td>3.2</td>
<td>61.3</td>
<td>154.9</td>
</tr>
</tbody>
</table>
Thus in the age fifty and over bracket, only eighteen per cent of the group terminated in thirty-nine months. In the 25 to 29 year group, on the other hand, 155 terminated in the same period. In other words, to maintain a constant force of 100 employees for that thirty-nine months in each of these age brackets would require the replacement of only eighteen in the oldest age group but would require 155 men in the youngest group. It would seem apparent, therefore, that freedom from turnover may be added to the production advantages of the older salesman. There would thus appear to be even further weight added to the argument of extending retirement limits past the present sixty-five years of age. And, in the present instance, the Company might even consider the hiring of older, more stable individuals. This would appear to be especially indicated to counteract the large turnover in the three resignation areas. As seen in Table 12, seventy-four per cent of the 25-29 year employees left Company A to go with another company. Above this age group, the problem would appear to be much less. The 25-39 brackets also suffer somewhat through an egress of employees bent on starting their own businesses. And, in the area of Other Resignations, once again, the primary disturbance arises in the 25-29 year group, sixty-one
per cent resigning in the period of this study. A trial hiring of older individual would appear to be warranted in an attempt to keep salesmen on territories long enough for them to realize the production potential of those territories.

Summary and Implications of Sales Studies

The studies on the sales force of Company A here reported show clearly that this is one area in which the older worker cannot only compete with younger men on equal terms but, through characteristics not completely identified by this analysis, can even surpass him. This equality or superiority cannot be claimed for other areas but these studies advance nicely the hypothesis presented in Chapter I of this dissertation, i.e., there are some occupations to be found in which older workers will hold their own with younger ones. The sales operation, as it exists for Company A, would appear to be on such occupation.

In summary, from these several analyses we have found the following factors:

1. Where group opinion of sales supervisors is used as a criterion of salesmanship (i.e., nominations) the correlation between age of salesmen and their nomination scores is a linear and
positive one. With exactly the same procedure, the correlations of age of sales supervisors and non-sales supervisors is negative and curvilinear with age. This finding supports the above contention of relativity of age-performance relationships to occupational characteristic.

2. When length of service with the Company is partialled out of the age-nomination score relationship, that relationship remains significantly favorable to age. This is admittedly only a partial control of the experience factor, ignoring experience with other drug companies. The two service factors together might well explain the positive age relationship in terms of experience. And it should be here pointed out that the two are mutual interactors, i.e., before one can have much experience, he must have reached a certain age.

3. It was also found that, of twenty-one production criteria, fourteen have significant relationship with nomination, criterion group standing. Of the criteria showing non-significant relationship, the relationship would appear to be explainable in terms of restriction of the
criterion variables through rigid scheduling of work operations or in terms of other criterion contamination. Of the significant relationships, on the other hand, total production per se would appear to account for the greatest portion of criterion group variance.

4. As for age relationships with the production criteria, the highest correlations also occur in the total production area, although older men also sell significantly more specialty products and bulk materials. Moreover, they realize a higher percentage of the territory's potential as well as a higher percentage of the management sales objective. And it is especially significant that sales supervision relies more upon them, setting a higher objective for older than for younger employees.

5. Regarding rated sales characteristics, the salesman rating scale used by Company A has substantial validity. Of highest validity are those scales concerned with ratings of production, although only a rating concerned with "Equipment Care" is of complete non-significance.

6. Generally, fewer age-rating relationships are significant than is true in the case of
age—production relationships. However, older salesmen are rated as significantly better on individual selling programs, on sales of specialty products and sales to dispensing physicians, on size of orders and in terms of overall production. Advantage on certain other items (detailing druggist and hospital personnel, stock inventory, displays, record keeping, and time spent on job) leads to a hypothesis that the older salesman is not following the usual policy of building for the future but is concentrating instead on immediate production. A second hypothesis emerges from his rated advantage in product knowledge and background for his job, i.e., in spite of the partial correlation reported in 2 (above), the older salesman's strength lies primarily in his experience in the drug industry. The hypothesis is supported with another rating scale finding, i.e., the older salesman enjoys no advantage in the selling of new products.

7. In an examination of turnover data for the period from January 1946 to March 1949, it was found that much of Company A's sales identifiable turnover problem occurs through resignation,
generally of younger men, either to join rival companies or to set up their own businesses. It was also found that unavoidable turnover (death and retirement) represents a minor portion of the variance.

It was also found that, for all reasons, turnover in the oldest age group (50 years and over) was only 11% of that in the youngest age group (25-29 years). There is, moreover, a steady decrease in turnover rate for successively older groups. And, above all, very little avoidable turnover occurs among the older sales personnel.

8. Two recommendations might be made to Sales officials of Company A as a direct result of these studies. In the first place, an extension of the retirement limit past the present one of sixty-five years of age can be recommended on the basis of nomination ratings, production records, sales rating, and turnover. In the second place considering the turnover analysis especially, a recommendation for trial hiring of older salesmen, particularly experienced ones, might be entertained in the hope of picking up turnover-free men and high producing men. The
first recommendation in particular is supported in this study by the finding of superiority of the older salesman is virtually every important area of sales performance here tested.
Description of the Study

The rank and file employee group in Company A numbers 3500. With this and the two groups previously studied, therefore, we will have surveyed the age-efficiency relationship for all but about 500 of the Company's employees. And these 500 are employed in small branches in the United States and abroad, where very few personnel records of any kind exist.

