11-1988

Development of a Weighted Application Blank for the Carryout Clerk Classification in a Large Retail Organization

Linda Gabbard
Western Kentucky University

Gabbard,

Linda G.

1988

DEVELOPMENT OF A WEIGHTED APPLICATION BLANK FOR THE CARRYOUT CLERK CLASSIFICATION IN A LARGE RETAIL ORGANIZATION

A Thesis Presented to
the Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

By
Linda G. Gabbard

November 1988

AUTHORIZATION FOR USE OF THESIS

Permission is hereby

☑ granted to the Western Kentucky University Library to make, or allow to be made photocopies, microfilm or other copies of this thesis for appropriate research or scholarly purposes.

☐ reserved to the author for the making of any copies of this thesis except for brief sections for research or scholarly purposes.

Signed Linda Gilliland

Date 12-7-88

Please place an "X" in the appropriate box.

This form will be filed with the original of the thesis and will control future use of the thesis.

WKU—Printing paid from state funds. KRS 57.375

DEVELOPMENT OF A WEIGHTED APPLICATION

BLANK FOR THE CARRYOUT CLERK CLASSIFICATION

IN A LARGE RETAIL ORGANIZATION

Recommended

Roy M Wandel

Director of Thesis

Elizabeth S. Effinger

John O Connor

APPROVED Dec. 13, 1958

Elmer Gray

Dean of the Graduate College

ACKNOWLEDGMENTS

I wish to express my appreciation to Ray Mendel, Elizabeth Erffmeyer and John O'Connor, the members of my thesis committee, for providing their expertise during this project. I also wish to thank H.E. Butt Grocery Company for allowing me the use of company data and, especially, Austin Reitenga for offering his computer skills and his support.

TABLE OF CONTENTS

DEVELOPMENT OF A WEIGHTED APPLICATION BLANK FOR THE CARRYOUT CLERK CLASSIFICATION IN A LARGE RETAIL ORGANIZATION

Linda G. Gabbard

November 1988

38 pages

Directed by: R. Mendel E. Erffmeyer J. O'Connor

Department of Psychology

Western Kentucky University

The purpose of this study was to develop and validate a Weighted Application Blank to predict turnover for use as a selection tool for a large retail organization. Utilizing the England (1971) procedure, it was hypothesized that significant derivation and cross-validities would be obtained. The hypothesis was partially supported: the derivation validity coefficient was significant ($r = .28$, $p < .01$) and the resulting cross-validity coefficient was not significant ($r = 19$, $p < .05$). The results and recommendations for implementation of the WAB are discussed.

CHAPTER I

Introduction and Literature Review

"What is needed is some weather vane which will show the way the labor winds are blowing before a gale sweeps valuable employees by your payoff window . . . " (Benge, 1925).

Employee turnover is a way of life for any organization. The positive effects of turnover include lower labor costs as a result of lower wages for new-hires and the exit of dissatisfied -- and often not fully productive -- employees, leading to the creation of opportunities for "new blood." Excessive turnover, however, can be expensive to the employer. Recruitment and training costs such as the time needed for employees to reach standard performance and the cost of closer supervision, as well as other costs, can be substantial. The purpose of the present study was to develop a method by which a large retail organization can better predict, before the hiring decision, turnover, and thus attempt to reduce turnover within its ranks.

Predictors of Turnover

Research on the topic of turnover is abundant. Researchers have studied both the characteristics of the individual and those of the organization that correlate with employee attrition. They have hypothesized relationships between turnover and intelligence, personal attributes (i.e., personality factors), demographic variables (e.g., age, sex, and family size), areas of interest, aptitudes in varying areas, tenure, attitudinal factors (e.g., job satisfaction), organizational

factors (e.g., organizational climate, recognition, work unit size, and supervisory styles) and referral sources.

In broad terms, the primary factors affecting a successful union between an individual and an organization are simply each of the two parties -- the individual with his or her unique attributes and the company with its unique culture. Businesses can therefore attempt to impact turnover from two angles: 1) By selecting individuals with certain traits or backgrounds that suggest they will remain with the company for a reasonable amount of time or 2) through creating and supporting an organization-wide climate and management style with the characteristics that research shows relate to low employee turnover. Developing and maintaining an organizational climate which provides opportunities that tend to satisfy its members requires top management support, continual communication and innovation, as well as modeling of the successful style. Such an environment is essential to retaining talented individuals -- especially in today's mobile society and relatively stable economy. The present paper, however, is not of the scope nor the complexity to tackle the subject of organizational philosophy. The researcher, therefore, chose to design a predictive tool that could be used in the selection process.

A recent review of turnover literature (Muchinsky & Tuttle, 1979) explored the reasons for turnover as well as the predictors of turnover. The 150 studies suggest that the most highly predictive factors are the employee's age, length of employment with current employer, behavioral intentions, and job satisfaction. The best predictive tools are biographical data forms (e.g., biographical information blanks and weighted application blanks). Use of any of the four predictive

factors alone is not appropriate in the present context. First, the Age Discrimination in Employment Act of 1968 made discrimination based upon age unlawful for certain age groups. Also, using age alone as a hiring criteria may not appear valid to applicants or current company employees. Second, length of employment in current job and job satisfaction are useful predictors for current or past employees only; the two measures are not quantifiable for applicants. Third, the measurement of behavioral intentions simply requires that individuals state how long they plan to stay with the firm. Although the method is simple and useful, all such studies reviewed by Muschinsky and Tuttle, with the exception of one (Waters, Roach & Waters, 1976), used behavioral intentions to predict turnover within a current employee population versus using the reported intentions before the hiring decision. Once employees experience the real work environment, their intentions may change if the reality and expectations do not coincide. Rather than test behavioral intentions in the present study, therefore, the tool chosen will incorporate a behavioral intention item which will be evaluated for predictive value at a later time.

Biographical data, or biodata, has none of the aforementioned limitations. Biodata can be collected in several forms to predict job success: application blanks, structured interviews, biographical information blanks (BIB's) and weighted application blanks (WAB's). All of these forms are used to obtain samples of relevant information including past behavior and demographics. When psychometric principles are used to quantify the elicited information, users can test the reliability and validity of the decision-making tools. As England (1971) notes, at that point the user is capitalizing on the three "hallmarks

of progress" in selection: standardization, quantification, and understanding.

