SELF-PERCEIVED TASK-RELEVANT ABILITIES AND ON-THE-JOB PERFORMANCE OF A GROUP OF NEWLY HIRED AUTOMOBILE ASSEMBLERS

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ABSTRACT

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This thesis is concerned with the general problem of the determinants of job performance. The study proposes "self-perceived abilities, relevant in the tasks (SPART)" as one such a determinant. SPART is an individual's self-estimate of his capacity to perform tasks which involve a group of abilities, that experts and incumbent workers agree are useful in the job. Do such self-estimates relate to job performance in industry?

An instrument was developed to operationally define SPART; it was administered to a group of newly hired automobile assemblers, and their responses were correlated with their on-the-job performance. The group comprised two overlapping samples, one "Predictive" (N = 123), and the other "Concurrent" (N = 90).

A list of abilities was compiled from reports of experts, and by observation of workers "on the line." Items were written and tried out among college students. Subjects in the "Concurrent" sample were required to say how "helpful" the specified abilities were in their jobs. The percent of respondents saying that each ability was helpful

was calculated, and used in selecting six abilities to define SPART for automobile assemblers. These were Perceptual Sensitivity, Motor Coordination, Alertness, Memory, Finger Dexterity, and Verbal.

On-the-job performance was indexed by turnover, and by subjective criteria: turnover intentions, and self-ratings of performance. Four variables threw light on the construct validity of SPART: education level, confidence in ability, the importance of acquiring skills, and job involvement as defined by Lodahl's (1965) scale. Another variable was supervision climate.

It was predicted that

1) SPART would correlate with turnover;

2) There would be significant interaction between SPART and supervision climate in determining turnover;

3) SPART would correlate negatively with turnover intentions;

4) SPART would correlate positively with self-ratings of performance.

The "Predictive" sample received a questionnaire containing SPART and biographical items. The "Concurrent" sample received the same SPART inventory, and items on the variables mentioned above. Supervisors' attitudes were surveyed. Finally turnover data were obtained from company records.

The major findings follow:

1) The SPART instrument was moderately reliable. Cronbach's (1951) alpha coefficients were .66 and .67 for the administrations to the "Predictive" and "Concurrent" samples,

respectively. Test-retest correlations for individual items (six months interval) ranged from .47 to .74 ($p < .01$).

2) There were evidences of construct validity. The six abilities tended to group together in two factors. SPART correlated with education level, confidence in ability, the importance of acquiring skills, and a subscale of Lodahl's (1965) Job Involvement. In a factor analysis with Lodahl items SPART formed distinctive factors.

3) SPART correlated with turnover ($r_{pb} = .27$; $r_b = .34$, $p < .01$). ANOVA confirmed this relationship, which from an eta (η) of .25 may be linear.

4) The interaction of SPART-supervision climate was not supported ($p = .15$).

5) SPART scores were not associated with turnover intentions.

6) SPART correlated positively with subjective ratings of job performance.

These findings are interpreted on the basic assumption that self-perceived abilities have motivating effects.

The six abilities are not exhaustive for the job studied. Suggestions are made for continuing the SPART research, with emphasis on job analysis studies as a foundation.

SPART may be used in the selection process, and in planning personnel development. SPART may extend self-concept and human ability theories.

In this study self-perceptions of the worker regarding the abilities involved in his job are related to his decision to stay on, or to leave the job. This conclusion may not be generalized until other studies replicate these findings.

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Abel Ekpo-Ufot

A THESIS

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This Thesis is Dedicated

to

Ufot-Ekpe, my late father;
Amma-mmi, my mother;

to

Ama Ekpo-Ufot, my first and newly-born child
Esit-Ima, my dear wife;

to

Udo-Eka-Ekpo and Ebenge, my brothers,
Idorienyin, my sister;

to

Eugene H. Jacobson and John H. Wakeley

and to

All my "Brothers" and "Sisters."

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I thank too Dr. Frank L. Schmidt, Dr. Theodore W. Forbes, and Dr. Charles F. Wrigley, the other members of my thesis committee, for what they have done to improve this thesis. However, I am solely responsible for any errors that may remain.

My graduate education in Psychology has been supported in whole by the Department of Psychology here at Michigan State University. I thank the Department. I thank too its Chairman, Dr. Lawrence I. O'Kelly because he listens to me when I talk; and he acts.

Let me thank again Dr. Charles F. Wrigley for the hospitality he has given me and my family. I have certainly finished this thesis under a less stressful climate than when I started writing.

An unnamed gentleman deserves my thanks also. He is a personnel staff member of the unnamed organization in which the study reported on in this thesis was carried out. Without his organization

and without his services this particular thesis would not have been written.

I thank too Mrs. Patricia Lodato and Mrs. Delores Cotton for the typing and associated duties which they carried out at the time of my emergency. Sure I had pressured them, but they bore it all.

Thanks are due to my people, to whom I have also dedicated this thesis: to Ufot-Ekpe, my late father--for he had placed high value on formal education, and I have accepted his value; to Amma-mmi, my mother, the woman who taught me how to endure suffering, and I believe I have learned well her lessons; to Udo-Eka-Ekpo, Ebenge, and Idorienyin, my brothers and sister--for their prayers that I succeed; to Esit-Ima, my dear wife--for the support she has given to me in those hard times; and to Ama, our first and new-born baby. She has brought us love, joy, and hope.

Lastly, thanks to all my Brothers and Sisters--for their memory, which is part of my goad.

The idea of "Self-Perceived, Task-Relevant Abilities (SPART)" has many roots. Those that stem from other authors I have acknowledged in Chapter I of this thesis. But some of the roots are in my personal history. Here I am not talking of innate abilities. My concern is with abilities inferred from performance activities and learned through carrying out such activities. Without the opportunity to learn to perform certain task activities there is no "SPART."

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

CHAPTER I

INTRODUCTION

The study reported in this thesis investigates the effect of self-perceived, task-relevant ability on the job performance of industrial workers. It was assumed that the worker's self-concept of his abilities relevant to the job activities plays a part in his motivation to perform on the job.

In this introductory chapter the evidence bearing on ability, motivation, and performance is reviewed. From this emerges the theoretical framework that has guided the investigation. The chapter closes with a statement of the general problems, the purposes, and the general hypotheses to which this study addresses itself.

Ability-To-Work

According to Vernon (1961), ability "implies the existence of a group or category of performances which correlate highly with one another, and which are relatively distinct (i.e., give low correlations with other performances.)" Fleishman's (1966) use of the term is similar: "Ability refers to a more general trait of the individual which has been inferred from certain response consistencies (e.g.,

correlations) on certain kinds of tasks." Obviously ability is an inferred construct. In this study, therefore, "ability-to-work" will be defined as the trait-capacity to perform a "work role" in a set of tasks as distinguished from other task sets. Conceivably when such a "trait-capacity" underlies a number of different sets of tasks, the ability inferred may be described as "basic" to such tasks, if in addition the capacity is requisite to performance in the tasks.

The capacity or process involved in performing certain groups of tasks may be classified under four heads: sensory, physical-motor, psychomotor, and cognitive. The scheme is based on the human features observed to infer the ability construct. For example the eye at work is an observable evidence from which the sensory ability of "visual acuity" may be inferred. Or, some mental processes must be involved in the work of the typist or pianist; but the rate the girl moves her fingers over the keyboard reflects the degree of her "finger dexterity" --a psychomotor ability. These two are but examples of "basic abilities" that are involved in task performance. How are these abilities determined scientifically?

Studies from two groups of investigators provide an answer to the question just put. One group is led by Fleishman (1957, 1961, 1962, 1967) and the other by McCormick (1957, 1967a, 1967b). Their methods are similar in that they both employ factor analysis. The basic difference between them is that while the former uses as data task performance measures and reference tests, the latter's data are mainly job element variables. The other slight difference between them is that Fleishman et al.'s interest is primarily on the pattern of abilities in task

performance whereas McCormick's concern is wider in scope: his "job dimensions" include situational factors as well as aptitude and temperamental traits.

Fleishman (1957), for example, gave 200 trainee airmen extended practice on seven tasks including Complex Coordination (the criterion task) rotary pursuit, plane control, kinesthetic coordination, unidimensional matching, two-hand matching, and discrimination reaction time. All these were performed in the laboratory. Ss also took a series of standardized tests: instrument comprehension, reaction time, rate of movement, pattern comprehension, mechanical principles, general mechanics, speed of identification, and visual pursuits. The scores on the tests and on sets of trials on the performance tasks were intercorrelated and factor analyzed. Eight meaningful factors were derived to include: speed of arm movement, visualization, perceptual speed, mechanical experience, spatial orientation, response orientation, fine control sensitivity and complex coordination. All these constitute the abilities as determined for the experimental tasks. The aim of this particular study was to investigate the nature of the profiles of the ability components at different practice stages on the criterion task of complex coordination. The results showed that the abilities measured by printed tests contribute much of the variance at early stages, decreasing in importance in the late stages of practice when aptitudes specific to the task assume progressively a more important role.

Fleishman (1962) has provided evidence in real life which is consistent with the laboratory findings just stated. In a Morse Code

learning experiment conducted in the field the abilities determined included "visualization," "auditory perceptual speed," and "auditory rhythm discrimination"--of which the last two are specific to the task. The first three abilities accounted for much of the variance in performance, but in the later stages this role was taken over by the task specific abilities. Another field study reported was with air pilots. During a flying mission E check-listed a number of items grouped under specified activities, e.g., maneuvering. The activity scores thus derived were intercorrelated and factored. The resultant factors were adequately described by the ability factors found in laboratory studies.

The other group of investigators, McCormick, et al. (1957), obtained rating data on a set of variables from the U.S. Department of Labor. These data were prepared by job experts and analysts and other personnel engaged by the Department to rate the requirements of a wide range of jobs. These data are published as "Estimates of Worker Trait Requirements for 4,000 Jobs," by the U.S. Employment Service (1957). The variables rated were classified under seven heads: training time, aptitudes, physical capacities, temperaments, interests, working conditions, and adaptability to conditions. The author intercorrelated the rating scores on these variables and factored the matrix to obtain "job dimensions" factors. As is obvious from the nature of the variables these were not all concerned with abilities. The authors' interests have not been confined to abilities per se but to all possible factors, including abilities, which are required for successful job performance. Their study therefore included permutations of the seven factors and examining jobs to fit them with the permuted patterns. In

fact, their main finding is that "there appears to be heavy concentrations of jobs in relatively few patterns."

These authors have continued in their search for a comprehensive pattern of job factors in terms of "worker-oriented variables." An example of this is the study reported by McCormick, et al. (1967). First they developed the "Worker Activity Profile" made up of items classified under (a) "job activities," (b) "general characteristics of the job," and (c) "situational variables"--physical and psychosocial. Some of the items are used as check-lists while others are rated on a scale ranging from zero to seven. Two samples of jobs were then selected--one based on the percentage of jobs in the main occupational groups, and the other on the percentage of employees in each group. Judge-analysts then applied the instrument on the jobs selected. As in other studies, scores were intercorrelated and factored to obtain 29 "job dimensions"--taking into account the factors common to and those peculiar to each of the two sample analyses. Relevant to our problem are the aptitude and physical factors like "skill physical activities," "mental versus physical activities," "responsible personal contact," "clerical activities," "knee-bending activities," and "intellectual versus physical activities." Clearly these are not stated in conventional ability terms, but it is not hard to see that they reflect basic abilities in gross terms.

These studies on task-abilities have been reviewed here because they provide methods for scientific determination of abilities. One need not be an enthusiast for the factor analytic or "synthetic" approaches in psychology, but the evidence of their utility in defining

abilities may not be gainsaid. McCormick et al. (1967) warn that their instrument is "not a finished product" and the warning may be well taken: there are limitations; but these may not be serious enough to make the technique useless. Another value of these studies is their attempt to analyze the ability components of task performances. Fleishman (1967), for example, has found that the abilities involved in target detection performance include "visual acuity," "spatial orientation." McCormick et al. (1957) give the test-engine-mechanic's job as requiring the following pattern of factors: "mental and educational development," "adaptability to precision operations," "manual art" and "heavy manual" abilities. These types of evidence therefore help to add meaning to the variable "ability-to-work."