We have not studied all of the 3500 rank and file (or, as they are known in the Company, "hourly" or "wage") employees. It was believed better to have full coverage of as many variables as possible rather than to study the entire hourly group. Consequently, this study is confined to the 1060 employees of the Company who are most adequately covered by personnel records, i.e., the home office and factory employees of the Company. The writer knows of no significant or important differences between these and the hourly group in the other two Company locations.
In the preceding two chapters we have tested a number of efficiency criteria in their relationship to age. Unfortunately, for the majority of rank and file employees of the Company, no such systematic records as production or even merit ratings are kept. Consequently, in this study, we are here limited to a number of criteria of behavior, some of which are rather clear-cut ones and some of which are not. However, wherever there was a record for the entire group of 1060 employees, and wherever that record seemed of any degree of importance to management, it was included as a criterion variable.

The method of study decided upon was this: A number of criterion variables, to be described later, were to be studied in their relationship with age. However, in addition to these criterion variables, a great number of other worker characteristics (education, level of job, type of job, etc.) were also available for study. It will be recognized that, by use of these worker characteristic variables, we will be able to examine the thesis speculated upon earlier in these studies, i.e., to what extent is age per se a single, meaningful psychological construct? It may be recalled that in connection with this we earlier advanced the possibility that what may appear to be an age-linked
bit of behavior may really be a function of some age concomitant such as the generally lesser education of older workers, their generally lower job levels, etc.

In an attempt, therefore, to study age as well as a number of possible age concomitants in their relation to a number of criteria of efficiency, the data were submitted to a factor analysis. It is believed that, through use of this technique, more meaningful basic concepts may be derived than are possible in terms of one-variable-at-a-time analysis, where perhaps few of the interactions of age with age-linked variables may be discovered.

The "Efficiency" Criterion Variables

The efficiency criteria available for study are not true efficiency indices in the strictest sense of the word. Some of them are really "desirable behavior" variables, where sometimes the behavior is desirable from the standpoint of the employee, again from the Company's standpoint.

The first of the criteria to be discussed, however, is a rather objective one. This is a Discipline variable. Where an employee breaks any one of a score or so of Company regulations (excessive absenteeism or lateness, "soldiering" on the job, contributing to
unsafe practices, "rowdyism", etc.) and where in the opinion of his supervisor the infraction is serious enough, a written warning is issued to the employee and is, concurrently, posted in his file maintained by the Personnel Department. Two consequences arise: If the employee has less than three years of service with the Company, his next "automatic" pay increase will be held up for six months. This is a completely routine and therefore invariant operation. When a disciplinary action notice is received by the Personnel Department, a copy is automatically sent also to the Payroll Department whose clerks "flag" the records for a six-months delay of pay increase.

The second consequence is far less certain. Theoretically, having a disciplinary action less than a year old on the record could postpone consideration for promotion. It is doubtful if much postponing is done. From six months' experience as an employment manager with the Company, the writer can testify that he never knew how to interpret the clause saying that disciplinary action would be "taken into consideration" in making promotions. Sometimes taking it into consideration meant considerable union activity. These, however, are the net effects of disciplinary action, i.e., it is effective for six months in delaying pay
increases and for one year in affecting promotional possibility.

The second criterion variable employed in this study is somewhat hard to interpret. It is a medical or "health" Mobility variable and has been included because it does have some effect on the way promotions are made within the Company. Company physicians examine employees for job-health classification purposes at the time they are hired into the Company. They may also be examined and a classification established for them if they have had physical difficulty with their jobs or have had a string of illness visits to the dispensary. Four classifications are recognized by the Company as a result of these examinations. They are as follows:

1. Classification A denotes that the employee has been examined and is free to take any kind of work within the Company.

2. Classification B indicates that the employee has some physical limitation for other jobs, but is considered no risk to himself or others on his present job. He must, however, be re-examined before he can be moved to another job.

3. Classification C means that the employee must be periodically re-examined on his present job, and, of course, he too must be re-examined before he is moved to another job.

4. Classification X merely indicates that the employee has not been examined by the Medical Department. In this case, he has no bad health
record against him and is free to move to any other job subject only to non-medical disqualification.

The Mobility variable consequently may tend to be a double-ended proposition. Most of the people in Classification X are the long-service (consequently, older) employees who entered before systematic, ongoing medical examinations were instituted. Although undoubtedly many of them are in poorer health than many individuals to be found in Classification B, they are mobile, i.e., Employment Department personnel can move them without checking with the Medical Department. Although we find ourselves combining healthy people from A with an unknown number of unhealthy people from X, this appears to the investigator the only way to handle the problem, and still maintain a measurement of what might be termed operational mobility. Consequently, in this study, the A and X categories are combined to form the mobile group, the B and C categories constituting a non-mobile group.

A third "criterion" variable included in this study must be considered a "desirable behavior" variable rather than an efficiency variable. This is Pension Membership, a notation of whether or not an employee has joined the pension plan. To do so is considered desirable both from the standpoint of
Management's wishes and the employee's protection. It becomes also a valuable measurement to include in terms of the somewhat acrimonious debating going on in gerontological circles as to the effects of pension plans upon retirement practices. It may be that some of the characteristics of pension joiners may be discovered, at least for employees of Company A. Findings must be interpreted, however, with certain considerations in mind. First of all, employees become eligible only after five years with the Company. Secondly, employee contributions to the plan, matched by the Company, are made in proportion to base pay rate, and, accordingly, returns from the plan will also vary with earnings. Thirdly, the plan is voluntary and it is not for "keeps" (i.e., individuals dropping out of the plan and/or the Company are returned their contributions plus accrued interest). Finally, retirement prior to the normal age of sixty-five is provided for with proportionately reduced benefit.