The weighted application blank (WAB) was chosen as the preferred biodata tool in the present study because of the ease of administration, the short length of time in which it can be completed by the applicant and its excellent track record in predicting turnover.

The Weighted Application Blank

The weighted application blank technique provides a means for identifying the aspects of applicants' backgrounds that differentiate successful and unsuccessful groups. Once differentiating items are identified, weights corresponding to the predictive power of each item are assigned and a cut-off score is set. That score can be used -- perhaps in combination with other data -- to improve selection decisions. The WAB technique is most useful in an organization where the following conditions are met: 1) there is a large number of employees doing similar work, 2) turnover is high or a lot of applicants are seeking relatively few positions, and 3) training is lengthy or costly (Cascio, 1982).

Research. Weighted Application Blanks and other biodata tools have been used to predict job success since early in this century. Scott developed a personal history record in 1917 to predict success for salesmen (cited in Owen, 1976). Since that time, researchers and practitioners have designed WAB's and other biodata tools to predict a wide variety of criteria including professional licensure (Mitchell & Klimosky, 1982), work performance (Kavanagh & York, 1972) and turnover (Lee & Booth, 1974; Gable, Hollan & Dangello, 1984; and Mosel & Wade, 1951). Turnover literature is the most prevalent and several authors

have used biodata to predict turnover in the retail sector, where turnover is typically quite high -- 30 percent across jobs, according to Cohen & Schwartz (1980).

In 1951, Mosel and Wade developed a WAB to predict turnover in retail sales employees. National Dry Goods Association was experiencing 78 percent turnover in its sales clerk ranks at an estimated cost of $125 per existing employee. Using a concurrent design, the researchers quantified and tested 42 items. Thirteen items predicted turnover when Mosel and Wade used the vertical percent method to weight items: age, weight, height, marital status, domicile, number of dependents, years of formal education, former sales experience, number of years of selling experience, time in most recent job and next-to-last job, and amount of lost time from work during the past two years. The set of 13 items retained their predictive power following cross-validation. When the researchers weighted the common application blank items at another store in the same city, only three were predictive (age, number of years of education, and domicile). The researchers noted that the prevalent management styles at the two stores were dramatically different. Apparently, practitioners cannot generalize results from a limited development group; rather, information from a representative sample of sites should be used.

A second study within the retail industry attempted to construct a valid WAB to predict turnover of managerial trainees. Gable, Hollan, and Dangello (1984) studied a national retail store chain, with more than 700 outlets, that had a 49 percent voluntary turnover rate per year. Using probit analysis, a psuedo-regression model, the authors found four variables significantly predictive of voluntary turnover:

prior military service, whether or not the trainees earned income to finance their educations, whether or not the applicant had a basic understanding of the job and past retail work experience. When the authors deleted items that clearly offered no explanatory help, and thus used only the eight variables that had been significantly predictive at the 20 percent level or lower, three variables were significant: understanding of the job, recruiting source, and the number of extra-curricular activities during school. Using the hold-out group, the authors found their predictions of turnover correct in 66 percent of the cases. Several of these variables may be potential predictors of success (as measured by tenure) for retail sales clerks. Dropping out college-related questions, items of interest are: 1) prior military experience, 2) understanding of the job, 3) past retail experience, and 4) recruiting source.

Certainly, WAB research has been shown to be useful in the retail sector for both professional and nonprofessional positions. In the present study, the employee group of interest is the nonprofessional part-time employee population. In the retail industry, where a part-time workforce ensures flexibility in scheduling and lower labor costs, more than half of the workforce is often on part-time status. Gannon and Northern, a pair of only a handful of researchers who have studied the part-time worker, found that the variables affecting turnover for part-time workers differed from those found predictive in studies using full-time workers (1971).

The researchers administered questionnaires to checkers at 14 Giant supermarket stores measuring job attitudes, personal traits, and demographic variables. Whereas job attitudes (as influenced by

supervisory style, type of work, etc.) are typically found to impact turnover, such factors did not correlate with turnover for part-time checkers. Several personal characteristics and one demographic variable, however, did appear to influence turnover: intelligence, initiative, self-assurance, and perceived occupational level all correlated negatively with turnover; age correlated positively with turnover. The demographic variables not related to turnover were marital status, years of education, number of children, current attendance/nonattendance of school on a part-time basis (full-time students were not included in this study) and area in which the employee was raised. Gannon and Northern's results, when considered along with other turnover research such as that reviewed by Shuh (1967) and Muchinsky and Tuttle (1979), highlight the need to separate predictive tools for primarily part-time employee populations. The present study will, thus, limit its sample to employees hired on part-time status since that is the group with the highest turnover rate.

Validity Research. The WAB is unique in that the criterion-related validity of the tool is ensured through the very method by which it is designed. Through archival research, using personnel records such as application forms, only those items found predictive of the criteria are scored on the newly developed application blank. However, several validity-related issues do arise: long-term validity, accuracy of self-reported answers to questionnaire items (i.e., the honesty of respondents), validity of certain types of items and their response categories, and adverse impact issues (e.g., differential validity).

Brown (1978) suggests that the long-term validity of biodata tools relates to several factors: scoring key confidentiality, test main-

tenance, and development sample size. Several prior studies showed significant drops in the validity of biodata tools within a few years' time (Hughes, Dunn & Baxter, 1956 and Wernimont, 1962). Brown studied a personal history form developed on a large sample (10,111) of life insurance agents. A cross-validation study had shown no drop in predictive power. Brown, using turnover and productivity as the criteria (as in the development study), collected data on 14,767 agents thirty-five years later and found no change in validity. In other words, the scoring key developed in 1936 still predicted turnover and productivity for 1969-71 applicants. Even with a greater restriction of range, since the biodata form had been used to select the applicants in the sample groups, the questionnaire predicted the criteria. The results are especially interesting when one considers the mass economic and social changes that occurred during those 35 years. Brown's results suggest that long-term validity may be improved by: 1) large sample sizes used both in follow-up studies and to develop the original questionnaire, 2) highly confidential scoring keys (that is, arranging for all questionnaires to be scored by unbiased scorers at a central location), and 3) periodic rescaling of items -- that is, reviewing and changing item weights, if necessary.