If job relevant abilities thus scientifically defined have psychological meaning to the workers on the job, then workers may be expected to be able to rate themselves on a list of abilities or skills agreed by experts to be involved in the job they are doing. Such ratings would reflect the workers' self-concepts of their abilities to do the job.

But the "self-concept" has been assumed to be part of one's motivation to act. For an example in academic settings self-concepts of abilities have been interpreted as a motivational variable, i.e. a stimulus which incites the student to learn. Based on this position Brookover and Thomas (1963/64) predicted that students' self-evaluations of their abilities in different school subjects would correlate with their academic performance in these subjects. In a sample of middle school pupils the prediction was fulfilled for boys (though not for

girls) in the subject areas of Mathematics, Social Studies, and Science. Similarly theorists in vocational psychology treat self-concept as a motivational variable in that it is part of the bases for choosing an occupation; this is the view expressed by Field et al. (1963). Following these authors one may assume that in industrial settings the workers' perceptions of their standings on job relevant abilities would form part of their motivation to perform on the job.

If industrial workers have some self-conceptions of the job abilities they possess, one may assume another ability variable that is derived from the scientifically defined abilities. This is the self-perceived, task-relevant ability with which the present study is primarily concerned. As just argued it is assumed to be a motivational variable, i.e. it may serve to stimulate the worker to perform on a job.

The Motivation to Work

Motivation as used here is exclusively human motivation to perform a specified work role. In general it is defined as the "force" in a person stimulating him to exert effort in the performance of an act. Thus, as in the case of ability, "motivation-to-work" is a construct, and is inferred from behavioral performance.

The general definition just stated begs a question: what is the source of the assumed "force"?

This is the question that has concerned theorists in this area. In their review of studies on managerial motivation Cummings and Elsalami (1968) recognize two trends in human motivation theories--one

based on Maslow's "need-hierarchy" and the other on Herzberg's "motivation hygiene" theory. As will be shown presently the concept of "need" is common in both trends. It is not intended to illustrate these trends extensively; but a few representative studies will be quoted to clarify their positions and to delineate the factors in work motivation.

Maslow's postulate is that human needs organize themselves in a hierarchy of potency. At the base are physiological needs, followed by those of safety, belongingness, love, esteem, with the need of "self-actualization" at the top. Porter (1964) studied the relation between some organizational variables and managers' perception of needs and need satisfaction. The organizational variables included job level, line or staff position, size, and structure (flat or tall). The need areas were "security," "social," "esteem," "autonomy," and "self-realization." The subjects were asked three questions:

a. how much need is there now?
b. how much need should there be?
c. how important is the need to me?

Some of the findings may be given. Job level was the only significant variable having substantial effect on managers' perceptions of need satisfaction, and only the top level managers felt the need of self-realization. The effect of the line-staff variable though significant was less than that of job level. Organizational structure interacted with size: in units less than 5000 the flat structure produced greater need satisfaction and many Ss perceived the importance of the self-realization need; also many more managers in tall structured than in flat structured organizations perceived social need as important.

Cummings et al. (1968) criticize Porter's design as too "limited": other task and organizational variables not allowed for included communication networks, decision-making arrangements, composition of managers' role set and location of the managerial position--field vs. office. The criticism is a valid one. Needs and need satisfaction perceptions may be prerequisite factors stimulating the individual to exert effort; but they are very likely to interact with situational variables.

The "motivation-hygiene" viewpoint may be illustrated from the originating study by Herzberg et al. (1959). The general problem that interested these authors was the relationship between job attitudes and productivity, and their specific purpose was to answer the question: "What does the worker want from his job?" Using a sample of engineers and accountants in the Pittsburgh area the authors conducted a semi-structured interview survey in which they asked the subject to recount times when he "felt exceptionally good or exceptionally bad about your job or any other job you have had." The verbal reports collected were content analyzed. The results of this survey led the authors to the following conclusions:

1) Job satisfaction and job dissatisfaction are not opposites.

2) The opposite of job satisfaction is no job satisfaction.

3) Job satisfaction is a function of feelings regarding "job content" factors--the "satisfiers": achievement, recognition, work itself, responsibility, advancement.

4) Job dissatisfaction is a function of feelings regarding "job context" factors--the "dissatisfiers":

company policy and administration, supervision, interpersonal relations, working conditions, and salary.

5) The "satisfiers" are the "motivators": the "dissatisfiers" are "hygienes."

One may accept the "job content"/"job context" distinction, but it is hard to see that the "satisfier"/"dissatisfier" concepts correspond. A number of factors have been classified inconsistently. Salary, for an example, is a job context dissatisfier; but it appears about equally in "high" and "low" times of job satisfaction. Another factor, recognition--a job content satisfier--was also reported in the "low" times of satisfaction although the frequency was not high (6 percent). It is not relevant to the theme of this paper to discuss the various supporting and discrepant studies of the Herzberg position, save to mention some evidence summarized by Cummings et al. (1968) that subjects at different occupational levels respond differently to "motivators" and "hygienes."

These and other limitations notwithstanding, Herzberg et al. have made at least one valuable contribution to our problem. They have defined some of the factors in work motivation, for examples: recognition, responsibility, achievement, advancement, salary, and the "work itself"; they also have drawn attention to the intrinsic "job content" factors.

It was observed earlier that the concept of "need" is common to both trends. This is expressly stated by theorists drawing their inspiration directly from Maslow; but the "motivators" and "hygienes" may also be translated into "need" terms: for example, need for "recognition," or need for good "interpersonal relations."

The conclusion is obvious, if not trite: need in a general sense is a factor in human motivation; and the "need may be innate and physical, or it may be socially acquired. But the concept of "need" is not without difficulties in theories of human motivation since in ordinary language it connotes some deficiency; for this reason it may be replaced by the word "motive." This preference for "motive" has precedents. Madsen (1968) for example refers to "need" and "drive" as "ambiguous terms" and recommends in their stead the word "motive" as "expedient for practical-linguistic reasons" (page 313).

Motive as used here subsumes Herzberg et al.'s research question: what does the worker want from his job? The idea is also similar to Vroom's "valence"--to be defined presently. Furthermore, "motive" as a component of motivation-to-work on a specified job (M_J) is intended to be specific to the job on which the individual is employed; that is, the particular motive (or motives) that brings an individual to the particular job situation. To emphasize this specificity such a motive may be represented symbolically by m_j (the small m with the small j as a suffix) in contradistinction to M_J, the specific motivation to work, of which m_j is a component.

White's (1959) theory of motivation is particularly relevant to the issues raised in this review. In the first place he uses the concept of "motive" in place of "need," and he considers one basic motive--the "effectance motive" defined as "the urge" to produce "effective changes" in the environment. Secondly the "broad biological" goal of this motive is "competence," i.e., the "organisms capacity

to interact effectively with its environment." What this author says further about this "capacity" may be quoted:

> In organisms capable of little learning this capacity might be considered an innate attribute, but in the mammals and especially man, with their highly plastic nervous system fitness to interact with the environment is slowly attained through prolonged feats of learning. In view of the directedness and persistence of the behavior that leads to these feats of learning I consider it necessary to treat competence as having a motivational aspect. [p. 296; underlining by the present writer.]

Admittedly White's "competence" is a "broad concept, but "ability-to-work" must by definition be a component of one's "fitness to interact with the (work) environment, "ability-to-work" must be part of the "process" of "manipulating" the (work) "surroundings" and "producing effective changes in the work environment"; in short ability-to-work must be an essential component in White's "competence." If this view be allowed then "ability-to-work," like White's "competence" may be considered "as having a motivational aspect." This means that "ability-to-work" may be regarded as a goal with its own motive, just like "competence."

This statement applies to both aspects of ability-to-work as distinguished in this thesis. Objective ability inferred in observable performance would serve as a goal inasmuch as level of performance itself can provide feedback to the individual who demonstrates his ability in the performance; in other words, the individual can infer the level of his ability from his observable performance and seek to raise that level, if possible, by increasing that observable performance. But his inferred level of ability is of course his self-perceived task-relevant ability; and if he perceives this to be low he can set

for himself the goal of raising that perceived level of ability. Thus the two aspects of ability can serve as potential goals for the individual.

What would be the motive for the "ability-to-work" goal? Here again White's (1959) conceptualization provides an answer. According to him "effectance motive" is "undifferentiated" in infants and young children, but

> later in life it becomes profitable to distinguish various motives such as cognizance, construction, master, achievement . . . . They are differentiated through life experiences which emphasize one or another aspect of the cycle of transaction with environment [p. 323; underlining by the present writer].

One may then say that "construction" and "mastery" motives are some, at least, of the motives behind the urge to acquire the ability-to-work.

It is the assumption proposed for testing and to be reported on in this thesis that, in a job situation one aspect of the "ability-to-work" that is motivating is the individual's perceptions of his task relevant abilities. This motivating effect can be positive or negative.

Vroom's (1964) "valence-force" model of human motivation comes closest, in the writer's view, to bringing together the motivating variables that may operate in industrial work setting. This model is developed from two propositions:

1) The valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentality for the attainment of these other outcomes (symbolically):

$$V_j = f[\sum_{k=1}^{n} (V_k \; Ijk]$$

where V_j = the valence of outcome j

V_k = the valence of outcome k

Ijk = the cognized instrumentality of outcome j for the attainment of outcome k

2) The force on a person to perform an act is a monotonically increasing function of the algebraic sum of products of the valences of all outcomes and the strength of his expectancies that the act will be followed by the attainment of these outcomes

Symbolically:

$$F_i = f[\sum_{j=1}^{n} (E_{ij} \quad V_j)]$$

where F_i = the force to perform act i

E_{ij} = the strength of the expectancy that act i will be followed by outcome j

V_j = the valence of outcome j

The key concepts in these propositions are "valence," "instrumentality," "expectancies" and "force." Valence refers to an affective orientation towards an outcome; it is similar to "motive" in the above discussion. "Instrumentality" refers to "the means for," and "expectancy" connotes the same idea since it refers to a person's degree of probability that a certain act will lead to a certain outcome; it will be correct to say that "instrumentality" and "expectancy" capture the "path-goal" notion of motivation of Georgopoulos et al. (1957) discussed below. "Force" is of course an "aroused motivation" to perform an act.

This "force" model is described as coming <u>closest</u> to bringing together the relevant motivating variables. In the writer's view it is short of that mark by not explicitly allowing for any aspect of the

"ability" variable. It may be that the ability variable is somewhat implied in the "expectancy" concept, as one cannot expect a certain act to lead to a valued outcome if he is not capable of carrying out that "instrumental" act. Such argument would be granted; the point however is that the writer considers the motivating effect of ability and, in particular of self-perceived task-relevant ability may be crucial enough to be expressly included in a model of human motivation to work. It should be mentioned that Vroom (1964) is explicit about the role of ability in performance, to be discussed presently. The remarks here therefore apply strictly to the "force" model of motivation to act.

Job Performance and Motivation-to-Work

Georgopoulos, et al. (1957) postulate that "productivity level" (or job performance) is a function of "motivation to produce at a given level" of output; motivation, on the other hand, is a function of perceptions of need-goal, and the perception of level of productivity as a path to that goal. The authors have conducted a study to confirm their "path-goal" view of human motivation to work.

The general hypothesis that guided their investigation may be quoted:

> . . . if a worker sees high productivity as a path leading to the attainment of one or more of his personal goals, he will tend to be a high producer. Conversely, if he sees low productivity as a path leading to the achievement of his goals, he will tend to be a low producer.

To test this general hypothesis the authors conducted a survey study in two plants of a unionized household appliances company. Workers here operated on an "individual incentive plan." Their output was rated 100 (for normal) or 90 or 130, say, for below normal and above normal respectively. A worker could raise his productivity and wages by increasing effort and work pace. Given three goals (more money, good peer relations, promotion) the subjects were required to rate "high productivity," and after, "low productivity"--to rate each of these on a five-point scale to reflect how they perceived each as instrumental to the attainment of the given goal. Ss also rated the goals as to their importance, and this provided the basis for categorizing them as the "high need" or the "low need" groups. They were also categorized as "free" or "not free," and to qualify for the former the subject must satisfy three conditions:

1) minimum of six months' experience
2) age 20-59
3) free to set his work pace

S also recorded on the questionnaire the percent figure he usually hit. The authors claim from their knowledge of the sample that this was a reasonable valid measure of performance--the dependent variable of the study.