The last two variables really express to a great degree the same measurement. These are the Number of Illness Absences the individual has had in the two-year period (July 1951 to July 1953) covered by this study, as well as the Total Number of Days Lost through illness absences in the same two-year period. Important
distinctions must be made at this point. In the first place, these are non-compensable (not work-linked) illness absences, i.e., the individual has at least reported in sick and, if the illness went three or more days, probably received a house call from a visiting nurse. In addition, before pay was approved, a note from a family physician had to be produced to the effect that the individual was under treatment. Finally, the illness-absentee had to report to the plant dispensary for a return-to-work pass. Certainly, one or more of these provisions will tend to eliminate non-illness absences from the category. To the extent that this is so, it becomes a more pure measurement than is found in many of the age-absenteeism studies reported to date.

Other elements will affect these absenteeism data. These are primarily two length-of-service elements. An individual who is with the Company for more than three years has no restriction on the number of absences he is paid for, although there is a limit on the total number of days for which he is paid when away from work, these limits are not strictly adhered to by the Company and are rather broad ones in the first place. However, those employees having less than three years service are much more restricted, not being granted pay for the first day of any non-consecutive illness absences and
being rather severely restricted in terms of the total number of days that are paid for. It will be seen, therefore, that in terms of an age relationship to this absenteeism criterion the possible effect of length of service will also have to be taken into account.

In summary, therefore, five "criterion" variables are included in the study. The first of these is a mere notation of whether or not an employee has been disciplined. The second is included in terms of whether or not the employee is mobile. For the third, we are concerned with whether or not the employee has joined the pension plan; in the fourth, whether or not he has had five or more absences in a two-year period. Lastly, in an attempt to get a measurement of long absence as free as possible from number of absences, we are considering that employees having lost a total of four work weeks (twenty days) in a two-year period are less efficient than are those who lost less than this amount.

Worker Characteristic Variables

The worker characteristic variables, here described, were selected by screening from approximately twenty such variables routinely kept by the Company as standard personnel information. Selection was performed keeping in mind any important modifying effect
that such variables might have on an age-efficiency relationship.

For instance, Sex was the first of the variables decided upon as having such modifying effect. It has previously been revealed, in our literature review, that there appear to be both age and sex components in absenteeism. The second variable selected was Marital Status, the variable perhaps having important relationship to pension joining behavior, absenteeism and disciplinary action. Closely linked with this reasoning, Number of Dependents (in terms of income-tax regulation, i.e., legal age and amount of support) was selected as another possible modifying variable. Again it was believed that the Type of Job (production or clerical) might affect the efficiency measures. Similarly, Job Level (skilled work and semi-skilled vs. unskilled) may modify age relationships in their relation to the criteria.

Education, of course, is a desirable worker characteristic to include in that it frequently shows rather great negative relationship with age and might also have relationship to the criterion variables. Again, Length of Service with the Company also tends to have definite relationship with age, and, through the above-
mentioned policy restrictions, perhaps major influence in industrial behavior.

Finally, of course, Age was included. However, under the further hypothesis that age, as a worker characteristic, might have certain critical ranges it was decided to study not a single division of young vs. old but two such divisions. In the first of these, the ranges for "young" were considered to be from the youngest age found among the 1060 employees (19 years) to 34 years. In the second data break individuals under the age of 55 were considered "young", while those from age 55 to 85 were considered "old".

Results:

All correlations obtained were tetrachoric coefficients. In setting up the fourfold tables, attention was given to both meaningfullness of the data break for each variable as well as to the resulting proportions. Table 13 shows the splits used as well as the coding of the variable dichotomy, the latter of course determining through the sign of the resulting coefficient, the interpretation to be given to the correlation.

Generally, where extreme breaks occur in the table, they will be seen to be a function either of the fact that no other break is possible (Discipline) or,
Table 13

THE DATA-BREAK POINTS FOR EACH OF THE VARIABLES,
THE NUMBER OF CASES ABOVE THESE POINTS,
AND THE CODING OF THE VARIABLES
(N = 1060)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Code and Break</th>
<th>No. above Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 15-34</td>
<td>35 and over = 1</td>
<td>521</td>
</tr>
<tr>
<td>Age 55-85</td>
<td>85 and over = 1</td>
<td>115</td>
</tr>
<tr>
<td>Sex</td>
<td>male = 1</td>
<td>436</td>
</tr>
<tr>
<td>Marital Status</td>
<td>married = 1</td>
<td>598</td>
</tr>
<tr>
<td>Dependents</td>
<td>1 or more = 1</td>
<td>569</td>
</tr>
<tr>
<td>Job Type</td>
<td>production = 1</td>
<td>703</td>
</tr>
<tr>
<td>Job Level</td>
<td>semi- and skilled = 1</td>
<td>544</td>
</tr>
<tr>
<td>Education</td>
<td>high school = 1</td>
<td>613</td>
</tr>
<tr>
<td>Length of Service</td>
<td>over 3 years = 1</td>
<td>688</td>
</tr>
<tr>
<td>Discipline</td>
<td>Disciplined = 1</td>
<td>116</td>
</tr>
<tr>
<td>Mobility</td>
<td>Mobile = 1</td>
<td>774</td>
</tr>
<tr>
<td>Pension</td>
<td>Member = 1</td>
<td>554</td>
</tr>
<tr>
<td>No. Absences</td>
<td>5 or more = 1</td>
<td>492</td>
</tr>
<tr>
<td>Days Lost</td>
<td>20 or more = 1</td>
<td>241</td>
</tr>
</tbody>
</table>
as in the case of the 55—85 age break and the Days Lost break, a belief that the split might produce more meaningful results. With these exceptions, the other proportions above and below the cutting points will be seen as generally symmetrical.