Another validity-related issue revolves around the accuracy of individuals' responses to items. Since biodata questionnaires are essentially self-report measures, applicants have the opportunity to falsify information. Several authors have studied the accuracy of responses to personal history items (Mosel & Cozan, 1952; Goldstein, 1971; and Cascio, 1975) and found correlations between responses to verifiable items and other sources (e.g., prior employers' records

and government records) to range dramatically. For example, Cascio (1975) found a median correlation of .94 when he studied 17 items from a questionnaire administered to 112 current police officers in a large metropolitan area. The biggest discrepancies were in response to items regarding age at first marriage, type of high school attended longest, and number of full-time jobs held after leaving high school. Higher correlations were found for questions such as the reason for leaving last full-time job, number and length of employment at previous full-time jobs, and amount of part-time work experience during last year of school.

In a similar study using only three categories, Mosel and Cozan (1952) correlated answers to questions during an interview with data contributed by prior employers. The sales and office employees provided information regarding wages, length of employment, and job duties in previous jobs. The correlation for all questions, except one, was over .90. Mosel & Cozan found the interviewees most likely to distort -- over estimate -- wage information. They found no relationship between accuracy of items related to a particular job and recency of that job, nor did the authors find significant sex differences.

Both of these studies used populations that are different from the typical employment applicant population in that both sets of data were from current employees at the time of collection (i.e., when the interview or application blank was completed). The respondents would thus certainly not be under the same kind of pressure as before-hire applicants. In 1971, Goldstein conducted a study using 111 nurses aid applicants. After the potential nurses aides had completed application forms, the author requested information regarding position, employment dates, salary, and reason for termination of employment from the

applicant's most recent employer. Goldstein found complete agreement on only about one-third of the questions. The highest discrepancies were in salary (typically overestimated by applicants) and duration of employment (where the mean underestimate was by three months and the mean overestimate was by 16 months). Goldstein's study poses an interesting question regarding the accuracy of applicants' responses to questionnaires. The significance of the disparity among applicants' versus former employers' responses, however, is hard to determine since Goldstein reported the percentage of conflicting answers versus correlations. In other words, one does not know how far the applicants' responses were from the data provided by former employers, nor, for quantifiable data, if the differences became more extreme at the extremes of the scales (that is, with many years' service and higher salaries).

Although Cascio (1975) and Mosel & Cozan's (1952) results are optimistic, Goldstein's results point out the potential for inaccurate responses. Developers of biodata forms such as WAB's, thus, must take steps to ensure the validity of responses. Some methods that may help, and will be used in the present WAB, are: 1) to have applicants sign a statement verifying that all information provided is correct and noting their understanding that providing false information can both disqualify them as candidates and result in suspension or termination from employment if hired, 2) to have applicants provide not only the names of prior and current employers, but also addresses and telephone numbers of those firms or individuals, and 3) to inform applicants that the information provided on the application form will be verified where possible.

In addition, WAB item developers should consider the work of Larson, Swarthout, and Wickett (cited in Owens, 1976). The investigators instructed a group of college seniors to complete a 65-item questionnaire "honestly" and then "as though you are a job applicant." They found that those items least susceptible to "faking" were historical in nature: "I have done..." versus "I will do...". Also, with respect to self-evaluation items, the authors found that those with options differing only in degree ("I am rarely/sometimes/usually/always friendly") or those differing in nature but not in degree ("I am friendly/pleasant/quiet/aggressive around people I don't know well") should be avoided.

Item development can impact validity of any biodata tool significantly and several authors have contributed valuable research and provided practical advice to test developers. Following a review of literature that helps identify potential predictors, item writers are challenged with writing item stems (or questions) and response categories to collect reliable & valid data. Items can be, for example, verifiable or unverifiable, historical or futuristic, factual or interpretive, specific or general, relying on memory or conjecture, and so on. Response categories may be dichotomous (i.e., yes/no) or continuum/noncontinuum with single or multiple choices allowed. Of course, one WAB form may utilize a combination of item stem and response category types.

In 1962, Owens, Glennon, and Albright published guidelines for obtaining acceptable test-retest reliability with biodata tools. Their study resulted in four item writing rules: 1) Brevity is desirable, 2) response options should be expressed in numbers, 3) either all possible response options should be available or an "escape" alternative should be provided and 4) items should carry a neutral or pleasant

connontation. In addition, in an article published in the Handbook of Industrial/Organizational Psychology, Owens (1976) suggested that continuum item response categories are preferable because of the higher likelihood of validation and their adaptability to statistical analysis. Also, multiple choice options versus single choice options (that is, "chose all that apply" versus "chose one") are inferior because of the lower probability of different applicants choosing the same cluster of responses.

Since the present study is archival in nature, the author is limited by the information contained in the available sources and is thus constrained to certain items or questions. Most of the questions are historical in nature and the response categories developed include dichotomous, continuous and noncontinuous options. Once predictive items are identified in this study, the aforementioned guidelines will be used to write items.

The final issue relating to the validity of any selection devise carries potentially the most liability for the employer -- selection devise validity as defined by the Equal Employment Opportunity Commission (EEOC). According to the Uniform Guidelines on Employee Selection Procedures (1978), employers may use selection procedures, including tests. Ideally, such devices should be job-related but should not unfairly discriminate against those individuals protected under Title VII of the Civil Rights Act of 1964. Legally, if any selection device disqualifies a higher proportion of a certain class of individuals than it does other individuals, then a prima facie case of unfair discrimination may be established. At that point, the burden of proof lies on the employer to demonstrate validity and selection fairness.

Criterion-related validity is built into the development of weighted application blanks, ensuring that WAB scores are valid predictors of the chosen criterion. The tool, however, is not isolated from scrutiny from the courts and is especially vulnerable in two areas: 1) While the WAB as a whole may show validity through its development, individual items may not be job-related, and 2) the tool may have different levels of validity for separate subgroups.

First, the job-relatedness of a single item and the possibility that an individual item tends to be answered by certain subgroups in a particular way (and thus discriminates) is a concern for any employer utilizing tests in the selection or promotional process. Although the Uniform Guidelines (1978) state that the whole selection process is subject to scrutiny, in the past the EEOC and the courts have seemed most interested in the relationship between total scores and job performance. In fact, the Uniform Guidelines suggest that "in considering whether to take enforcement action, the Government will take into account the general posture of the employer concerning equal employment opportunity" (p. 38291, emphasis not included). Nevertheless, it is prudent of users to discontinue items the answers to which appear to be moderated by race, sex, color, or national origin.