The research hypothesis relevant for our purpose was that for each of the goals the percent of high producers will be higher among Ss having "positive (performance) path-goal" perceptions than among those having "negative (performance) path-goal" perceptions. Positive implies that performance is seen as "helping" goal attainment, whereas

negative implies that performance "hurts" goal attainment. The following percents of high producers were obtained for each goal area:

Goal	(Performance) path-goal perceptions	
	Positive	Negative
More money	38 (n=234)	21 (n=376)
Good peer relations	32 (n=66)	23 (n=195)
Promotion	26 (n=236)	23 (n=31)

The differences in the percent values are all in the predicted direction, and the first one (under the more money goal) only was significant at the .05 level. The chi-square test was used.

Based on such results the authors conclude: "The path-goal perception variable seems to be a significant determinant of individual productivity . . . ." They admit, however, that the contribution of this variable may be "modest."

One weakness in the design of the study by Georgopoulos and associates is the performance measure: the workers' subjective report of his performance may not be very reliable. But this criticism may be moderated by the fact that the questionnaires were anonymous.

The significance of the authors' conceptualizations far outweighs any weaknesses in the study reported. They have brought together goal and performance into the motivation concept; besides, they have emphasized individuals' perceptions as crucial: performance must be perceived as path-to-goal.

Performance: A Joint Function of Ability and Motivation

But Maier (1955) has also proposed that ability interacts with motivation to determine level of performance. This means that at low levels of ability, performance of highly motivated and lowly motivated subjects would not differ significantly; but, at high levels of ability the highly motivated will excel the lowly motivated in performance. Similarly with motivation held constant at low, and then at high levels: only in the latter group would the performances of high versus low ability subjects differ significantly.

Fleishman (1958) set out to explore the "interaction effects of motivation and ability" in determining performance. His subjects were 400 basic trainee airmen. The task involved complex coordination in which S adjusts controls following visual signals. The treatment consisted of E verbally instructing S of the importance of the task and also encouraging him in his performance: this was the treatment for the "motivated" group; the control ("unmotivated") group received no such instructions. All Ss had the same number of practice trials at the start, and on the basis of that performance were categorized as low or high in ability if they were below or above the median for the group. The experimental session consisted of 20 one-minute trials separated by 20-second rest pauses during which the motivation of the treatment group was verbally manipulated as described. The dependent variable was the number of correct adjustments per trial. The results showed that the treatment produced differences among the high ability subjects and not among those low in ability. By the ANOVA analysis

both main effects of ability and motivation and their interaction were significant at the .01 level.

Another study to be summarized was conducted by Lawler (1966) in three different organizations. These were government agencies and were similar in their personnel practices, especially in the matter of pay and promotion which were based on merit. The subjects were lower and middle managers. Data were obtained from a three-part questionnaire to the subjects and ranking forms to Ss' superiors. The first part of the questionnaire asked Ss to rate how they perceive three job factors--quality, productivity, and effort--how these were related to their pay; such attitude measures, the author argues, reflect motivation to work. The second part asked Ss to rate themselves on the same factors; these constituted one of the performance measures, the other being "superiors' rankings" of Ss in groups of three or more. Such rankings were also made on Ss' ability. All Ss were categorized as either low or high on the motivation and ability measures.

The main purpose of the study was to test the implications of the interacting model. The hypothesis was therefore that for Ss low in motivation, there was no difference in performance among the low or high ability subjects, but for those high in motivation there would be significant differences in performance between the high ability Ss on the one hand and the low ability Ss on the other. A similar postulate was made of the relation between motivation and performance with ability held constant. Typical results were as follows, using scores derived from superiors' rankings:

	High Motivation	Low Motivation
High Ab.	54.7	50.3
Low Ab.	46.5	46.0

The hypotheses were confirmed when the results were analyzed by the t-test. An ANOVA analysis also showed significant effects for both ability and motivation at the .05 level. The interaction effect was not significant; the p value was at .06. The author claims that his data also support the interaction model.

These interaction studies are relevant to the present problem for a number of reasons. In the first place, they bring together the variables of interest: ability, motivation, and performance. Secondly, they draw attention to the interaction relationship postulated to exist among these variables. After reviewing the evidence from previous studies and his, Lawler (1966) concludes the model "has some general validity." But one may be skeptical in accepting this conclusion: in some of the studies subjective measures were used as the criterion of performance. The same criticism applies to the measures of ability or motivation. Fleishman's (1958) measure of ability inferred from initial trials may be defended but it is still contaminated not only because performance in subsequent trials was the criterion but also because performance is not a pure measure of ability as the studies also show. Lawler used indirect derived indices of motivation so that it was necessary for him to argue that his indices reflect motivation to work. A critic may grant their arguments and yet still wish more direct and reliable measures.

Vroom (1964) after reviewing similar studies arrives at a conclusion similar to the Lawler and others position. A long quotation is necessary to make clear the issue, which is underlined below:

> The general picture emerging from these studies is that the effects of motivation on performance are dependent on the level of ability of the worker, and the relationship of ability to performance is dependent on the motivation of the worker. The effects of ability and motivation on performance are not additive but interactive. The data presently available on this question suggest something more closely resembling the multiplicative relationship depicted in the following formula:
>
> Performance = f (Ability x Motivation). It follows from such a formula that when ability has a low value, increments in motivation will result in smaller increases in performance than when ability has a high value. Furthermore when motivation has a low value, increments in ability will result in smaller increases in performance than when motivation has a high value (p. 203).

The writers' position is that there are methodological and especially instrumental limitations on the studies reviewed and that the suggested "multiplicative relationship" is doubtful. Nor is the writer alone in taking this position: Campbell et al. (1970) "choose not to assume such a multiplicative relationship" in their "heuristic model of manager behavior." Their reason is that evidence in support of the Maier proposition is not consistent (p. 11). At this stage one may adopt tentatively these authors' theoretical proposition that: job behavior (or performance) = f (ability, motivation, organizational opportunity).

An Integration

The chapter began with a preliminary statement of the research problem. It is now evident that the general problem area may be described as the determinants of worker productivity in industry. But as many have observed productivity or performance in industry is a function of complex factors, some individual, others situational; some phenomenal, others objective. The problem focuses on an individual and phenomenal determinant: "self-perceived ability, relevant in the task." It is relatively neglected in industrial contexts. Yet it may well be a significant motivating variable. The primary aims of the review were first to clarify the concepts of "ability-to-work" and "motivation to work" so as to bring out the link of "self-perceived ability" with these well studied variables. Secondly, the review would prepare the ground for developing a theoretical framework for the investigation.

Thus selected studies of the ability construct were considered. The discussion here focused exclusively on attempts to define abilities which are relevant in a particular task performance. Such scientifically defined abilities are in most cases derived from factor analytic studies. The section ended with a note: if the task abilities thus defined have psychological meaning, then workers engaged in tasks involving these abilities would experience themselves as having these abilities, and would be able to rate themselves on the abilities. Anyway, such self-ratings define self-perceived ability.

The following section dealt with motivation-to-work. Motivation is a complex concept. However the essential notion is that of a "force"

which excites an individual to a particular action. The review was devoted to studies which seek to define the factors which constitute such a "force." In the work situation one set of such factors is defined by the individual's work motives, i.e. what the individual wants from his job, to use Herzberg et al.'s (1959) term.

Emphasis was placed on a broad class of wants, which White (1959) calls "competence"--the "capacity to interact effectively with one's environment." Since by definition ability-to-work is a component of White's "competence" it must like "competence" have motivating effects on job performance.

But there are two aspects of ability--one is "objective," evident and inferred from observable performance, and the other is subjective, known only through self-reports. Objective ability would have motivational feedback effects when the individual perceives his demonstration of that ability and is aware of and internalizes the social value of that ability. The demonstration of ability is in performance activity; it follows therefore that the motivating effect of objective ability is indirect, as it is mediated by the perceived performance activity. Self-perceived ability partly develops from observed objective ability as described. But once developed it becomes a relatively stable trait which exerts motivational influence in the "perceptual world" of the individual. Furthermore both aspects of ability-to-work may have motivating effects in that they may be supported by such motives as "construction" and "mastery," which White (1959) postulates to develop from the basic "effectance" motive whose goal is "competence."

The last group of studies reviewed provide evidence that job performance is a joint function of ability, motivation, and organizational "opportunity," to quote Campbell et al. (1970). Thus the variables that have been widely studied as determinants of job performance have been brought together. The less widely studied variable, self-perceived task relevant ability has also been fitted into the class of motivational determinants of job performance.

The Theoretical Rationale

The review has touched upon a number of theoretical positions that are basic to this study. First there is the theoretical construct of ability refined by the factor analytic technique. The derived abilities may be assumed to have psychological meaning.

Secondly, there is the theoretical position so well developed by Murray (Hall and Lindzey, 1967) that most of human behavior is a function of his "needs," or motives--the term preferred in this report. Thirdly, the "phenomenological" approach is adopted. This as Combs and Snygg (1959) say, "attempts to understand the behavior of the individual in terms of how things 'seem' to him," and in terms of his self-perceptions. Fourthly there is the proposition adopted from Campbell et al. (1970) that job performance is a function of ability, motivation, and organizational opportunity.

The theoretical rationale for the current research is thus an amalgam of a number of theoretical positions. From these is derived

the general hypothesis about human work performance. "Work" in this context is synonymous with Vroom's (1964) "work role," that is "a set of functions to be performed by a role occupant, the performance of which contributes to the production of goods and services." The general hypothesis may now be

> Job performance is a function of the individual's self-perceptions of his abilities to carry out the work activities, a function of his demonstrable abilities on those activities, a function of his motives and his self-perceptions that performing will contribute to the satisfaction of some, at least, of his multiple motives and also a function of those organizational climate elements not incorporated in any of the previous variables.

There are five main components in the hypothetical function: first, there are the self-perceptions on work relevant abilities; secondly, there are those aspects of abilities which may be objectively observed when demonstrated in a performance situation; thirdly, there are motives; fourthly, performance-motive satisfaction contingencies or expectations. And lastly, organizational climate variables not accounted for by performance-motive satisfaction contingencies.

The Problem, Purposes, and Hypothesis

The present study will focus on a delimited problem: the effect of self-perceived task relevant abilities on the job performance of a group of industrial workers.

The general hypothesis presented serves to delineate the focal problem of this research as well as place it in the context of the

determinants of industrial work performance. The question is: Do the worker's self-perceptions of his endowment with the ability requirements of a job influence his performance at that job?

This research therefore had two main purposes:

1) to develop instrument to tap "self-perceived task relevant abilities" (SPART)

2) to relate "self-perceived task relevant abilities to on-the-job performance of a group of industrial workers.

From these emerge the research hypothesis of this study:

"Self-perceived task relevant ability" is a correlate of on-the-job performance of industrial workers.

The specific predictions called for by this research hypothesis are discussed in Chapter 2, following fuller descriptions of the study variables and the instruments designed for the investigation. That chapter also describes the study setting, the design, and procedure, as well as the analysis planned. Chapter 3 presents the results and the analyses done. Lastly, Chapter 4 discusses these results as well as some theoretical and methodological issues touched upon in this chapter. It also summarizes the main conclusions and adds speculations on further research. The Appendices are in some way an integral part of the report; for they contain not only the instruments used but also relevant tables that were too long to be inserted in the body of the text.

CHAPTER II

METHODOLOGY

This chapter begins with a description of the study setting, including the job and the worker-samples. Next the variables are redefined and followed by illustrations of the instruments used in the investigation; the research predictions are summarized. The study design, procedure, and the proposed statistical analyses are also described.