The resulting tetrachoric coefficients may be seen in the upper half of the matrix comprising Table 14. It should be noted in the table that the age variables were not treated along with the other variables in the original matrix, but were "tacked on" to the unrotated factor loadings via a modified Dwyer Extension Method.

The method used for the factor analysis was a modified Thurstone Centroid Method. Six factors were extracted and rotated in terms of both simple structure concepts and meaningfullness of the resulting configurations. In the light of the investigator's personal experience with the Company, the latter was preferred wherever conflict with the former occurred. The resulting, rotated factors are shown in Table 15. It will be seen that all residuals (Table 14) are .10 or less with exception of the Length of Service and Pension residual which stands at .11. There is the possibility that additional factor extraction might further reduce this residual. However, it is believed that but little meaningful interpretation could be so added.
<table>
<thead>
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<th></th>
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<th>2</th>
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<th>4</th>
<th>5</th>
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<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
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<tbody>
<tr>
<td>1. Age 15-34</td>
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<td>19</td>
<td>34</td>
<td>49</td>
<td>-24</td>
<td>-54</td>
<td>55</td>
<td>21</td>
<td>14</td>
<td>89</td>
<td>-03</td>
<td>18</td>
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</tr>
<tr>
<td>2. Age 55-85</td>
<td>33</td>
<td>08</td>
<td>18</td>
<td>30</td>
<td>-02</td>
<td>-39</td>
<td>68</td>
<td>04</td>
<td>27</td>
<td>49</td>
<td>-23</td>
<td>-04</td>
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<td>3. Sex</td>
<td>04</td>
<td>08</td>
<td>56</td>
<td>76</td>
<td>41</td>
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<td>13</td>
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<td>-01</td>
<td>51</td>
<td>42</td>
<td>-06</td>
<td>-21</td>
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<td>-07</td>
<td>16</td>
<td>-03</td>
<td>14</td>
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<td>5. Dependents</td>
<td>02</td>
<td>-08</td>
<td>03</td>
<td>-07</td>
<td>38</td>
<td>03</td>
<td>-18</td>
<td>19</td>
<td>-13</td>
<td>02</td>
<td>37</td>
<td>04</td>
<td>-01</td>
<td></td>
</tr>
<tr>
<td>6. Job Type</td>
<td>-06</td>
<td>04</td>
<td>08</td>
<td>-03</td>
<td>-10</td>
<td>82</td>
<td>-77</td>
<td>30</td>
<td>48</td>
<td>-07</td>
<td>45</td>
<td>26</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>7. Job Level</td>
<td>08</td>
<td>-05</td>
<td>08</td>
<td>-06</td>
<td>00</td>
<td>-07</td>
<td>56</td>
<td>08</td>
<td>-33</td>
<td>24</td>
<td>-18</td>
<td>-20</td>
<td>-17</td>
<td></td>
</tr>
<tr>
<td>8. Education</td>
<td>05</td>
<td>-03</td>
<td>01</td>
<td>08</td>
<td>-10</td>
<td>-01</td>
<td>-41</td>
<td>-31</td>
<td>04</td>
<td>-54</td>
<td>-13</td>
<td>-31</td>
<td></td>
<td></td>
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<tr>
<td>9. Length of Service</td>
<td>-03</td>
<td>-03</td>
<td>-06</td>
<td>-07</td>
<td>03</td>
<td>00</td>
<td>05</td>
<td>-04</td>
<td>60</td>
<td>58</td>
<td>70</td>
<td>13</td>
<td>31</td>
<td></td>
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<tr>
<td>01. Discipline</td>
<td>07</td>
<td>-06</td>
<td>08</td>
<td>-05</td>
<td>-01</td>
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<td>00</td>
<td>-06</td>
<td>08</td>
<td>22</td>
<td>-28</td>
<td>17</td>
<td>28</td>
<td></td>
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<td>02. Mobility</td>
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<td>-06</td>
<td>-06</td>
<td>-02</td>
<td>-05</td>
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<td>03</td>
<td>00</td>
<td>-01</td>
<td>28</td>
<td>01</td>
<td>-05</td>
<td></td>
</tr>
<tr>
<td>03. Pension</td>
<td>09</td>
<td>-09</td>
<td>-04</td>
<td>-02</td>
<td>00</td>
<td>08</td>
<td>03</td>
<td>-03</td>
<td>11</td>
<td>-10</td>
<td>02</td>
<td>15</td>
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<tr>
<td>04. No. Absences</td>
<td>-10</td>
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<td>-01</td>
<td>-09</td>
<td>05</td>
<td>00</td>
<td>02</td>
<td>01</td>
<td>05</td>
<td>-02</td>
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<td></td>
</tr>
<tr>
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<td>-05</td>
<td>04</td>
<td>04</td>
<td>-02</td>
<td>02</td>
<td>10</td>
<td>-07</td>
<td>05</td>
<td>-08</td>
<td>-07</td>
<td>01</td>
<td>08</td>
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</tbody>
</table>

§ Two-place decimals have been omitted from the table. The double line indicates that the age groups were not a part of the original matrix but were treated with unrotated factor loadings via a modified Dwyer Extension Method.
Table 15