The second issue is related to the concept of test fairness. Unfairness is defined by the Uniform Guidelines (1978) as evident when "members of one race, sex or ethnic group characteristically obtain lower scores on a selection procedure than members of another group, and the differences in scores are not reflected in differences in a measure of job performance..." (p. 38301). The Uniform Guidelines

state that, where it is "technically feasible" (i.e., the sample size is sufficient), fairness should be investigated.

More research has been conducted to study differential validity than any other test fairness model. Differential validity results when a single test can be shown as valid at a certain level for one subgroup but as having less validity for another subgroup. In other words, the test is more predictive for one group so that an observer can have more confidence in the resulting performance for that group than for the other. Combining the groups reduces the predictive potential of the test for one group and gives less useful (or useless) information regarding the other group -- the test scores for the second group may not reflect potential job performance. In some cases, the test is valid for both subgroups, but the strength of the correlation for each group is significantly different. Therefore, once a predictive tool (with significant validity) has been developed, researchers may determine validities for separate homogeneous groups, and, if significant differences in validities are found, the selection device should be revised or its use should be limited to the group for which it is valid. Prior research, however, has consistantly failed to identify differential validity as a real world phenonemon.

In 1976, for example, Cascio developed a weighted application blank and evaluated its differential validity. Application blank responses from 160 female clerical applicant-hires were used to design and cross validate a biodata form. Cascio found no significant differences in validity of the WAB for minorities (Spanish speaking and blacks) and nonminorities (whites) between the two groups. Since prior research has shown that more objective selection tools (such as tests)

are less prone to test unfairness, the WAB may present a strong case for both validity and fairness.

CHAPTER II

The Present Study

The present study represents an attempt to develop a weighted application blank for use as a selection device in a large retail organization.

The organization for which the present study will be conducted, hereto referred to as LRO, employs approximately 25,000 people in the southwest. Approximately 50% of the workforce is Hispanic, 48% Anglo and 2% black. The majority of the personnel is employed on a part-time basis in retail outlets and about one-third of the employees are classified as part-time carryout clerks. In the two years prior to this study (January 1985 to December 1987), the annual company-wide turnover rate was around 42% with the rate for part-time carryout clerks being significantly higher. An analysis of the time-frame within which most turnover occurs showed that the greatest amount occurs between three and six months of hire and, secondly, within three months of hire.

The employee subgroup with the highest turnover rate is the carryout clerk classification. Thus, this is the group that was targeted as that for which the WAB would be developed. Nearly all store new-hires at LRO begin as part-time carryout clerks and may be promoted from that position to other, usually part-time, positions. Opportunities to advance to full-time status are limited with even the best performers generally remaining on part-time status for over a year. The estimated

cost of hiring and training a carry-out clerk (including labor hours, training materials and administrative costs) is $100 -- a yearly cost of more than $350,000 based on current turnover rates. Obviously, a significant reduction in turnover could result in substantial savings for LRO.

In the present study, the empirical approach to scoring biodata will be used. Several techniques exist, but the two most commonly used methods are the "rational" and "empirical" approaches. The rational approach utilizes factor analysis or internal consistency analyses to quantify clusters of items that measure a set of meaningful constructs. The criterion measure is regressed on the items, resulting in a regression equation that is predictive of the criterion. The empirical method, on the other hand, simply requires that two criterion groups be formed -- a high criterion group consisting of employees that performed well on the criterion and a low criterion group consisting of employees that did not perform well on the criterion. These groups are then used to identify and weight items that differentiate between them.

The empirical method is simpler, requiring, according to England (1971), about 100 labor hours. Logically, however, it has constraints in that it does not facilitate understanding of turnover nor does the method take into account potential redundant measurement of the criterion -- more than one item may account for identical variance in the criterion, thus reducing the validity of the instrument. Mitchell and Klimosky (1982) compared the rational and empirical approaches to determine which method yielded higher derivation and cross-validities. Using a sample of 698 real estate sales licensure candidates, they

found both scoring methods useful for predicting the criterion of licensure attainment. However, the cross validity of the empirical method was significantly higher than with the rational approach.

Based on Mitchell and Klimosky's (1982) results, along with the fact that the empirical approach is less time-consuming and expensive, the method of choice for the present study is the empirical approach -- specifically England's approach (1971). England's is the most frequently cited of all empirical methodologies and has the most consistently high validity coefficients (Wiess, 1976).

Hypothesis

Based on the review of literature, it is hypothesized that significant derivation and cross validities will be obtained.

CHAPTER III

Methodology

Criterion Development

The criterion of interest in the present study is tenure. In order to define the short-tenure and long-tenure classifications, eight company managers were polled -- two current store managers and six current human resources professionals (four of the six had been promoted from the store manager classification). The group agreed, with 87.5% agreement, that the best definition of "short-tenure" (i.e., the low criterion group) was three months tenure or less. In order to diversify the sample, extremes in criterion performance were identified. Thus, for the derivation sample, the long-tenure (i.e., high criterion) group was defined as those employees who stayed with LRO at least six months.

Sample

Two hundred and ten application forms of individuals within each of the two criterion groups were randomly chosen if they met the following criteria: 1) had been hired in the 1986 calendar year, 2) were classified as part-time carryout clerks at the time of hire, and 3) if their employment has been terminated, the termination was voluntary. Upon completion of the derivation study, two hundred application forms of individuals meeting the following criteria were selected: 1) had been hired between January 1, 1987 and April 30, 1988, 2) were classified as part-time carryout clerks at the time of

hire, and 3) if they had terminated from employment, the termination was voluntary. Four subjects were deleted from the study because their application forms were grossly imcomplete.

During coding, three subjects were deleted from the study because their application forms were grossly incomplete. The total ending sample size was 613 (417 derivation group subjects and 196 hold-out group subjects).

Procedure for WAB Development

The application was examined and 45 items (see Appendix A) were chosen based on a review of previous research. Tentative response categories were developed and application blank items were coded using the guidelines suggested by England (1971), Owens (1976) and Owens, Glennon and Albright (1962). Ten items (Items 2, 5, 6, 7, 11, 20, 21, 31, 35 and 36) were dropped during coding because, based on applicant responses, they appeared to be ambiguous or because all, or nearly all, applicants had responded identically.