The Study Setting

A midwestern automobile company provided the site in which this study was carried out. The specific job sector was that of the "assembler." The description of this job title, according to the Dictionary of Occupational Titles (1965, p. 23) is as follows:

> [The assembler, automobile] performs any combination of a variety of repetitive tasks involved in assembling automobiles and trucks or automobile and truck components, such as axles, transmissions, bodies and motors; fits and fastens parts, such as brackets and small body-hardware or sub-assemblies, such as manifolds, transmissions, engines, and axle units, using hand tools or powered hand tools; adjusts brakes, inflates tires, lubricates chassis, and pours in oil or brake fluid.
>
> May be designated according to component assembled as Assembler, Axle; Assembler, Body; Assembler, Motor;

> Assembler, Soft Trim; Assembler, Transmission; or according to stage as Assembler, Final.

A visit to the research site has convinced the investigator that the quote is an accurate description of the job. At this point it must be emphasized that the "ability-to-do the job," "(job) performance" and "motivation-to-work" as used in this text must be understood not only in terms of the job described but also in the context of the unnamed midwestern automobile company. This company, like other modern industrial companies, has experienced the labor "turnover" problem. There was an in-house study project trying to find solutions to this and other problems at the time the present investigator was looking for a research site. It became possible for this study to be carried out with the same sample of workers as used in the in-house project. There is no other link between the in-house project and the present study other than the use of the same samples of workers and some biographical data on these workers.

The Samples

There were two different sets of recruits used in the study. The first was hired in the peak season for recruiting in preparation for model change-over. This took place in the last two weeks of August, 1970. The present study is concerned with those assigned to the assembly, and for whom there are complete data on the desired variables. This group constitutes the "Predictive Study Sample" with an

N = 123. The designation "predictive" underlines the fact that it was their turnover behavior that was predicted.

The second set was recruited at various times stretching from December, 1970, to about mid-March, 1971. This set was treated differently for two reasons: first they were hired after the long labor strike that involved the "blue collar" workers of this company; secondly, data on them trickled in very intermittently, and up to March, 1971 when a follow-up was administered.

By the end of March a number of these workers from both sets had quit the organization. Those that remained included 71 from the first set and 19 from the second. These 90 constitute the "Concurrent Study Sample."

The "Predictive Study" Sample was made up of 100 men and 23 women; the "Concurrent Study" Sample on the other hand comprised of 74 men and 16 women. The following tabular illustration will help to clarify the assignment of the two sets of recruits to the two study samples.

Relation of Recruits to the Study Sample

			Males	Females	Total
Predictive Sample	I.	First Recruits			
		A. Hired Aug. 1970	100	23	123*
		B. Quit-Aug. 1970-March 1971	45	7	52
		C. Remained, March 1971	55	16	71
	II.	Later Recruits			
		D. Hired Dec. 1970-March 1971	40	0	40*
		E. Quit Dec. 1970-March 1971	21	0	21
		F. Remained, March 1971	19	0	19
Concurrent Sample	IC + IIF (Those that remained in both sets of recruits)		74	16	90

*Applies to those assigned to the Assembler Job, and for whom there were complete data on the study variables.

The Company record describes the "typical new hire" in these samples as "young (under 20 years old), unmarried, a high school graduate, uncertain of his vocational and educational future--and new to the automobile factory environment." This last characteristic of relative lack of skilled work experience is reflected by the responses to two questionnaire items put to all the new hires including those not assigned to the assembler job. Of these about two-thirds had no full-time work experience in skilled trades, and over four-fifths had never worked in an automobile factory.

Variables and Instruments

This section describes the variables of this study and the specific predictions involving them. The indices of on-the-job

performance are described first, followed by the main independent variable: self-perceived task relevant ability. The subsidiary variables include Lodahl's (1965) job involvement scale, educational level, confidence in ability to do the job to be assigned, and the importance of the motive to acquire skills; these are used to throw light on the construct validity of the main independent variable. There is also a measure of supervision climate which was postulated to interact with self-perceived ability in affecting job performance. At the close of the section predictions about these variables are summarized.

Job Performance Indices

Turnover data at the end of six months after employment constitute the "hard" criterion variable of this study. Turnover was chosen because it was the practical problem that was of great concern to the organization in which the study was carried out. If "on-the-job performance" is defined as the willingness of the worker to remain on the job situation and contribute positively to the production functions of the industrial organization, then turnover may be an acceptable index of "on-the-job-performance." This index, however, applies to the Predictive Sample only.

In the Concurrent Sample the indices of job performance were subjective. To parallel the hard turnover data, subjects in the Concurrent Sample were asked to report their thoughts on leaving the organization. This variable is named "turnover intentions." The

subjects were also asked to rank themselves on job performance and to rate themselves on how fast they work. The questionnaire items for these variables are shown in Appendix 1C.

Distinction Among Ability and Related Concepts

Five concepts are used in this report that have related definitions. They are aptitude, ability, skill, demonstrable ability, and self-perceived ability. The following quotations from Drever's (1964) revised Dictionary of Psychology bring out the traditional distinctions made between the first three:

> Aptitude: Natural ability to acquire relatively general or special types of knowledge or skill; tests to determine such ability are called aptitude tests. (p. 19)
>
> Ability: Power to perform an act, physical, or mental, either before or after training. Must be distinguished from aptitude. (p. 7)
>
> Skill: Ease, rapidity, and precision (usually) of muscular action. (p. 271)

The writer admits that he himself is confused with the first two quoted definitions. After having defined aptitude as "natural ability," the Dictionary goes on to warn that ability "must be distinguished from "natural ability." Perhaps it is non-natural ability that may be distinguished from "natural ability." Whether or not these terms are distinguishable, traditional usage has made them so. Aptitude invariably refers to potential to profit from a future learning or training experience. In other words, it is most applicable in a

predictive rather than a concurrent context. Thus for example, a college may administer numerical "aptitude" tests to applicants for the purpose of selecting some of them for a Mathematics program; the same or parallel "numerical" tests administered to students already in the program are meant to tap numerical abilities.

This distinction in use is crystallized by the United States Department of Labor's GATB (General Aptitude Test Battery) used in the selection of potential successes for most jobs both in the public and private sector of the economy. The first four, intelligence, verbal, numerical, spatial, as well as the other aptitudes are labels of what in other contexts may be described as "general ability" (e.g., "intelligence") or specific "ability" (e.g., "spatial ability"). In the study reported in this thesis the list of specific task relevant abilities were drawn from the same source of "aptitudes" in the GATB. If information were obtained from workers on these specific abilities just before they were placed on jobs, then such information may be used in the "aptitude" sense to predict their job behaviors six months later. If at the end of six months the same workers were tested again on these specific abilities, the information would reflect their concurrent job abilities.

Earlier discussion of the ability concept has leaned toward Fleishman's (1969) position which conceives "ability" as a trait that accounts for "observed consistencies in performance . . . across different tasks." Thus, if performances in separate tasks are correlated, then there is an underlying capacity to perform basic to these tasks; ability is therefore a general capacity to perform a group of tasks.

For example, the present study has evidence that motor coordination ability is involved in the job of assembler, automobile; there is evidence in the literature that this same ability is involved in the job of the airplane pilot (e.g., Fleishman, 1958).

When the context is restricted to a specific task and the task performer is observed the term "ability" tends to be replaced by "skill," which according to the Dictionary meaning above is the "ease, rapidity and precision" with which the worker performs. Skill, therefore, refers to "proficiency attained on a specific task." But such proficiency is inseparably connected with the ability to perform the task. Furthermore, if the worker were to be asked anything about his "ability" to perform, and his "skill" in performing he may in fact be attaching the same meaning to both concepts.

The conclusion of this issue is that, conceptually, ability is distinguished from skill in that the former is general while the latter is specific; but in a given job situation the distinction between the concepts become so tenuous that the practical distinction becomes near impossible. It is in such a situation that the terms skill and ability are used as synonyms in this report.

The distinction that must be emphasized in this study is that between demonstrable or objective ability and self-perceived or subjective ability. An example of the former is Stanford-Binet test of "intelligence" or general ability: the demonstrable ability is inferred from an observable response performance to an objective set of stimuli. Self-perceived ability, on the other hand, is inferred from subject report. The two types of information concern an individual's

trait capacity to perform certain activities; they are, therefore, positively related though the statistical correlation coefficient may be low. For example, Arsenian (1942) found among college Ss a "contingency coefficient" of .36 between "own estimate of ability" and ability as measured by the ACE Psychological Examination. The position taken here is that both aspects of ability may be motivational variables, provided that the objective ability is perceived by the individual, i.e., they may represent the "force" stimuli which excite an individual to action. The studies reviewed in Chapter I were dealing with demonstrable ability; the present one is concerned with self-perceived ability.

Self-Perceived, Task Relevant Ability (SPART)

The instrument for measuring the key variable of this study was arrived at in four main steps. First, a list of psychomotor and other job abilities was compiled from the works of Fleishman (1967), Flanagan (1953-1959), and McCormick, et al. (1957-1967). Second, the aptitude profile of workers in assembling jobs was examined in both the Worker Trait Requirements for 4,000 jobs (1957) and the Dictionary of Occupational Titles, Vol. 2 (1965). They give essentially the same information on the "aptitude" requirements of jobs. Five aptitudes are said to characterize successful workers in various assembly jobs: they are Spatial, Form Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The expert job analysts engaged in the rating

project indicated that at least two-thirds of the successful working population in these jobs have these aptitudes. This would imply that the successful worker in an assembly job possesses these aptitudes to an extent that is at least average for the population working in that job.

In the third step the investigator paid a visit to the plant and observed the workers at their jobs. Based on these steps, items were written on each of the abilities. Editing and selecting by a personnel officer in the organization resulted in the questionnaire items displayed in Appendix 1A.1.

The last step in the definition applies to the concurrent study. A questionnaire required the worker to say how "helpful" a particular ability or "skill" is in the job he does. The condition imposed by the writer was that at least 50% of the workers responding should say the ability is helpful: The questionnaire may be seen in Appendix 1A3.

"Self-perceived abilities relevant in the task" (SPART) is therefore operationally defined as an individual's self-estimate of his capacity to perform a set of tasks which involve a group of abilities or skills, provided "experts" agree, and, at least 50% of workers currently in the job also agree that the specified abilities or skills are involved and useful in the jobs they are doing.

The final SPART instrument measures six specific abilities: Perceptual Sensitivity, Motor Coordination, Alertness, Memory (of people's names), Finger Dexterity and Verbal Ability. The data on which the final selection was based are presented in Chapter III. The instruments used in measuring the SPART construct may be found in Appendix 1A (1-4).

A set of minimum conditions were established which had to be satisfied for the instrument to be used in testing the research hypothesis. These are stated below.

1. The SPART Construct should be reliably measured, in terms of internal consistency.

2. There should be significant and positive correlation between the first and re-test administrations of the instrument.

3. When analyzed together, and with no other variables, all the SPART measures should have salient loadings on one general factor; a minimum loading of .30 was set as recommended by Nunnally (1963). This is based on the assumption that most specific abilities are significantly correlated, however, low the absolute values of the r's.

4. The SPART measures should have salient loadings on a common factor when they are analyzed together with variables of different types; this is on the assumption that the construct is psychologically distinct.

Construct validity was probed further by testing the SPART measures against Lodahl's (1965) Job Involvement, and a specially designed item requiring an individual to say how important it is to him in life to "develop himself by learning new skills." The specific conditions follow the description of these variables.

Lodahl's Modified Job Involvement Scale

Lodahl (1965) defines the concept of "job involvement" as the degree to which a person's work performance affects his . . . self-esteem." Further, he suggests that job involvement is multidimensional: the job involved person is affected personally by his whole job situation, including the "work itself," his co-workers, and the company, to

mention a few. That dimension defined by the "work itself" and the activities involved may be assumed to be associated with the worker's abilities to do the job. In fact the author, quoting Allport, makes the point: "when the individual is busily engaged in using his talents, understanding his work, . . . then he is identified with his job." One may expect that a measure of involvement in the "work itself" should correlate with the SPART measures.

The expectation is strengthened by Lodahl's (1965) report of a study in which Job Involvement was related to the perceptual skill of women workers in a factory.