**ROTATED FACTOR LOADINGS**

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
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<tr>
<td><strong>Age 15-34</strong></td>
<td>28</td>
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<td>23</td>
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<td>30</td>
<td>11</td>
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<td>-10</td>
<td>81</td>
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<td>78</td>
<td>08</td>
<td>04</td>
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<td>-01</td>
<td>37</td>
<td>82</td>
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<tr>
<td><strong>Marital Status</strong></td>
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<td>-08</td>
<td>-04</td>
<td>09</td>
<td>-06</td>
<td>31</td>
<td>50</td>
</tr>
<tr>
<td><strong>No. Dependents</strong></td>
<td>71</td>
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<td>00</td>
<td>08</td>
<td>47</td>
<td>73</td>
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<tr>
<td><strong>Job Type</strong></td>
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<td>-59</td>
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<td>42</td>
<td>34</td>
<td>09</td>
<td>98</td>
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<tr>
<td><strong>Job Level</strong></td>
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<td>85</td>
<td>06</td>
<td>-28</td>
<td>-30</td>
<td>-03</td>
<td>90</td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<td>38</td>
<td>-03</td>
<td>-25</td>
<td>-53</td>
<td>-13</td>
<td>57</td>
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<tr>
<td><strong>Length of Service</strong></td>
<td>25</td>
<td>33</td>
<td>58</td>
<td>30</td>
<td>62</td>
<td>10</td>
<td>99</td>
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<tr>
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<td>-29</td>
<td>76</td>
<td>40</td>
<td>06</td>
<td>-35</td>
<td>96</td>
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<tr>
<td><strong>Mobility</strong></td>
<td>-05</td>
<td>45</td>
<td>50</td>
<td>05</td>
<td>23</td>
<td>15</td>
<td>53</td>
</tr>
<tr>
<td><strong>Pension</strong></td>
<td>06</td>
<td>14</td>
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<td>27</td>
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<td>54</td>
<td>1.00</td>
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<tr>
<td><strong>No. Absences</strong></td>
<td>-08</td>
<td>-06</td>
<td>-06</td>
<td>70</td>
<td>-10</td>
<td>12</td>
<td>53</td>
</tr>
<tr>
<td><strong>Days Absent</strong></td>
<td>05</td>
<td>-01</td>
<td>-04</td>
<td>90</td>
<td>02</td>
<td>-05</td>
<td>82</td>
</tr>
</tbody>
</table>

§ Two-place decimals have been omitted.
Factor I, as shown in Table 15, in order of magnitude of loadings is made up if the following conditions: Being a male (.78), having one or more dependents (.71), being married (.62), and being a production ("blue collar") worker (.58). There is also a tendency for these individuals to have longer service, to be less educated, and to be older as defined by either the age thirty-five and over break or the age fifty-five and over break. Note also that the efficiency-conformity criterion variables have no significant involvement in the factor.

The factor, ranking second in percentage of common variance accounted for among the six factors extracted, would appear to be a "Plight" or "Dependency" factor. Not involving a question of efficiency of job performance, there emerges a picture of the personal characteristics of a group of employees who, primarily, are married men who have dependents and who perhaps as a result of lower education find themselves in production-type work.

But of more importance to the present study is the relationship of length of service and age to the factor. Both have loadings, the Dependency group tending to be those with longer service. Above all,
the two age variables taken together have higher loadings on this factor than any other with the exception of Factor VI. This is taken to mean, therefore, that older workers are more apt to find themselves in a Dependency position than are younger ones. However, through the factor's lack of relationship with the criterion variables, such older personnel can be said to be neither more nor less "efficient" or conforming than are the younger.

Factor II has loadings which indicate that it is describing individuals who are semi-skilled or skilled (.85) and who are clerical rather than production workers (.59). These personnel are inclined to be older, long-service, educated people. The Factor as such may be considered as a White Collar Work factor.

Of great interest are two loadings showing a structuring for two criterion variables. Thus these personnel tend not to be disciplined (.29) and to be mobile (.45). In connection with the former, company officials have speculated that the white-collar workers especially tend not to be disciplined by their superiors, a permissive atmosphere prevailing more in the small, clerical work groups than in the larger, more impersonal production work groups. This
speculation, therefore, tends to find verification in this factor.

Although the heaviest factor loadings occur for other variables, age does have some loading. But note that it is not the "young-old" group described by this factor. It is rather what we might term the "old-old", i.e., fifty-five year and over group. There is thus defined for us another picture of an older rank-and-file worker of Company A. This one is the more highly educated, skilled clerical worker who is not disciplined and who is mobile.

In terms of mobility, the interpretation is not clear. Mobility may have arisen in that, having longer service, the individual has no official record that would make him immobile. However, some of his mobility may well be occasioned by the fact that health is not so much a critical requirement for clerical as it is for production work. Consequently, fewer clerical personnel are examined, and more readily given the "green-light" for job transfer. To the extent that this holds true, there may here be defined an area of operation for older personnel (i.e., high level clerical work) where, in meeting educational requirements of the job, they may operate with some flexibility.
Factor III may be seen as a triplet involving mainly the criterion area. Having none of the worker characteristics variables, it would appear difficult to interpret. However, it most nearly appears to be a Freedom from Policy Restriction variable. It will be recalled from our earlier discussion of the length of service variable that it was deliberately broken, for correlation purposes, at the point at which restriction on automatic pay increases vanished from among the outcomes of disciplinary action. Thus the factor might also be considered as disciplinary action "without teeth". There appears to be, in other words, no function of the mere advisement of Employment Department to "consider" disciplinary record in making promotions, the great effect coming on the policy restricted service group in terms of pay action. The interpretation would be given additional weight by consideration of the lack of age loading in the factor. These are not the old, long-service personnel. They are those of service just long enough to get them free of effective disciplinary action.

It will be seen that Factor III also has a substantial loading on the mobility criterion. This may well be a condition of the double-ended nature of this criterion. As hypothecated above, the group here
represented would tend to be a median length of service and age group. This group is perhaps free of the medical conditions of older personnel which might result in their being given a non-mobile classification. At the same time, it may contain enough individuals who were not examined at time of hiring, so that they become mobile as the mere result of having no medical classification. Certainly these two conditions could pyramid most easily in a middle service group to give a high mobility effect.