Following coding, the response catagories were modified using the method of equal frequency classes -- that is, by dividing the responses of the combined weighting groups into classes with an approximately equal number of individuals in each class. The researcher checked for reversals within each class by noting the number of respondents for each possible catagory and, where possible, for each potential answer. By viewing all responses, the researcher determined that some items obviously did not differientiate between the high-criterion and low-criterion groups. Also, substantial decreases in sample sizes for some questions were observed. For example, several items referred to previous experience as an LRO employee. The number of applicants

who were able to respond to those items was nominal. As a result of these observations, 14 items (Items 12, 13, 14, 15, 16, 23, 28, 32, 37, 38, 39, 40, 41, and 42) were eliminated. The differentiating power of the remaining 21 items (see Appendix B) was determined using the England method.

Using England's (1971) procedures, as follows, only the items which differentiate between the high and low criterion groups were ultimately weighted: 1) The number of subjects from the high and low criterion group, from the development sample, whose responses fell into each item response category were recorded, 2) these numbers were converted into percentages using the appropriate number of subjects for each of the two groups, 3) the percentages for the low criterion development group were subtracted from the corresponding percentages for the high criterion development group, 4) the net weights for the differences were determined using Strong's Tables of Net Weights for Differences in Per Cents (reproduced in England, 1971), and 5) in order to eliminate negative values, net weights were converted to assigned weights using England's Table of Assigned Weights Derived from Net Weights (England, 1971).

One item (Item 9) was eliminated following step one because of an insufficient sample size (high criterion n = 33, low criterion n = 57). Five additional items were eliminated following step four because 1) all of the response options for each question were assigned the same nets weight -- in other words, the item did not differentiate between the two criterion groups (Items 29 and 33), 2) the resulting item weights escaped rational explanation and thus appeared spurious (Items 34 and 44) or 3) the item overlapped with another item that

had higher differentiating power (Item 24). Conversion of net weights to assigned weights resulted in the deletion of 12 of the remaining 15 items because the weights for each of the response options in the separate items were identical. However, because of the large sample on which the weights were derived, and the resulting confidence in the stability of the weights, the researcher decided to use net weights. The 15 items that, hence, made up the weighted application blank are age, time in current address, time in previous address, years of education, activities during educational years, desire for full-time employment versus part-time employment, desired salary, date of availability for employment, amount of previous work experience, amount of previous retail work experience, average time in all retail positions, amount of time in most previous retail postion, reason for leaving last job, whether or not relatives work for LRO and emergency contact (See Appendix C).

Cross-Validation

Next, the items weights derived using the development sample (or derivation group) was applied to the hold out group, then those scores were correlated with the tenure criterion.

CHAPTER IV

Results

Validity

A product-moment correlation coefficient was calculated for the derivation group. The WAB scores of the subjects assigned to the development group were correlated with their criterion scores (i.e., short-tenure /<90 days or long-tenure />185 days). The resulting correlation was .28 which is statistically significant ($p < .05$).

The cross-validity coefficient was calculated by correlating the WAB scores of the hold-out group members with their criterion scores (i.e., short-tenure /<90 days or long-tenure />90 days). The resulting correlation, .193, was not statistically significant ($p < .05$).

Discussion

The hypothesis, that significant derivation and cross-validities would be obtained, was partially supported by the present results. That is, the derivation validity was statistically significant ($r = .28$, $p<.05$), however the cross-validity was not statistically significant ($r = .19$, $p<.05$). Since the correlation coefficient obtained during the second (i.e., cross validation) study decreased from that obtained during the derivation study, it is obvious that the weights assigned to the derivation sample were not applicable to the cross validation group.

Several potential reasons for the present results exist. First of all, it is possible that the results obtained in the first study were spurious. That is, the results of the derivation study, which indicated a significant positive relationship between tenure and the WAB were due to chance. Although some such error is bound to occur in all psychological research, it is unlikely that the results of the original (i.e., derivation) study were spurious because of the conservative approach taken in this study. The researcher took steps to assure valid results by choosing a large sample size and conducting an in-depth literature review to identify procedures and specific items that have proven useful in obtaining positive results.

Another potential reason for the results obtained during cross-validity is that the samples used for the two studies were different from each other. The subjects chosen for the hold-out study had joined LRO one day to two and one-third years later than the original (i.e., derivation) group. The derivation group members had been hired in 1986 while the hold-out members were hired between January 1, 1987 and April 30, 1988. Possibly, the populations from which the samples were chosen varied significantly from each other. Factors such as the labor pool may have affected the sample. Another factor related to population is possibly the factor that had the most impact on the current results. The derivation study looked at extremes in criterion performance; the "unsuccessful" or short-tenure group was made up of individuals with less than 90 days' tenure with LRO while the "successful" or long-tenure group was composed of individuals with 180 days or more tenure. Although the technique helps strengthen the correlation coefficient, the cross-validity study required looking

at the entire tenure continuum in order to observe the predictability of turnover based on a realistic population sample. The researcher also wanted to calculate other statistics, such as the base rate of turnover, that could be used in further analyses. As expected, the correlation coefficient decreased, and at least part of that shrinkage can be attributed to the use of extreme criterion groups in the original (i.e., derivation) study.

Thirdly, the number of subjects in the short-tenure criterion group for the hold-out sample was small. Although 173 subjects made up the hold-out sample, only 46 had less than 90 days tenure with LRO. England's guideline is 50 per group and, as always in psychological research, even more is better. However, since the hold-out group was randomly chosen the distribution of subjects into each of the two criterion categories (long-tenure and short-tenure) could only be estimated. Because the confidence one can have in the results of research based on large groups of subjects, the size of the correlation coefficient needed to reach significance is lower than for studies -- such as the present cross-validation study -- with fewer subjects.

A fourth phenomenon that may have contributed to the present results is restriction of range. The prior selection of all LRO employees, and thus the current subjects, using the application form that was used in the present study may have caused the entire sample population to be homogeneous. This restriction of range in the predictor may deflate the observed validity estimates (Arvey, 1979). However, it is unlikely that restriction of range had a significant impact on the current results since the predictor (i.e., application blank) was em-

ployed to screen candidates for the carryout clerk classification in both the derivation and cross-validation study.