For this study the Job Involvement Scale was modified slightly. Only fifteen of the twenty items in the original scale were used. Minor editorial changes were necessary to adapt the scale to the organization; and instead of reporting one sum score for the whole scale, as the author does, two scores were derived--one made up of the sum of positively worded statements (Lodahl P), and the other of negative statements (Lodahl N). An unpublished study by the writer (Ekpo-Ufot, 1969) has shown that "positive" and "negative" attitude statements tend to load on separate and distinctive factors. Positive here means that the job involved person may be expected to endorse the scale items: for an example:

"I make an extra effort to do my job right."

Negative means the job involved individual is expected to endorse items classified as negative; for an example:

"My work is only a small part of me."

Respondents were asked to indicate their agreement with the scale items on a five-point scale in which 1 signified "definitely disagree" and 5 "definitely agree." The fifteen items used and the format are displayed in Appendix 1B.

The conditions of relationships between the SPART measures and the Lodahl scale scores are as follows:

1) there should be significant correlation between the SPART measures and each of the Lodahl P and Lodahl N scores. This is on the assumption that the dimension of involvement in the "work itself" in the Lodahl scale would be associated with an individual's self-perceptions of his task relevant abilities.

2) variables in the SPART measures should have relatively low loadings on factors defined by the Lodahl scores, and vice versa. This condition is necessary to distinquish the SPART from the Lodahl measures.

The Importance of the Motive to Acquire Job Skills

Self-perceived task relevant ability (SPART), a subjective variable, has already been distinguished from demonstrable or, objectively observable task relevant ability. It has been noted that, in a specific task situation, it may be impractical to distinguish "ability" from "skill." However there is a distinction between all these concepts on the one hand and the motive to develop one's ability or the motive to acquire new skills. Even so, one may expect low empirical correlations between responses to stimuli eliciting self-perceptions of skills possessed and responses to stimuli eliciting reports of the importance to the individual of the need or motive to

acquire the skills. The correlation between such sets of responses would not be perfect because while individuals may be assumed to have fairly reliable perceptions of how much of specified abilities they have and whether or not they have any urge or motive to acquire such abilities, they may not all be expected to perceive the importance of the motive to acquire such abilities. But empirically there may be some at least who perceive themselves as high on the specified abilities, and at the same time perceive the importance to them of having the abilities; also there may be some at least who perceive themselves as low in the abilities and also regard the abilities as unimportant needs. Such is the reasoning behind the inclusion of an item requiring the individual to say:

> "How important is it to you that you get this out of life in general: develop myself by learning new skills"

The full item format is shown in Appendix 1C. It was expected that the response to this item would correlate with the responses to the SPART items, on the assumption that the controlling stimulus in both sets of items is skill, and that, as already argued, some, at least, of the workers would respond in a similar manner to the two types of items. Obviously such correlations would reflect on the construct validity of the SPART items.

Other Variables

The subject's educational level, and his rating of his "confidence" in his ability to do the job were obtained during the first week on the job.

Supervision climate was inferred in the predictive study by the supervisor's response to the item: "if a supervisor gives his people too much say in running his area, he will lose control of them." The supervisor was required to indicate his agreement or disagreement to this item. An agreement was interpreted to mean that the supervisor distrusts the workers under him, whereas disagreement would mean the supervisor trusts his workers. The response was on a four-point scale:

1. definitely agree
2. inclined to agree
3. inclined to disagree
4. definitely disagree

Thus 1 and 2 operationally define a distrustful supervision climate, whereas 3 and 4 define a trustful supervision climate.

For the purpose of analysis the supervisor's response was assigned to the workers under him. "Distrustful-trustful" supervision climate thus defined must be understood to reflect the perceptions of the supervisor, which may not necessarily be the same as that of the worker. In any case such was the operationally defined "supervision climate" used as a "moderator."

Appendix 1c presents in full the questionnaire items used in obtaining information on the variables described in this section. The predictions involving them are summarized in Part 2, below.

Summary of Conditions and Predictions

"Conditions" here refer to the specified minimum properties which had to be evident in the research instrument for some confidence

to be put on it; only if such confidence was established would the instrument be used in testing the research hypothesis. The conditions are summarized in Part 1 below. On the other hand "predictions" largely expand the research hypothesis, in addition to whatever light they may throw on the SPART construct. These are summarized in Part 2.

Part 1: Conditions

1. The SPART instrument should be reliable, in terms of internal consistency.

2. There should be significant and positive correlation between the first and re-test administrations of the instrument (six-months interval).

3. When analyzed together and with no other variables, all the SPART measures should have salient loadings on one general factor. In line with Nunnally's (1963) recommendation, loadings of .30 or larger were considered; this condition is in line with the assumption of significant correlations among job relevant abilities, however low the absolute values of the r's.

4. There should be a positive and significant correlation between the SPART measure and the Lodahl P score.

5. There should be a negative and significant correlation between the SPART measure and the Lodahl N score.

6. The SPART factors should be distinguished from the Lodahl factors, as indexed by the number of variables with salient loadings on a factor. This means that variables in the SPART instrument should have relatively low loadings on factors defined by the Lodahl scores, and vice versa.

7. There should be a positive and significant correlation between the SPART measures and the individual's perceptions of the importance to him of acquiring new skills. This is on the assumption that at least some individuals would respond in a similar way to a stimulus involving job relevant skill and to another involving importance of the motive to acquire job skills.

Part 2: Predictions

The predictions bearing on the research hypothesis may now be outlined:

1. The SPART measure will correlate with turnover; the higher the SPART score the greater the probability that the worker will stay on the job.

2. There will be significant interaction between the SPART measure and supervision climate in their effect on turnover, such that r will be positive under distrustful supervision, but negative under trustful supervision climate. The rationale for this prediction is that workers with high SPART will find a distrustful climate frustrating and so would tend to quit.

3. The correlation between the SPART measure and education level will be positive and significant.

4. The correlation between the SPART measure and each of the following subjective criteria would be positive and significant:

   I. Confidence in ability to do the job to be assigned
   II. Turnover intentions
   III. Self-ranking of job performance
   IV. Self-rating on fast job performance

The Design

As stated in the first chapter, the research hypothesis is that job performance is, in part, dependent on the workers' self-perceived task relevant abilities (SPART). The previous sections of this chapter have described the job performance indices of turnover and the subjective behavioral ratings of job performance and as well the operational measure of the independent variable, SPART.

Another element in the design is the sample. This has been described to comprise two sets of recruits that form the "predictive" and the "concurrent" study samples. Thus both longitudinal and concurrent studies were carried out simultaneously. In neither of these were the subjects randomly chosen from the population of workers.

To test the research hypothesis the subjects were rank-ordered according to their scores on the SPART measure, and then categorized as in the lower third or middle third or upper third of the score distribution. When a moderator was introduced, i.e., the distrustful-trustful supervision climate described earlier, the subjects were also rank-ordered and categorized on this variable. But to magnify the differences between the sub-groups only the lower and upper thirds on the two variables were used in the result analysis. Such restriction considerably reduced the number of subjects in each cell used in the analysis.

The categories of the independent variables were used as if they were treatment levels in an experiment. The following matrices summarize the resultant designs:

SPART

(a)

Lower Third	Middle Third	Upper Third
n = 40	n = 43	n = 40

SPART

(b)

Supervision Climate	Lower Third n = 40	Upper Third n = 40	Unclassified remaining n
(Upper Third) Trustful n = 40	9	8	23
(Lower Third) Distrustful n = 40	5*	16	19
Unclassified remaining n	26	16	

*This minimum n of 5 became the n for each cell of the two-way ANOVA to meet the "equal frequency" demands. A table of Random Numbers was used to select the 5 for each of the other cells.

Procedure

This study was carried out in five steps as follows:

1) development of the questionnaire instruments on the main independent variable: "SPART."

2) first questionnaire administration: SPART and biographical information were administered to the Predictive Study Sample in August, 1970.

3) second questionnaire administration six months later: retest SPART, and other items were administered to the Concurrent Study Sample in March, 1971.

4) collection of data on turnover--March-April, 1971.

5) analysis of results and write-up.

The first step included a preliminary try-out of the instruments with a small group of college students. Both initial and retest administrations of the instruments to the study samples were carried out in small groups in the offices of the company, and during the official working hours.

It must be emphasized that these instruments were administered in non-threatening conditions, as a research project. They were not part of the selection process; nor did the company officials have any access to the workers' responses. Quotation from the relevant parts of the general instructions to the questionnaire will serve to make the point clear:

> This survey is being given to you as a part of a study being carried out to try to make [name of company] a better place to work. It contains questions about you and your background and since you have already been hired, it does not affect your chances of getting a job. When you have filled out the survey, put it in the envelope given you, seal the envelope, and put it in the box labeled SURVEY. It will be sent to [name of a research institute] and no one at [name of company] will ever see how you answered the questions.

The whole research has been carried out true to the letter of the above statements.

Provisions had been made for recording incidence of quitting among the subjects; the data on turnover therefore was obtained from such records.

Analysis

Four types of analysis were planned and carried out, including correlational and factor analysis, analysis of variance (ANOVA) and t-test comparison of means.

The independent variables were correlated separately at first, and later together with the criterion variables. The purpose was to investigate the interrelationships of all the study variables so as to test the specific conditions outlined earlier.

Factor analyses were run so as to investigate the clustering of the variables, and throw light on their construct validity. A minimum loading of .30 was set, as recommended by Nunnally (1963); also each factor was required to account for at least five percent of the total variance to be considered salient.

The analysis of variance provided an additional test of the predictor-criterion relationships, and also made it possible to speculate on the type of relationship, that is whether linear or curvilinear.

Lastly, the t-test served as an adjunct of the ANOVA to show the significance of the differences of the typical job behaviors for the three categories of subjects as defined by the SPART measure.

All predictions were tested at the .05 level.

CHAPTER III

RESULTS, ANALYSIS, AND INTERPRETATION

The first purpose of this study was to develop reliable instruments for measuring SPART, the hypothesized variable which influences motivation to work on a specified job. A second purpose was to correlate this variable with on-the-job-performance of a group of industrial workers. This chapter presents the results in two parts. In the first, data is presented which completes the last step in the definition of the construct as stated in Chapter II; results on the reliability and validity of the instrument follow. The second part of the chapter presents the results pertinent to the specific predictions of this study. Preliminary interpretations of the results are given, and summarized at the end, as preparation for fuller discussion in Chapter IV.

Last Step in a Definition

As described in Chapter II the definition of self-perceived abilities relevant in a task (SPART) was arrived at through the following four steps:

1. Compilation of a list of job-relevant abilities as scientifically defined by factorial studies.

2. Limitation of the list to conform with the aptitudes specified by the Dictionary of Occupational Titles (1965) and Estimates of Worker Trait Requirements (1957).

3. Modification of the resultant list in line with impressions gained by the investigator during a visit to the research site to observe the workers at work.

4. A special questionnaire requiring the worker to say how "helpful" a particular ability is in the job he does.

The first three steps have already been described. When the theoretical definition of SPART was given, reference was made to the results of step 4. The following percentage values were obtained for each of the abilities presented in the questionnaire. The values were calculated from 83 of the 90 in the Concurrent Sample who gave complete responses to this set of items.

1.	Perceptual Sensitivity	81.9
2.	Motor Coordination	78.4
3.	Alertness	74.7
4.	Memory (of People's Names)	55.4
5.	Finger Dexterity	54.2
6.	Verbal	48.1
7.	Clerical Perception	44.5
8.	Reasoning	38.0

9.	Perceptual Map Reading	27.7
10.	Numerical	25.4

Only the first 5 abilities meet the requirements of the definition started with. But since Verbal Ability was close to the 50% definition, and had been found to correlate with the turnover criterion in the Predictive Sample, it was decided to include it in the list of SPART measures used in the analysis. These measures therefore include Perceptual Sensitivity, Motor Coordination, Alertness, Memory (of People's Names), Finger Dexterity, and Verbal. This list is different but not inconsistent with Ghiselli's (1966) review findings that objective measures of motor, spatial-mechanical, and perceptual accuracy abilities, used commonly in industrial selection, are the most valid predictors of success in training and job proficiency of "bench workers (e.g. assemblers)." Intellectual abilities are less valid. The coefficients reported may be quoted:

Objective Abilities	Pearson r with: Training Success	Job Proficiency
Motor	.42	.21
Spatial-Mechanical	.26	.19
Perceptual Accuracy	.27	.20
Intellectual	.21	.13

It must be borne in mind that Ghiselli's (1966) "bench workers" is a gross classification of routine repetitive machine-paced jobs.