Other characteristics of the factor should be noted. First, it is not significantly loaded with either of the absenteeism variables. Consequently, when the discipline occurs, it is not as a result of excessive absenteeism. Once again, the policy-restriction interpretation comes into play. It will be recalled that there is a double indemnity for the less than three year service group — once in terms of interruption of pay increases as a result of a formal disciplinary action and again in the form of no-pay-for-days-lost. Once past this "probationary" period it might be expected that the employee might have more absences as well as more disciplinary action recorded against him. Disciplinary action in Factor III,
however, does not seem directed against absenteeism. A possible explanation lies in the other "controls" on absenteeism cited earlier, i.e., the limit on total number of days paid may continue to hold absence in check.

Still another interpretation of the relationship may be given. The absences studied here are illness absences. It is rather difficult to complain of time lost to an employee returning to work with a pass from the Medical Department. It is even more difficult to take disciplinary action and make it stick. Factor III, therefore, would appear more than ever to be a freedom-from-restriction or discipline-without-consequence factor.

Factor IV by far accounts for the major variance of absenteeism. Note that it may not be differentiated as to absence frequency or severity. Rather it is seen here as Illness Absenteeism per se. Enough of the worker-characteristics variables enter into the factor to aid us in the identification of individuals tending to have frequent and long absences. Note, first of all, that the positive loading for job types indicates the absentee to be a production worker. Two possibilities arise in this connection. The production worker may be ill more frequently because of
the speeded and more physically exhausting nature of the work. Examination of the Company's medical files reveals a substantial number of "nervous exhaustion", "neuraesthenia" or "needed a rest" reasons being given for absences. Again, another explanation is offered by Company officials. Production workers, many of them, are on incentive work. Consequently, by working hard for a few days they can "afford" a rest, irrespective of whether or not they are paid for the absence. Above all, no psychologist should pass up the opportunity to speculate on the morale or wanting-to-come-to-work aspect of the picture as found in Walker's study. Morale might appear, at least, to have more opportunity to be high in the clerical operation.

What, however, are the other characteristics of absentees in the Company? The negative loading on Job Level shows that these individuals are inclined to be on the unskilled level. This lends credence to the interpretation, given above, of absenteeism as a function of incentive work. Most of the incentive jobs in the production area are in the lower, i.e., unskilled job grades. The finding might also, however, lend support to the "exhaustion" and "low morale" hypotheses, incentive jobs being fast, furious, and apparently depressing.
As for the other characteristics of absentees, they are first of all less educated, this probably being one of the major reasons for their being in production work in the first place. Again, they tend to be long service employees. Note also that they are disciplined, perhaps for their absenteeism. This, then, is the discipline variance discussed in connection with the previous factor, the present discipline variance having significance with absenteeism whereas the former did not.

There is also relationship with another criterion variable, i.e., absentees join the pension plan. Why this may be so cannot be explained by the writer, unless the answer lies in eligibility to join the plan through longer service. Perhaps there may also be a tendency for individuals on difficult, physical work who are already having a foretaste of things to come through many and long illnesses to want to protect themselves, through at least the savings feature of the plan, against the day when the job catches up with them.

Of greatest interest, for age study purposes, however, are two other worker characteristic variables, e.g., Sex and Age. Previously we have cited other investigators' works where both of these variables have
entered heavily into a relationship with absenteeism. And it will be seen that both play a role, albeit a somewhat different role, here.

First of all, it will be seen that these absentees tend to be females, this corresponding, of course, with the findings of several other investigators. This must be modified, however, in terms of the age loadings. From an examination of the loadings for both age groups it will be seen that the age relationship to absence appears for the "young-old" group but not for the "old-old" group. There is suggested a curvilinear relationship to absenteeism in which the youngest (and consequently most policy-restricted) group have less absences. This goes along with a similar finding for the oldest ages, the middle age ranges constituting the "plateau" or highest absence group.

The Illness Absenteeism factor loadings tend to illustrate a previous contention, i.e., if age be studied along with the several variables that "ride along" with age, what might appear to be an age finding with fewer of these qualifying variables, might give way to other interpretations in the presence of such variables. Thus many investigators have found days lost through absence to vary directly with age. But Factor IV may well lead us to place emphasis on
other variables. Thus highest loading on the worker characteristic variables of the absence factor occurs for job type. It so happens that many middle-aged and older workers (.23) work on production jobs (.42), at a lower job level (.28), perhaps as a consequence of not having the education (.25) to take other jobs less physically demanding or more attractive. It may be recalled from Factor II, moreover, that with older clerical workers, no such age-absence relationship exists. Illness absenteeism, therefore, may be more related to the type of work in which middle-aged or older workers find themselves than to age per se.

The picture is further strengthened by the loadings for Factor V. It will be seen that the heaviest loadings are on the two age variables, i.e., the factor may be identified as Age regardless of the age reference point. Our primary age interpretations consequently must come from this configuration.

In terms of accompanying, significant worker characteristics, it will be seen the older worker in Company A is a long-service (.52), less educated (.53) employee. He works, once again perhaps as a result of his lack of education, primarily on production jobs (.34) and at a low skill level (.40) where work is apt
to be strenuous. The picture is apt to be a discouraging one in terms of optimal placement of workers where their capacities may be best utilized.

In terms of criterion variables, we see that the older worker is a pension joiner (.77). This, in fact, is the largest loading the pension variable has on any factor. The outcome arises probably from two sources: (1) the older worker has the prerequisite service to join the plan; (2) as retirement approaches, he undoubtedly finds more incentive to join the plan than do younger men not facing retirement for some years to come. One other point of emphasis; regardless of the findings of Fox and others that pension plans tend to lead to fixed retirement ages, it is obvious that the greatest support for the pension plan comes from the older worker.