A final factor that may have impacted the current study is that it was archival in nature -- that is, only data existing on the application blanks was used. This procedure does not allow the use of many items that have been found predictive in past research (e.g. Glennon, Albright & Owens, 1966). Furthermore, the research was limited to 45 items. Mitchell and Klimosky (1982) suggest that if the original question pool is small or poorly chosen, shrinkage is likely during cross-validation. The use of archival data limits the research to items contained on the original application form.

Implications

The weighted application blank developed in the present study is not a valid predictor of tenure. From both a legal and practical standpoint, it should not be implemented as a selection device at LRO.

The results of the present study are, however, valuable from a theoretical standpoint. It highlights the importance of cross-validation studies to measure the stability of correlation coefficients resulting from validity studies as well as the potential drawbacks of using a concurrent design (with, therefore, some restriction of range), small sample sizes, samples drawn from separate populations and archival data.

APPENDIX A

PROPOSED WAB ITEMS

1. Age at hire: _____ years

2. Mailing address: Same as emergency contact
   Different from emergency contact

3. Time spent at previous address: _____months

4. Time at current address: _____months

5. Do you have a current valid driver's license? Y/N

6. Do you have your own transportation? Y/N

7. Have you ever been convicted of a felony? Y/N What? _____

8. Years of education: _____

9. How was education financed? Parents
   Self
   Loan
   Grant
   Other

10. What kind of extracurricular activities were you involved in? Sports
    Academic
    Other
    None

11. Military experience? Y/N

12. Are you a previous employee of this company? Y/N

13. If previously employed, was the position a carry-out clerk? Y/N

14. How long did you work for this company? _____months

15. Reason for leaving: Pay
    Hours
    Working conditions
    Other

16. Is the current position for which you are applying the same or different job that you had previously worked?

    Same
    Different

17. Is applicant looking for:
    - Part-time
    - Full-time
    - Either

18. Requested starting salary:
    - Open
    - Actual rate offered
    - More than 10% above actual rate
    - Between 1% and 10% above actual rate
    - More than 10% below actual rate
    - Between 1% and 10% below actual rate

19. When can you begin work?
    - ASAP
    - 2 days to 2 weeks
    - More than 2 weeks

20. Can you work day shift? Y/N

21. Can you work evening shift? Y/N

22. Total number of months experience: _____

23. Previous retail experience? Y/N

24. Number of retail positions held: 0, 1, 2, 3, 4

25. Average number of months in retail positions: _____

26. Total number of months in last retail position: _____

27. Total number of months in retail: _____

28. Most recent salary above/below current starting wages.

29. Job Duties:
    - Carryout clerk
    - Retail
    - Other

30. Reason for Leaving:
    - Pay
    - Hours
    - Working conditions
    - Other

31. May we contact previous employer? Y/N

32. Previous salary above/below current starting wages?

33. Job Duties:
    - Carryout clerk
    - Retail
    - Other

34. Reason for leaving:
Pay
Hours
Working conditions
Other

35. May we contact previous employer? Y/N

36. Physical Condition _____Good
_____Problems

37. Time lost from work in last 2 years? _____days

38. Are plans for future related to this company? Y/N

39. Are plans related to:
This company, retail
This company, other
Retail, but not this company
Not retail

40. Do you belong to any civic, professional, or other organizations that are job related? Y/N

41. How many job related organizations are you involved in? 0,1,2,3,4

42. Does your spouse work for this company? Y/N

43. Do you have relatives working for this company? Y/N

44. Number of references 0, 1, 2, 3

45. Who may we contact in case of emergency?
Spouse
Parent
Other relative
Other

APPENDIX B

CONVERSION OF WAB ITEMS TO NET AND ASSIGNED WEIGHTS

	RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT	ASGND WEIGHT
1.	AGE:	<16,16	58	31	28%	16%	12%	3	1
		17	47	40	23%	21%	2%	0	1
		18,19	47	52	23%	27%	-4%	-1	1
		20-24	33	53	16%	27%	-11%	-2	1
		>25,25	23	19	11%	10%	1%	0	1
		T	208	195	100%	100%	0%		
2.	TIME	<12M	66	99	33%	52%	-19%	-4	0
	CURRENT	>12,<48	44	37	22%	19%	3%	1	1
	ADDRESS:	>48,<120	38	30	19%	16%	3%	1	1
		>120	50	24	25%	13%	13%	3	1
			198	190	100%	100%	0%		
3.	TIME	<24	38	66	26%	41%	-15%	-3	1
	PREVIOUS	>24,<60	48	34	33%	21%	12%	3	1
	ADDRESS:	>60,<120	39	28	27%	17%	9%	2	1
		>120	21	33	14%	20%	-6%	-1	1
			146	161	100%	100%	0%		
4.	YRS EDUC:	<9	26	20	13%	10%	2%	0	1
		10	46	28	22%	14%	8%	2	1
		11	39	32	19%	16%	2%	0	1
		12	59	61	29%	31%	-3%	-1	1
		>13	37	53	18%	27%	-9%	-2	1
			207	194	100%	100%	0%		
5.	**** EDUC.	P	14	23	42%	40%	2%	0	1
	FINANCED:	S	10	15	30%	26%	4%	1	1
		G	8	9	24%	16%	8%	2	1
		L	1	5	3%	9%	-6%	-2	1
		O	0	5	0%	9%	-9%	-4	0
			33	57	100%	100%	0%		

	RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT	ASGND WEIGHT
6.	ACTIVITIES	A	40	31	22%	17%	4%	1	1
		S	86	73	46%	41%	6%	1	1
		O	19	32	10%	18%	-8%	-2	1
		N	40	44	22%	24%	-3%	-1	1
			185	180	100%	100%	0%		
7.	DESIRE FT/PT	FT	37	114	19%	62%	-43%	-11	0
		PT	140	51	73%	28%	45%	12	2
		E	16	19	8%	10%	-2%	0	1
			193	184	100%	100%	0%		
8.	DESIRED SALARY:	AR	78	69	38%	35%	3%	1	1
		>10%A	31	16	15%	8%	7%	1	1
		<10%A	13	35	6%	18%	-12%	-4	0
		>10%B	30	23	15%	12%	3%	1	1
		<10%B	14	9	7%	5%	2%	0	1
		OPEN	39	43	19%	22%	-3%	-1	1
			205	195	100%	100%	0%		
9.	WHEN BEGIN:	A	163	156	84%	89%	-5%	-1	1
		<2WK	27	19	14%	11%	3%	1	1
		>2WK	5	1	3%	1%	2%	2	1
			195	176	100%	100%	0%		
10.	TOTAL MO EXP:	0	32	17	27%	15%	12%	3	1
		>0,<12	39	47	33%	42%	-9%	-2	1
		>12,<24	17	16	14%	14%	0%	0	1
		>24,<72	27	26	23%	23%	-1%	0	1
		>72	3	5	3%	5%	-2%	-1	1
			118	111	100%	100%	0%		
11.*	# RETAIL: POSITIONS	0	86	71	48%	41%	7%	1	1
		1	56	59	31%	34%	-3%	-1	1
		2	29	34	16%	20%	-4%	-1	1
		>3	10	10	6%	6%	0%	0	1
			181	174	100%	100%	0%		