Obviously the four steps taken to define SPART for automobile assemblers in this study have resulted in a list more comprehensive than the one Ghiselli (1966, p. 58) has derived from his review of studies "on the validity of tests in the selection and placement of

workers in various occupations." The notable omission in the SPART list is spatial-mechanical ability. Even so, the specification of the six abilities as the SPART measures for automobile assemblers is strictly limited to the sample studied; further research alone can answer how far the definition may be generalized.

Reliability of the SPART Instrument

The first precondition for using the SPART instrument for the investigation of the research hypothesis was that it be reliable. Two methods were used to explore the reliability of the instrument: Cronbach's (1951) coefficient alpha and a test-retest correlation coefficient of stability.

Is Cronbach's alpha coefficient of internal consistency a suitable statistic to use in this exploration? The investigator answers: yes. A quotation from Cronbach (1951) its author is relevant here:

> [Alpha] estimates the proportion of the test variance due to all common factors among the items. That is it reports how much the test score depends upon general and group, rather than item specific factors. (p.320)

If alpha estimates general and/or group factor concentrations, its use should throw light on the internal consistency of the SPART items.

Alpha was calculated three times. The first calculation of Alpha was for the first administration of the SPART instrument to the Predictive Sample. Alpha was calculated again for the administration of SPART to the Concurrent Sample. Alpha was also calculated for the

responses to the question: "How "helpful" are the skills to you on the job" for each of the SPART measures, obtained during the administration of SPART to the concurrent sample. The values obtained were .66 and .67 for the administrations of SPART items to the Predictive and Concurrent Samples, respectively, and .63 for the administration of SPART-"helpful" to the Concurrent Sample. The proportion of variance on the SPART inventory due to "true" individual differences would therefore be estimated at about 66% and 67% for SPART and 63% for SPART-"helpful." Data for these calculations may be found in Appendix IIIA.

Table 1 below presents the correlations between the first and retest administrations of the SPART instrument.

TABLE 1

Pearson r Correlation Between the Responses to the SPART Items on First and Retest Administrations (6 months interval), Sample N = 57

SPART Item	r
Alertness	.74*
Perceptual Sensitivity	.58*
Memory of People	.59*
Finger Dexterity	.47*
Motor Coordination	.53*
Verbal	.56*

*p < .01

All the correlation coefficients are positive and significant. They are interpreted to indicate stability of the SPART instrument items.

Construct Validity of the SPART Instrument

Another precondition for utilizing the SPART instrument was that there should be some evidence that the SPART construct is valid. This evidence was probed in three factor analyses of the SPART items by themselves, in the correlation of the SPART sum score with Lodahl subscale scores, in a factor analysis of the SPART and Lodahl items together, and in the correlation of the SPART measures with an item on the importance of learning new skills.

One condition was that all the SPART items should have salient loadings on one general factor, when analyzed together and with no other variables. Tables 2 and 3 present the results from the first and second administrations for comparison.

The factor patterns in both Tables are not the same, but they do appear to be similar. For example Factor III of the first administration is loaded on by Verbal, Motor Coordination, and Alertness (.70, .76, .66, respectively). Similarly Factor IV of the second administration loads highly on these same variables (.73, .67, .57). Since each of these two factors account for 23% of total variance, the three SPART items that consistently load on these factors may be said to define a stable SPART factor.

Factor IV of the first administration has loadings on Finger Dexterity and Perceptual Sensitivity (.89, .50). So does Factor III of the second administration (.90, .49). Note that the two pairs of factors illustrated have highest loading on the same SPART variables: in the first it is Verbal and in the second it is Perceptual

TABLE 2

Varimax Rotated Factor Structure of SPART Items
(First Administration, Sample N = 123)

		I	II	III	IV
SPART: Numerical	1		.91		
SPART: Reasoning	2		.66	.50	
SPART: Verbal	3			.70	
SPART: Perceptual (Map Reading)	4			.67	
SPART: Clerical Perception	5	.36			-.67
SPART: Motor Coordination	6			.76	-.37
SPART: Finger Dexterity	7				-.89
SPART: Memory of People's Names	8	.85			
SPART: Perceptual Sensitivity	9	.57			-.50
SPART: Alertness	10	.57		.62	
Highest Loading		.85	.91	.76	-.89
Proportion of Variance		.16	.16	.23	.18

TABLE 3

Varimax Rotated Factor Structure of SPART Items
(Retest Administration, Sample N = 90)*

		I	II	III	IV
SPART: Numerical	1	.77			-.31
SPART: Reasoning	2	.60		-.52	
SPART: Verbal	3				-.73
SPART: Perceptual (Map Reading)	4	.43			-.66
SPART: Clerical Perception	5	.83			
SPART: Motor Coordination	6		-.50		-.67
SPART: Finger Dexterity	7			-.90	
SPART: Memory of People's Names	8		-.86		
SPART: Perceptual Sensitivity	9	.35		-.49	-.61
SPART: Alertness	10	.33		-.48	-.57
Highest Loading		.83	-.86	-.90	-.73
Proportion of Variance		.22	.12	.17	.24

*In comparing Tables 2 and 3 it must be remembered that the samples differ in number and in composition; the 90 of Table 4 include 71 from the 123 of Table 3 and a different set of 19 individuals.

Sensitivity. The first two factors in the two tables are not similar, though it may be observed that Perceptual Sensitivity and Alertness load on Factor I in both tables.

These results do not meet the condition of a general factor for all the SPART items. In fact they show that SPART for the automobile assembler job is multifactorial. At least two such factors would appear to be fairly stable: one defined by Verbal, Motor Coordination, and Alertness, and the other by Finger Dexterity and Perceptual Sensitivity. These findings are consistent across the two analyses. It must be borne in mind, however, that the factors in Table 3 with an N of 90 may not be as reliable as those in Table 2 with N = 123.

In the Concurrent Study Sample there were complete data on the first and retest administration of the SPART instruments for 57 individuals. Their responses were correlated and analyzed. Table 4 presents an extract of the factor analysis results. The purpose was to see whether the items load on the same factors.

One common feature in the pattern is worth noting. The factor on which the first administration item loads highly is also loaded on by the same item in the retest administration; to some extent the relative loadings may be reversed such that the retest item loads higher than on the first administration. Examples follow:

Factor II and Finger Dexterity	first loading	.85
	retest loading	.59
Factor III and Memory of People:	first loading	.82
	retest loading	.81

TABLE 4

Varimax Rotated Factor Structure of First and Retest Administration of SPART Items
(6 MONTHS INTERVAL: SAMPLE N = 57)

	I	II	III	IV	V	VI	VII
1 SPART: Numerical	.93*						
2 SPART: Reasoning	.53	-.39		.37		-.31	
3 SPART: Verbal		-.33			-.78		
4 SPART: Perceptual (Map Reading)						-.72	
5 SPART: Clerical Perception		-.44	.45		-.32		
6 SPART: Motor Coordination		-.67				-.49	
7 SPART: Finger Dexterity		-.85					
8 SPART: Memory of People's Names			.82				
9 SPART: Perceptual Sensitivity		-.39		.76			
10 SPART: Alertness		-.52		.44		-.34	.44
RETEST ADMINISTRATION							
11 SPART: Numerical Retest	.68			.30		-.31	.35
12 SPART: Reasoning Retest		-.31		.61	-.45		
13 SPART: Verbal Retest					-.76	-.31	
14 SPART: Perceptual (Map Reading) Retest	.35					-.69	
15 SPART: Clerical Perception Retest							.84
16 SPART: Motor Coordination Retest			.38	.36		-.71	
17 SPART: Finger Dexterity Retest		-.59	.31		-.38		
18 SPART: Memory of People's Name Retest			.81			-.32	
19 SPART: Perceptual Sensitivity Retest				.77		-.34	
20 SPART: Alertness Retest				.67		-.36	.44
Highest Loading	.93	-.85	.82	.77	-.78	-.72	.84
Prop. of Variance	.10	.14	.10	.15	.10	.13	.08

*The loading on the same factor by the first and retest administration of the same SPART item are underlined.

Factor IV and Perceptual Sensitivity:	first loading	.76
	retest loading	.77
Factor V and Verbal:	first loading	.78
	retest loading	.76
Factor VI and Motor Coordination:	first loading	.49
	retest loading	.71

The reader has to be warned of the unreliability of factors from a small sample of 57. The results are presented for what it may suggest of the stability of the individual specific ability responses. Furthermore, it may be as Guertin and Bailey (1970, p. 185) say that "the stronger the factor structure the better it resists the vagaries introduced by the unreliability of a small sample."

The full reports of these separate analysis of the SPART measures may be found in Appendix IIA-F. These include the intercorrelation matrices.

The construct validity of SPART was investigated further through the analysis of its relationships with Lodahl's Job Involvement. The conditions were:

1) there should be a positive and significant correlation between the SPART measure and the Lodahl P sub-scale.

2) there should be a negative and significant correlation between the SPART measure and the Lodahl N sub-scale.

3) when analyzed together the SPART items should form factors distinct from those of the Lodahl items.

The correlation between the SPART measure and Lodahl P was positive and significant. Since the Lodahl items were scaled 1--"definitely disagree" . . . to 5--"definitely agree" a negative sign preceding the r between the two sets of items must be interpreted as showing a positive relationship. The obtained value was -.25 (sign. at .05 level) for the correlation between the sum score for the six SPART measures and the sum score for the nine positively worded Lodahl items. If some items in the Lodahl scale measure involvement in the "work itself" then this correlation with the SPART score is some evidence of construct validity. That is to say, the SPART is measuring something in the individual worker, and that thing is connected with the "work itself."

However the correlation of the SPART sum score with Lodahl N was .08, and not significant. It must be noted too that the correlation between Lodahl P and Lodahl N was not significant (r = -.18). No adequate explanation was available for such findings. But the non-significance of the r between the Lodahl P and N subscales reflects some limitations of the Lodahl Job Involvement Scale.

Further evidence for the construct validity of the SPART measure was provided from the results of a factor analysis in which the SPART items were analyzed with the fifteen Lodahl items. Nine Varimax factors emerged as Table 5 shows.

Obviously the conditions were fulfilled. Factor I is a SPART factor; Factor II is Lodahl although one SPART variable (#19, Finger Dexterity) loads on it: this is interpreted to mean that the constructs tapped by the two instruments are distinct but correlated.

TABLE 5

Varimax Rotated Factor Structure of Lodahl's (1965), Modified, and SPART Items

(Sample N = 90)

		I	II	III	IV	V	VI	VII	VIII	IX
Lodahl's "job interesting"	1		.83							
Lodahl's feel bad with work mistake	2						.82			
Lodahl's show up for work early	3		.51		-.35	-.47				
Lodahl's extra effort to do job	4				-.33		.66			
Lodahl's discuss work outside	5							.78		
Lodahl's really interested in work	6		.77					.34		
Lodahl's job means more than pay-check	7		.68	.46						
Lodahl's most important things connect job	8		.79							
Lodahl's glad at end of job shift	9				.82				.82	
Lodahl's do nothing extra than required	10				.63					
Lodahl's don't care about job	11									-.32
Lodahl's most things more important than job	12		-.30	-.63						-.32

Lodahl's work only a small part	13									-.87
Lodahl's wouldn't keep job but for money	14			-.76						
Lodahl's very good at doing job	15			-.45				.33	.33	
SPART: Alertness	16	-.67				.38				
SPART: Perceptual Sensitivity	17	-.71								
SPART: Memory of people	18					.69				
SPART: Finger Dexterity	19	-.45	-.51							
SPART: Motor coordination	20					.83				
SPART: Clerical perception	21	-.71							.37	
SPART: Perceptual (Map Reading)	22	-.63				.33				
SPART: Verbal	23	-.40				.60				
SPART: Reasoning	24	-.85								
SPART: Numerical	25	-.79								
Highest Loading		-.85	-.83	-.76	.81	.83	.82	.78	.82	-.87
Proportion of Variance		.15	.14	.07	.06	.09	.06	.06	.05	.05

This point is made because SPART factors have salient loadings on Lodahl factors, and vice versa.