As a second criterion characteristic, the older worker is seen to be somewhat more mobile. Once again, this finding is of little consequence, probably indicating only that the older employee has not been examined medically; consequently has nothing against his record. And in view of the findings regarding promotability in executive personnel, it is doubtful if his "mobility", real or otherwise, will do him much good.

We are left, therefore, more with a picture of the
characteristics and status of the older worker than
with any efficiency picture. One thing must be recog-
nized, however. If Factor V be taken as the configura-
tion from which the majority of age interpretation be
made, the older hourly worker does not, at least, com-
pare unfavorably with his younger number. Thus we find
discipline being recorded neither more nor less for the
older worker. Above all, on this major age factor
neither number of absences nor total days lost enters
the picture, the older personnel concerned being ab-
sent neither more nor less than younger ones.

Factor VI, in recognition of its loadings on Pen-
sion (.54) and Discipline (-.35) variables, is consider-
ed to be a Conforming Behavior factor. There is in-
volved an element of the dependency configuration found
on Factor I, i.e., there are loadings on the sex, marit-
amal status, and dependents variable. The factor is con-
sidered to be a conformity or consideration factor,
however, in that in this case, something is done about
one's dependency status, i.e., the individual stays
out of trouble and covers himself for certain contin-
gencies by joining the pension plan. Presumably, from
the lack of loading on other variables, these individu-
als are of any age or length of service and work in
either production or clerical work, at any job level.
Ranking in last position in terms of common variance accounted for, the factor may still be suggesting some important employee behavior not fully covered in the present study. To the extent that this apparently conforming or cooperative behavior is being measured, it has no significant relationship to age. Older hourly personnel, therefore, in these terms can be considered to be neither more nor less conforming than younger ones.

Summary and Implications

For fourteen worker characteristic and efficiency-conformity criterion variables recorded for 1060 rank and file employees of Company A, a modified Thurstone centroid factor analysis has contributed six factors accounting for 79% of the total variance. The factors appear to be concerned with: **Dependency** - a factor unrelated to any efficiency or conformity variable but having significant relationship to both age breaks. Secondly, a **White Collar Work Factor** has been isolated. This factor may be described on the criterion variables in terms of being mobile and not being disciplined. Where age becomes important to the factor is for the second of the two age breaks, i.e., the "old-old" group. It is believed that this factor may define an
occupational area in which the older employee may function flexibly.

A third, "triplet" factor is here isolated, appearing to be a **Freedom from Policy Restriction** factor. It would tend to indicate to the writer that only the "flagging" of the automatic pay increase is a deterrent to discipline. Factor IV is loaded heavily with both frequency and severity absence; therefore has been named "Illness Absence". Absentees appear to be female, unskilled production workers of the median age ranges. They also tend to be past policy restriction lengths of service, and are disciplined, perhaps for their absences, but apparently not effectively disciplined.

Factor V describes **Age**. There is revealed a picture of the older worker of Company A as a long service, less educated, relatively unskilled, production worker. He shows probably in terms of his needs and eligibility, a strong tendency to join the pension plan; in fact, major support for the plan would appear to come from older workers. Again, the older worker is classified as more mobile, probably as a consequence of not having been examined, hence not classified, by the Medical Department. The picture, in conclusion, tells us more of the personal characteristics of the older worker than it tells us of his efficiency record.
Factor VI, with loadings on pension membership and discipline is felt to be a Conforming Behavior factor. The factor has no relationship to age.

The implications of the study in terms of age are these: In the first place, it is believed to have consequence for the matter of experimental design in gerontology studies, i.e., when the natural concomitants of age are studied along with age, there are found loadings for the former more significant than the loadings on age per se. Thus in the Absenteeism factor, the underlying conditions appear to be the nature of the work the older person is doing as well as other of his personal characteristics.

Secondly, there here emerges a rather complete picture of the older worker at Company A. Generally, he would appear to be operating under something of a handicap, i.e., he is found on production jobs which are frequently more of a physical strain than are other jobs. Where found on white-collar jobs he would appear to be in a better position. It may well be that, if Company A ever finds it desirable to retain workers past the present retirement age of sixty-five, they might first examine such possibilities in the clerical operation. However, even in the former, more unfavorable operation
the older worker shows in these data no great disad-
vantage as compared to younger workers.

Other implications are pertinent more as sugges-
tions to the Management of Company A in areas other
than age. Thus from an examination of the character-
istics of absentees, here presented, employment person-
nel might be able, either by formal or informal "weight-
ing" to cut into the present extent of absenteeism.

Again, the apparent difficulties with the Medical
mobility classifications show the need to make correc-
tions either in the medical or employment procedures.
Finally, there is evidenced here the effectiveness of
probationary period restriction only for the delay of
automatic pay increases. If discipline records are to
be maintained for other purposes, they may be more ef-
fective if more attention is given to discipline re-
cords when men are considered for promotion.
Chapter VII

SUMMARY AND IMPLICATIONS

Within the work groups here studied, it has been seen that a clearly favorable picture is obtained for older sales personnel. They have higher sales, better ratings, and are not as subject to turnover. For executive and wage groups, the situation would appear to yield mixed results. Thus, in the study of executive personnel via forced-choice ratings, it was found that, although valid age differences were few, older executives were rated down on the total score as well as on items appearing to pertain to inter-personal relations and, especially, on promotability. This last rating area, although an extremely "valid" one, is seen as perhaps not applicable to the older worker. And, because of the Company's need to replace a valuable top management staff now nearing the end of its term of office, there is perhaps an over-emphasis placed on promotability.