	RESPONSE CATEGORY	NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT	ASGND WEIGHT
12. T MOS	0	86	71	51%	44%	7%	1	1
RETAIL:	>0,<12	38	58	23%	36%	-13%	-3	1
	>12,<24	19	19	11%	12%	0%	0	1
	>24	25	14	15%	9%	6%	1	1
		168	162	100%	100%	0%		
13. $\bar{X}$ MOS	>0,<12	50	72	62%	79%	-17%	-4	0
RETAIL:	>12,<24	19	10	23%	11%	12%	3	1
	>24	12	9	15%	10%	5%	2	1
		81	91	1	1	0%		
14. MOS LAST	>0,<12	54	68	66%	75%	-9%	-2	1
RETAIL:	>12,<24	15	13	18%	14%	4%	1	1
	>24	13	10	16%	11%	5%	1	1
		82	91	100%	100%	0%		
15.** JOB	CC	9	12	6%	7%	-1%	0	1
DUTIES:	R	57	62	39%	38%	1%	0	1
	O	82	91	55%	55%	0%	0	1
		148	165	100%	100%	0%		
16. REASON	S	27	30	19%	20%	-1%	0	1
LEFT:	M	21	28	15%	18%	-4%	-1	1
	R	34	25	24%	16%	7%	1	1
	P	7	10	5%	7%	-2%	-1	1
	H	12	11	8%	7%	1%	0	1
	O	31	38	22%	25%	-3%	-1	1
	SE	12	10	8%	7%	2%	1	1
		144	152	100%	100%	0%		
17.** JOB	CC	5	7	5%	6%	-1%	0	1
DUTIES:	R	41	48	41%	41%	0%	0	1
	O	55	62	54%	53%	1%	0	1
		101	117	100%	100%	0%		

RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT	ASGND WEIGHT
18.*** REASON LEFT:	S	21	20	19%	17%	2%	0	1
	M	14	24	13%	21%	-8%	-3	1
	R	23	23	21%	20%	1%	0	1
	P	4	2	4%	2%	2%	2	1
	H	8	6	7%	5%	2%	1	1
	O	28	33	25%	28%	-3%	-1	1
	SE	12	8	11%	7%	4%	2	1
		110	116	100%	100%	0%		
19. RELATIVES:	Y	27	11	14%	7%	8%	3	1
	N	163	158	86%	93%	-8%	-2	1
		190	169	100%	100%	0%		
20.*** # REF:	0	21	19	10%	10%	0%	0	1
	1	9	11	4%	6%	-1%	0	1
	2	25	13	12%	7%	5%	1	1
	>3,3	153	152	74%	78%	-4%	-1	1
		208	195	100%	100%	0%		
21. EMERG. CONTACT:	P	143	126	69%	66%	3%	1	1
	S	13	17	6%	9%	-3%	-1	1
	OR	33	24	16%	13%	3%	1	1
	O	18	23	9%	12%	-3%	-1	1
		207	190	100%	100%	0%		

* ITEM DROPPED BECAUSE OF LACK OF DIFFERENTIATION AND EXPECTED OVERLAP WITH ITEM 12.

** ITEM DROPPED BECAUSE OF LACK OF DIFFERENTIATION.

*** ITEM DROPPED BECAUSE OF LACK OF CONCEPTUAL REASON FOR RESULT.

**** ITEM DROPPED BECAUSE OF INSUFFICIENT SAMPLE SIZE.

APPENDIX C

CONVERSION OF SELECTED WAB ITEMS TO NET WEIGHTS

	RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT
1.	AGE:	<16,16	58	31	28%	16%	12%	3
		17	47	40	23%	21%	2%	0
		18,19	47	52	23%	27%	-4%	-1
		20-24	33	53	16%	27%	-11%	-2
		>25,25	23	19	11%	10%	1%	0
		T	208	195	100%	100%	0%	
2.	TIME	<12M	66	99	33%	52%	-19%	-4
	CURRENT	>12,<48	44	37	22%	19%	3%	1
	ADDRESS:	>48,<120	38	30	19%	16%	3%	1
		>120	50	24	25%	13%	13%	3
			198	190	100%	100%	0%	
3.	TIME	<24	38	66	26%	41%	-15%	-3
	PREVIOUS	>24,<60	48	34	33%	21%	12%	3
	ADDRESS:	>60,<120	39	28	27%	17%	9%	2
		>120	21	33	14%	20%	-6%	-1
			146	161	100%	100%	0%	
4.	YRS EDUC:	<9	26	20	13%	10%	2%	0
		10	46	28	22%	14%	8%	2
		11	39	32	19%	16%	2%	0
		12	59	61	29%	31%	-3%	-1
		>13	37	53	18%	27%	-9%	-2
			207	194	100%	100%	0%	
5.	ACTIVITIES	A	40	31	22%	17%	4%	1
		S	86	73	46%	41%	6%	1
		O	19	32	10%	18%	-8%	-2
		N	40	44	22%	24%	-3%	-1
			185	180	100%	100%	0%	

	RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT
6.	DESIRE FT/PT	FT	37	114	19%	62%	-43%	-11
		PT	140	51	73%	28%	45%	12
		E	16	19	8%	10%	-2%	0
			193	184	100%	100%	0%	
7.	DESIRED SALARY:	AR	78	69	38%	35%	3%	1
		>10%A	31	16	15%	8%	7%	1
		<10%A	13	35	6%	18%	-12%	-4
		>10%B	30	23	15%	12%	3%	1
		<10%B	14	9	7%	5%	2%	0
		OPEN	39	43	19%	22%	-3%	-1
			205	195	100%	100%	0%	
8.	WHEN BEGIN:	A	163	156	84%	89%	-5%	-1
		<2WK	27	19	14%	11%	3%	1
		>2WK	5	1	3%	1%	2%	2
			195	176	100%	100%	0%	
9.	TOTAL MO EXP:	0	32	17	27%	15%	12%	3
		>0,<12	39	47	33%	42%	-9%	-2
		>12,<24	17	16	14%	14%	0%	0
		>24,<72	27	26	23%	23%	-1%	0
		>72	3	5	3%	5%	-2%	-1
			118	111	100%	100%	0%	
10.	T MOS RETAIL:	0	86	71	51%	44%	7%	1
		>0,<12	38	58	23%	36%	-13%	-3
		>12,<24	19	19	11%	12%	0%	0
		>24	25	14	15%	9%	6%	1
			168	162	100%	100%	0%	
11.	$\bar{X}$ MOS RETAIL:	>0,<12	50	72	62%	79%	-17%	-4
		>12,<24	19	10	23%	11%	12%	3
		>24	12	9	15%	10%	5%	2
			81	91	1	1	0%	

RESPONSE CATEGORY		NUMBER >185	NUMBER <90	PERCENT >185	PERCENT <90	DIFF	NET WEIGHT
12. MOS LAST RETAIL:	>0,<12	54	68	66%	75%	-9%	-2
	>12,<24	15	13	18%	14%	4%	1
	>24	13	10	16%	11%	5%	1
		82	91	100%	100%	0%	
13. REASON LEFT:	S	27	30	19%	20%	-1%	0
	M	21	28	15%	18%	-4%	-1
	R	34	25	24%	16%	7%	1
	P	7	10	5%	7%	-2%	-1
	H	12	11	8%	7%	1%	0
	O	31	38	22%	25%	-3%	-1
	SE	12	10	8%	7%	2%	1
		144	152	100%	100%	0%	
14. RELATIVES:	Y	27	11	14%	7%	8%	3
	N	163	158	86%	93%	-8%	-2
		190	169	100%	100%	0%	
15. EMERG. CONTACT:	P	143	126	69%	66%	3%	1
	S	13	17	6%	9%	-3%	-1
	OR	33	24	16%	13%	3%	1
	O	18	23	9%	12%	-3%	-1
		207	190	100%	100%	0%	

BIBLIOGRAPHY

Avery, R.D. (1979). Fairness in Selecting Employees. Reading, Massachusetts: Addison-Wesley.

Benge, E.J. (1925). An index of predicting labor turnover. Journal of Personnel Research, 3, 359-365.

Brown, S.H. (1978). Long-term validity of a personal history item scoring procedure. Journal of Applied Psychology, 63(6), 673-676.

Cascio, W.F. (1975). Accuracy of verifiable biographical information blank responses. Journal of Applied Psychology, 60(6), 767-769.

Cascio, W.F. (1976). Turnover, biographical data, and fair employment practice. Journal of Applied Psychology, 61(5), 576-580.

Cascio, W.F. (1982). Applied psychology in personnel management. Reston, VA: Reston.

Cohen, M.S. & Schwartz, A.R. (1980). U.S. Labor Turnover: Analysis of a New Measure. Monthly Labor Review, 103, 9-13

England, G.W. (1971). Development and use of weighted application blanks (rev.ed). Minneapolis: University of Minnesota

Equal Employment Opportunity Commission (1978). Uniform guidelines on employee selection procedures. Federal Register, 43(166), 38290-38315.

Gable, M., Holland, C.J. & Dangello, F. (1984). Predicting voluntary managerial trainee turnover in a large retailing organization from information on an employee application blank. Journal of Retailing, 60(4), 43-63.

Gannon, M.J. & Northern, J.C. (1971). A comparison of short-term and long term part-time employees. Personnel Psychology, 24, 687-696.

Glennon, J.R., Albright, L.E., & Owens, W.A. (1966). A catalog of Life History Items. Greensboro, N.C.: Center for Creative Leadership.

Goldstein, I.L. (1971). The application blank: How honest are the responses. Journal of Applied Psychology, 55(5), 491-492.

Hughes, J.F., Dunn, J.F., & Baxter, B. (1956). The validity of selection instruments under operating conditions. Personnel Psychology, 9, 321-324.

Kavanagh, M.J. & York, D.Y. (1972). Biographical correlates of middle managers' performance. Personnel Psychology, 25, 319-332.

Larson, R.H., Swarthout, D.M. & Wickert, F.R. (1967). Objectionability and fakability of biographical inventory items. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology. Chicago: Rand McNally.

Lee, R. & Booth, J.M. (1974). A utility analysis of a weighted application blank designed to predict turnover for clerical employees. Journal of Applied Psychology, 59, 516-518.

Mitchell, T.W. & Klimosky, R.J. (1982). Is it rational to be empirical? A test of methods for scoring biographical data. Journal of Applied Psychology, 67(4), 411-418.

Mosel, J.N. & Cozan, C.W. (1952). The accuracy of application blank work histories. Journal of Applied Psychology, 36, 365-369.

Mosel, J.N. & Wade, R.R. (1951). A weighted application blank for reduction of turnover in department store sales clerks. Personnel Psychology, 4, 177-184.

Muchinsky, P.M. & Tuttle, M.L. (1979). Employee turnover: An empirical and methodological assessment. Journal of Vocational Behavior, 14, 43-77.

Owens, W.A. (1976). Background data. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology. Chicago: Rand McNally.

Owens, W.A., Glennon, J.R. & Albright, L.E. (1962). Retest consistency and the writing of life history items: A first step. Journal of Applied Psychology, 46, 329-332.

Shuh, A.J. (1967). The predictability of employee tenure: A review of the literature. Personnel Psychology, 20, 133-152.

Waters, L.K., Roach, P. & Waters, C.W. (1976). Estimates of future tenure, satisfaction, and biographical variables as predictors of termination. Personnel Psychology, 29, 57-60.

Weiss, D.J. (1976). Multivariate procedures. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology. Chicago: Rand McNally.

Wernimont, PP.E. (1962). Re-evaluation of a weighted application blank for office personnel. Journal of Applied Psychology, 46, 416-419.