The pattern is similar in the other factors. Factors III, IV, VII, VIII, and IX are distinctively Lodahl. Factor V is SPART but it is loaded on by one Lodahl variable. On the other hand, Factor VIII is Lodahl, but a SPART variable also loads on it. It is premature at this stage of the research to name these factors; the purpose of the analysis was to investigate the factor pattern. The results clearly show that SPART factors are distinct from Lodahl's; yet, both sets of factors are weakly correlated.

Table 5 is an extract from Appendix II H; the intercorrelation matrix is presented in Appendix II G.

One questionnaire item asked the worker how important it was to him to develop himself "by learning new skills." The correlations of responses to this item with those of the SPART measures were as follows:

SPART Item	Pearson r with the importance of the motive to learn skills
1. Alertness	.38**
2. Perceptual Sensitivity	.42**
3. Memory of People	.29**
4. Finger Dexterity	.24*
5. Motor Coordination	.36**
6. Verbal	.30**

*p < .05
**p < .01

Five of these r's are significant at the .01 level and the sixth is significant at the .05 level. What would account for this significant correlation? The answer appears to lie, at least in part, in the common stimulus, skill, which the two sets of items present. Furthermore, as previously noted it is an empirical fact that some, at least, of those who see their standing as high on task relevant skills are likely to rate high the importance of learning new job skills; similarly some of those who rate themselves as low on the task relevant skills may also underrate the importance of acquiring new skills. On the basis of this reasoning the significant correlations reported between the SPART measures on the one hand and the item on the importance to develop new skills on the other hand have been taken as evidence that the SPART instrument has tapped the individual's self-perceptions of his or her job relevant abilities.

Turnover and Self-Perceived, Task Relevant Ability

It was predicted that SPART would correlate with turnover. The criterion measure, turnover, was quantified 1 for "stays" and 2 for "quits." Point-biserial r's calculated between the criterion measure and SPART variables are displayed in Table 6. The biserial coefficient of relationship between the SPART sum score and the turnover criterion was also computed to be .34, and is significant at .01 level. This r_b compares well as an estimate of the Pearson r represented by the r_{pb} value of .27 shown in Table 6. If corrected for

TABLE 6

Relationship Between the SPART Variables and Turnover Criterion (N = 123)

Variable	r_{pb} with Turnover
Verbal	-.23*
Motor Coordination	-.21*
Finger Dexterity	-.18*
Memory of People	-.16
Perceptual Sensitivity	-.14
Alertness	-.22*
Sum of the Six SPART Measures	-.27**

*p < .05.
**p < .01.

attenuation r_{pb} of .27 becomes .34, and the r_b of .34 is .41. There was not a sufficient large number of women to warrant a separate analysis, such that the total n of 123 (100 men, 23 women) was used in the above computations.

It must be remembered that responses to the SPART items were quantified 1--"outstanding" . . .5--"below average." The correlation results are therefore interpreted to mean that the higher the worker perceives his standing on the task relevant abilities the greater the probability of his remaining on the job.

The significant relationships revealed by the last SPART score, i.e., the sum of responses on the six measures, was probed further by an analysis of variance in which the sum score was used as an independent

variable. Workers were ranked on this sum score and then divided into three categories: lower third, N - 40, middle third, N - 43, and upper third, N - 40. The result of a one-way ANOVA is shown in Table 7.

TABLE 7

Analysis of Variance of Turnover as Contributed by the Sum of Six SPART Measures Categorized in Three Levels

Source	Sum of Squares	df	MS	F	Approx. Sign. Prob.
Between Categories	1.7561	2	0.8780	3.8298*	0.024
Within Groups	27.5122	120	0.2293		
Total	29.2683	122			

*p < .05.

The F-value in the above table is significant at .05 level. The mean score on the criterion variable and the standard deviation (SD) for the three categories of workers were:

	$\bar{X}$	SD
Lower 3rd	1.5	.25
Middle 3rd	1.375	.4843
Upper 3rd	1.300	.4582

A t-test comparison of these means showed that the difference between the means for the Lower and Upper groups was significant at .02 level ($t = 2.424$; $t_{.02}$, df 70 = 2.38). The other pairs were not significantly different. These comparisons mean that there is real

difference in the turnover behavior of those who score at the top and those who score at the bottom of the SPART instrument. The middle group scorers would not be consistently distinguishable from the lower group on the one hand and from the upper group on the other.

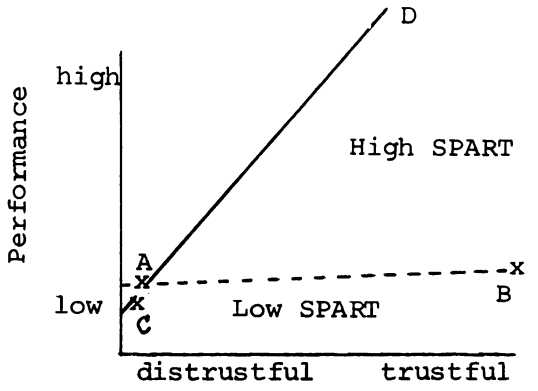
ANOVA provided an additional test of the predictor-criterion relationship evident in the correlational analyses. Its primary purpose was to provide data for computing eta (η) the coefficient of curvilinear relationship. The value was found to be .25, significant at .01 level. The relevant data may be found in Appendix III B. Since this value is not larger than any of the linear coefficients (r_{pb} = .27; r_b = .34) this was interpreted to mean that the relationship is linear. The point is discussed further in Chapter IV.

The SPART-Supervision Climate Interaction

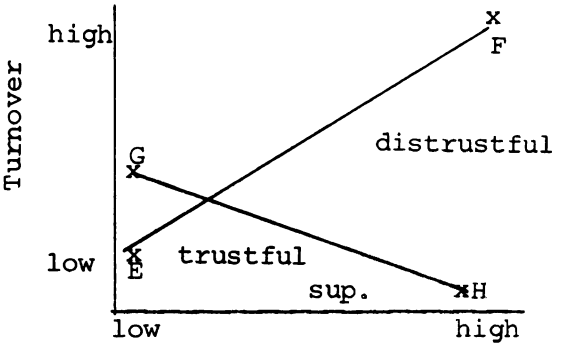
It was further predicted that the effect of SPART will be moderated by the supervision climate. In this study this was defined by the supervisor's trust of workers under him. Under trustful climate it was predicted that the effect of SPART would be enhanced, but if the climate were distrustful no effect would be evident, i.e., there will be a significant interaction between SPART and such defined supervision climate in the relation of the two variables to the criterion.

The following graphs illustrate what is implied in this interaction prediction. In (a) job performance is considered in general,

but in (b) the graph is modified to depict the fact that high performance as defined for this study may be indexed by low (or zero) turnover.



a) hypothetical job performance curves for high and low SPART Ss under distrustful-trustful supervision climates.



b) hypothetical turnover curves for trustful and distrustful supervision climates at varying levels of SPART.

In (a) D would be always larger than C; C may not be significantly different from A; A may be significantly lower than B, but the D-C difference would be significantly different from the B-A difference. In (b) turnover would be higher at F than at E, even though Ss at F are more skilled (high SPART) than those at E (low SPART). G may not be significantly different from E, but F would be significantly larger than H, i.e. the effect of SPART would be enhanced under trustful supervision climate, but inhibited under distrustful climate. Table 8 below summarizes the ANOVA results for testing this prediction.

TABLE 8

Analysis of Variance of Turnover as Contributed by the Sum of Six SPART Measures (A) and Supervision Climate (B)[a]

Source	Sum of Squares	df	MS	F	Approx. Sign. Prob.
Between SPART Levels (A_1, A_2)	1.2500	1	1.2500	6.2500*	0.024
Between Moderator Levels (B_1, B_2)	0.0500	1	0.0500	0.2500	0.624
Interaction: A X B	0.4500	1	0.4500	2.2500	0.153
Within Groups	3.2000	16	0.2000		
Total	4.9500	19			

*$p < .05$.

[a]Note: The limitation of these results must be recognized. Only the top and bottom thirds of each variable were used; such restrictions reduced the number in each cell to 5.

As the table above shows, the interaction prediction was not fulfilled. The SPART main effect is again significant, but the supervision climate effect is not. This last result is contrary to other research findings. It may be an artifact of the categorization procedure which sought to magnify the differences between the SPART categories. The p value of .15 would suggest that the interaction prediction may be supported, given a larger N. This point is discussed further in Chapter IV.

SPART and Education Level

It was predicted that the SPART measures would correlate with educational level, on the assumption that the development of SPART is in part connected with an individual's life experiences of which the school (in Western Culture) plays a large part. The following Pearson r's were obtained:

SPART	Pearson r with Education Level	
Alertness	-.06	ns.
Perceptual Sensitivity	-.22*	
Memory of People	-.03	ns.
Finger Dexterity	-.28**	
Motor Coordination	-.23*	
Verbal	-.27**	
Sum of the Six Measures	-.26**	

ns. = not significant
*p < .05
**p < .01

Since the SPART responses were quantified 1--"outstanding . . . to 5--"below average" and Education Level was quantified 1--"Grade School . . . to 7--"College Graduate," the negative values of the coefficients in fact show that high SPART is associated with high level of education.

SPART and Subjective Criteria

Table 9 gives the correlations of the SPART measures with confidence in ability to do the work to be assigned, self-ranking on job performance, self-rating on how fast the worker performs on the job and lastly the relation between both the SPART and the SPART-helpful variables with turnover intentions. Predictions of significant relationship between the SPART sum score and each of the first three variables were confirmed. The relationship with turnover intentions was not confirmed. However, SPART-"helpful" sum score showed significant relationship with this criterion. SPART-helpful, it must be remembered, was defined by responses to the set of items requiring an individual to say how the skills specified, which he possessed--how such skills "help in doing the job" (See Appendix I A3). Incidentally, this relationship if replicated would suggest a relationship between SPART-"helpful" and job satisfaction: this would follow the obvious empirical fact that turnover and turnover intentions stand in opposite to job satisfaction. No argument may be necessary to show that a relationship with SPART-"helpful" may suggest a relationship with SPART: the conclusion follows from the operational items from which these variables are defined (Compare Appendix I A1-3).

The interpretation of these results is based on the correlations with the SPART sum score. It must be remembered that the SPART responses were quantified 1--"outstanding" . . . to 5--"below average." Since turnover intention was quantified 1--"thought of quitting many times" . . . to 4--"No" thought of quitting, high SPART-"helpful"

TABLE 9

Pearson r Correlations Between the SPART Measures and Other Subjective Criteria

Columns 1	SPART & A N = 123 2	SPART & B N = 90 3	SPART & C N = 90 4	SPART-"Helpful" & D N = 90 5	SPART & D N = 90 6
1 Alertness	.16 n.s.	.26*	.32**	-.17 n.s.	-.02
2 Perceptual Sensitivity	.19 n.s.	.26*	.28*	-.18 n.s.	-.10
3 Memory of People	.09 n.s.	.18 n.s.	.09 n.s.	-.23*	-.10
4 Finger Dexterity	.23*	.21 n.s.	.12	-.17	-.13
5 Motor Coordination	.25**	.17 n.s.	.14 n.s.	-.27*	-.07
6 Verbal	.17 n.s.	.37**	.32**	-.22*	-.04
7 Sum of the six SPART measures	.26**	.35**	.30**	-.31**	-.11

n.s. not significant (applies to all values on column 6).
*p < .05.
**p < .01.

Key:

A. Confidence in ability to do the job to be assigned (response during the first week on the job).

B. Self-ranking on job performance--after six months or less on the job.

C. Self-rating on how "fast" he works on the job--after six months or less on the job.

D. Turnover intention--after six months or less on the job.

would be associated with "No" thoughts of quitting. This particular finding is consistent with the results on the hard turnover data, and suggests that dissatisfaction grows among the workers in a job which does not utilize their tas-relevant abilities. The nonsignificant r_s of the SPART items with turnover intention may be due to the fact that the Concurrent Sample was now highly selective, being confined to those that remain on the job. The SPART-helpful sum correlation which is significant at the .05 level can be interpreted to reflect the effect of SPART. If Ss who perceive the job relevant abilities to be "helpful" in their job also think less of quitting the job, they may be expected to stand high on SPART.