Similar findings were obtained from analysis of a graphic scale used to describe the same executive personnel. Older workers, once again, were found to
be most lacking in promotability. However, as with the forced-choice scale, older executives have other strengths. They are thus depicted as being better at cost control and as being more cooperative than younger executives.

A corollary study is of interest in view of the age-toward-age attitude studies made by other investigators. In the situation where supervisors are rated by their superiors, age biases, as tested, were not found to exist.

From an analysis of the efficiency of salesmen in Company A, there was found the clearest indication of the value of older personnel. Thus older salesmen were found to produce more, as determined from a number of sales production records. In addition, they are rated higher by their superiors on a number of important characteristics, such as customer relations, product knowledge, background for the job, detailing of physicians, display work, etc. Presumably his longer experience would give him an advantage over younger men in many of these. Finally, older salesmen are apt to be much more turnover-proof than are younger ones. The studies of salesmen, taken together with those of executives and hourly personnel, illustrate a hypothesis
earlier stated, i.e., the age-efficiency relationship may be found relative to a number of factors; one of which is the occupation in which older people find themselves. This is especially to be noted from the results of a comparison of the nomination scores obtained by salesmen, their supervisors and other, non-sales supervisors, an increase of score with age being found only for the salesmen.

It is difficult to determine the precise reason for the superiority of the older detailman. Some of it is felt to result from his longer service, if not with Company A, then perhaps with other drug concerns. However, he is found here to be especially superior in the area of immediate production rather than in the long-range phases of production concerned with detailing or reputation-building.

Finally, the older salesman is seen as a more desirable employee in that he is far less likely to leave the Company than is his younger counterpart. His turnover, moreover, is likely to be unavoidable turnover, a very minor portion of the total termination picture.

In our third and final analysis an attempt was made to study age and its concomitants in their relationship to a number of criteria available for
rank-and-file workers. Of the three studies this is the one where the data best permitted us to test the hypothesis set forth in Chapter I, i.e., that age may itself have less meaning than may some of the con­comitants of age. The method of Factor Analysis was used to test the hypothesis. Through use of a modified Centroid Method, six factors were isolated, only one of which appears directly related to age. This factor tends to depict the older hourly employee as less ed­ucated, relatively unskilled, tending to be found in production rather than in clerical work. Probably as a result of not having been medically examined he is apt to be classified as medically mobile. Finally, al­though pension plans may militate against selective re­tirement, the strongest support for the pension plan is seen as coming from the older worker.

Age has been found to have no relationship to other factors isolated. Thus on a Freedom from Policy Restriction factor neither of two age-breaks used enters into the picture. Again, a factor appearing to describe Conforming Behavior has no age relationship.

On the remaining factors, age has some relation­ship. Thus, slight significance for both middle and old age is found for a Dependency (Economic Support of Others) factor. A White Collar Work factor involves
only the age 55 and over group. In view of the other variables entering into this factor, it appears to define an occupational family where, given the prerequisite education, the older worker may operate flexibly, i.e., being mobile and not disciplined.

On the final factor defined in this study, median age ranges have significance. This factor is here termed Illness Absence. In addition to being in middle age ranges, absentees tend to be female production workers who are past the point of effective policy restrictions. It may be that the menopause, hard physical labor, and a type of work not conducive to high morale are important conditions underlying this finding.

The implications of these studies would appear to be several. First, in the area of executive evaluation, there is seen the need for Company A to consider for older personnel, as well as for others hired for specific purposes, characteristics other than potentiality ones. As evaluation devices are re-designed, they could be constructed so as to yield separate measurements of both potentiality and present job performance. The finding would also appear to have relevance for any industrial concern using potentiality scales to evaluate older personnel. Factor analyzed, forced-choice scales would appear to merit consideration
as a solution to these and other rating problems.

Several implications arise from the rank-and-file worker analysis. Some evidence appears to have been obtained here that disciplinary action in Company A is ineffective except in those instances in which automatic pay increases are "flagged" as a result of disciplinary notation. Clearer definition of the role of disciplinary action in the area of promotions may be needed.

Above all, the rank-and-file worker analysis yields a picture of the characteristics of older workers. These findings may be of value to Company A only. In view of their agreement with the work of other investigators as cited in Chapter II, they would appear, however, to have more wide-ranging significance.

Briefly, the data indicate that the older worker is in lower level jobs and the support of others. An understanding of this status may help to define his present work role. Secondly, there is indicated the fact that older, educated workers may operate more flexibly in clerical occupations. If older workers are to be hired or allowed to continue past the present retirement age of 65 years, first consideration might well be given to this occupational area.

Again, from a consideration of the variables
entering into the major age factor defined in this study there also may be an implication for a need to understand the older worker not in terms of his age but in terms of concomitant characteristics. Perhaps he is not affected so much by his age as he is by his lesser education, the type of work he is limited to, and his needs for security. Finally, from examination of the characteristics of absentees, employment personnel of the Company, either by informal or formal weighting systems may be able to select personnel somewhat more resistant to absence.

The sales analysis, however, would appear to yield the most objective implications. Of foremost importance would appear to be the need for officials of the Company to review both the present fixed retirement policy as well as policies relating to hiring age limits. Retirement of a group as highly rated and productive as the group now approaching retirement age would appear to represent waste of still useful "material". Again, especially in view of the Company's losses of personnel to other companies and enterprises, the hiring of older experienced salesmen may well represent a savings in turnover costs, and, possibly an increase in production. Both recommendations would appear at least worthy of trial, this in
view of the findings of superiority of the older salesman in virtually every important area of sales performance here tested.
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