The SPART sum relation with self-rating of confidence in ability to do the job to be assigned strengthens the interpretation that SPART is a measure of task-relevant ability. The correlation with self-ranking on job performance, and self-rating of how fast one works supports the research hypothesis that SPART is a correlate of on-the-job performance. Alternative interpretations are considered in Chapter IV.

Summary of Results and Interpretations

Conditions of the Research Instrument

1. The SPART instruments are fairly reliable. Coefficient alpha obtained ranged from .63 to .67. Thus at least 63 percent of the "true" individual differences on the trait is being measured.

2. The first and second administration correlations (six months' interval) are all positive. Furthermore, all are significant at .01 or better. The interpretation is that the instruments are measuring the same trait which is relatively stable.

3. Factor analysis of the SPART variables together, without any other variables, reveals that the SPART construct is multi-factorial. Two of these factors appear to be relatively stable: one has loadings on Verbal, Motor Coordination, and Alertness; the other is loaded on Finger Dexterity and Perceptual Sensitivity. It may be that these two are essential components in the SPART for the automobile assembler job.

4. The positive correlation with Lodahl P is interpreted as evidence of construct validity: the SPART, like Lodahl's test, is measuring something in the individual connected with the work itself; this interpretation is made acknowledging the insignificant correlation of the SPART with Lodahl N since Lodahl P and N themselves are not significantly correlated.

5. A factor analysis of the SPART and Lodahl Measures together resulted in distinctive SPART and Lodahl factors.

6. The SPART measures correlate positively and significantly with a measure of the importance of the motive to acquire new job skills. This is interpreted to mean that the worker's perceptions of how much of task relevant abilities he possesses are

associated with the importance to him of the motive to acquire these and other job skills.

The conclusion based on points 1 through 6 is that self-perceived task-relevant ability has been reliably measured; there is also some evidence of its construct validity.

The Research Hypothesis and Associated Predictions

7. The correlation between the SPART sum score and turnover was .27 (r_{pb}), or .34 (r_b) and significant at .01 (N = 123). These values corrected for attenuation were .34 (r_{pb}) and .41 (r_b). This means that the higher the worker perceives himself to be on the abilities which job experts and at least 50% of workers say are involved in his job, the greater the chances that he will stay on; correspondingly the lower his self-perceived standing on the job abilities the greater the chances that he will quit the job.

8. ANOVA results were consistent with the interpretation of the correlation analysis.

9. The prediction of an interaction between SPART and supervision climate in predicting turnover did not reach significance, but may have reached if N was larger.

10. SPART correlated significantly with educational level. This is interpreted to mean that the development of SPART is associated

with an individual's life experiences, of which the school plays an important role.

11. SPART correlated significantly with confidence in ability to do the job to be assigned; this is interpreted as another evidence of the validity of the construct of self-perceived, task-relevant ability.

12. The positive and significant r's between SPART and each of self-ranking and self-rating on job performance are taken as evidence that SPART is a motivational correlate of job performance.

13. There was the finding that the workers' perceptions of the relevance of the specified abilities are associated with their turnover intentions, i.e. thoughts about leaving the job; this is interpreted to mean that dissatisfaction grows in a job that does not utilize one's task relevant abilities.

Discussion of these results and interpretations is resumed in Chapter IV.

CHAPTER IV

DISCUSSION AND CONCLUSIONS

In Chapter I the research problem is stated in question form: do the worker's perceptions of his possession of the ability requirements of a job influence his motivation to perform on that job? The answer is yes--according to the findings of this study. A theoretical framework for the research was suggested in the "proposition" made by Campbell et al. (1970) that "job behavior" is a function of "ability, motivation, and (organizational) opportunity." From this is derived the postulate that performance on a specified job is a function of (a) the worker's self-concepts regarding the job relevant abilities (SPART), (b) his objectively demonstrable abilities, (c) his motives, and (d) his perceptions that performing on the job will contribute to the "satisfaction" of some, at least, of his multiple motives; performance is also (e) a function of the organizational climate variables not accounted for by the performance-motive satisfaction contingencies. The actual investigation was, however, concerned only with the functional relationship between job performance and SPART, one of the hypothesized variables.

This last chapter has comments on the empirical findings reported in the previous chapter. In particular, the issues of the definitiveness of SPART, of the reliability and validity of the

research instrument, and of the criteria-predictor relationships are discussed. The practical and theoretical implications of the study are also considered. A discussion of the limitations of the study leads to suggestions for further research, and these are followed by concluding remarks on the research problem.

Definitiveness of SPART

The four steps used in this study to arrive at the six specific abilities had practical utility and can be replicated in other situations. Even so, the six specific abilities cannot be claimed to be exhaustive of the abilities involved in the job of automobile assemblers. One specific ability (Manual Dexterity), which was selected at step 2 (Worker Traits Estimates--and the Dictionary of Occupational Titles, 1965) and confirmed at step 3 (the investigator's visit to the research site) was not included in the final questionnaire, only because the questionnaire was becoming too long to meet the practical demands of the organization.

Furthermore it is not clear to the investigator why "Verbal Ability" should correlate with the criteria used in this study, and in particular, the turnover criterion. The stimulus item reads:

How good are you at using word to communicate with people?

What interpretation did the worker give to this stimulus such that his report of his experiencing should predict his turnover behavior? Perhaps verbal communication skills are indeed necessary for the worker

to enjoy himself with his co-workers on a job which is essentially "dull and repetitive"; perhaps such skills help him to defend his position when confronted by his supervisor. One may also speculate that verbal communication skill is an essential component of general "intelligence" which is a prerequisite for minimum effective functioning in any industrial work environment. This statement acknowledges the fact that the correlation of intelligence with performance in assembly jobs is low positive, e.g. .13 as reported by Ghiselli (1966). Lastly it is possible that this empirical finding about Verbal Ability is a peculiarity of the sample.

Another intriguing ability is "Memory of People's Names." The stimulus item reads:

> How good are you at remembering the names of people you meet?

About 55% of respondents (see page 50) said this ability is "helpful" in their job of automobile assembling. Here again one has to speculate that this ability may be essential in making friends and relating with people and that such ability may play a part to make one enjoy a "dull" and monotonous job.

The other abilities have immediate appeal to an observer of people on the job--spotting small mistakes in things (Perceptual Sensitivity) doing jobs that require coordination of both hands and feet (Motor Coordination), reacting quickly when you see a dangerous situation (Alertness) and using your fingers to work with small things, like repairing a watch (Finger Dexterity); these four abilities are obviously relevant to the job of automobile assemblers described in

Chapter II. As outlined in Chapter III the percents of the workers agreeing to this statement are 81, 78, 74, and 54 respectively.

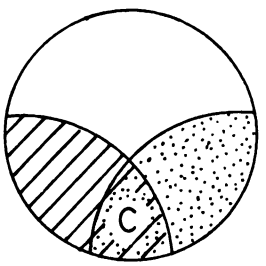
There is still the possibility that these results are peculiar to the study sample. However the results of Table 2 suggest that five of the abilities selected may constitute essential factorial components in the SPART for the automobile assembler job: Verbal, Motor Coordination, and Alertness all have salient loadings on one factor, and another factor has loadings on Finger Dexterity and Perceptual Sensitivity. Even so, the list of six specific abilities cannot then be offered as the abilities relevant in the job studied.

Reliability of the SPART Instrument

The conclusion reached in Chapter III is that the SPART instrument is fairly reliable. A defense was also put up for the use of Cronbach's coefficient alpha for estimating this reliability. This statistic, according to Cronbach (1951), is "an index of common-factor concentration." This study is in every way exploratory: alpha because of its nature is a useful statistic to use to probe the common or group factor concentration in the SPART instrument. Nothing may be wrong in the assumption of common or group factors among a list of specific abilities when the self-perceived aspects of these are in consideration. But such assumption remains testable, and the empirical data of this study justify it.

This position does not imply the denial of other influences that may account for correlation among self-perceived specific abilities. The score on the research instrument may be analyzed into components and compared to parallel analysis of the score on an objective measure of the job relevant abilities as follows:

"True" Job Relevant Ability (the whole circle)



SPART Score	Objective Ability Score
1. Self-perceived "true" job relevant ability (shaded)	1. Objectively tapped "true" job relevant ability (dotted)
2. Errors in self-perceptions of "true" ability	2. No parallel
3. Instrument errors	3. Instrument errors
4. Random errors	4. Random errors
5. Social Desirability and Self-Evaluation factors	5. No parallel

The basic assumption of this research is that No. 1 component of the SPART score is the most dominant, i.e. self-perceived "true" job relevant ability. This statement is made even though it is not yet possible to specify the variance contributions of these five components. Future research may tackle this problem. The fifth component, social desirability, may be classed as "error" in as far as it is not a component

of "true" ability represented by the full circle above; but it is a useful factor that may serve as a moderator in the SPART research, whether or not it occurs to a significant extent in the SPART score. In the present study its contribution may have been minimal since the SPART was not administered as part of a selection process.

The above analytical definition should help to clarify the relation between SPART and objectively measured task relevant ability. The No. 1 components in both cases are similar but not identical. The shaded sector is not identical with the dotted sector. But both sectors tap portions of "true" ability and these portions are conceptually different fractions of the total circle. However the portions overlap, as represented in the sector marked C in the circle. It is this small overlapping sector that is represented by the low positive r that may be found between SPART and objectively measured ability. It is therefore an empirical question which sector, the shaded (SPART) or the dotted (Objective Ability) captures the larger proportion of "true" ability. Let research answer this question.

Undoubtedly the SPART score has more error sources than the objective ability score. But these error sources are controllable, and provided a substantial proportion of "true" ability is tapped a useful correlation may be obtained between the SPART score and a given index of job performance. Here again how "useful" the correlation may be is an empirical question.

Validity of the SPART Instrument

The SPART Score as defined above is also useful in analyzing the validity question, i.e., is the instrument really measuring the perceived job relevant abilities which it purports to measure? The first part of the results presented in Chapter III contains four types of evidence in support of the construct validity of the SPART measures. In the first place both Tables 2 and 3 reveal the SPART is a multifactorial construct, and two of such factors appear to be relatively stable; each accounts for about 23% of the total variance in their respective cases. The factors are not identical; but this is not surprising as the pattern of abilities in a given performance changes with practice, as Fleishman (1967) has found. Add to this the fact that the Predictive and Concurrent Samples were of slightly different composition. Secondly, there is also some stability over time in the intercorrelations of the first and re-test administrations of the instrument. Thirdly, there is the inter-test evidence, when the SPART and Lodahl items are analyzed together: SPART is positively correlated with Lodahl P, and distinctive factors emerge from their joint factor analysis. Lastly the SPART measures correlate with perceived importance of the motive to acquire new skills.

According to Cronbach and Meehl (1955) "a necessary condition for a construct to be scientifically admissible is that it occur in a nomological net, at least some of whose laws involve observables." Cronbach and Meehl (1955) also specify this "fundamental" principle:

> The laws in a nomological network may relate
>
> a) observable properties or quantities to each other
> b) theoretical constructs to observables
> c) different theoretical constructs to one another (p. 290)

The four types of evidence referred to earlier belong to category (c). The evidence in the second part of Chapter III belong to (b). SPART has been found to relate to turnover behavior and also to educational level, both of which are observable facts. Thus the study as a whole does provide some evidence for the SPART construct to be "scientifically admissible." The conclusion is therefore that the SPART instrument is largely measuring the individual's perceptions of his possession of a number of the specific abilities involved in his job of automobile assembling. Such perceptions may however be contaminated with errors and social desirability factors, the extent of which contamination can only be determined by future research.

The next section discusses the predictions emanating from the research hypothesis that self-perceived task relevant ability is a motivational correlate of on-the-job performance of industrial workers.

Turnover and SPART

In this study "on-the-job-performance" was defined as the willingness of the worker to remain on the job situation, and to contribute positively to the production functions of the job organization. Turnover can then be an index of on-the-job performance, if this definition is accepted.

Does the worker stay on the job to work for the organization, or does he quit? This is the turnover question. In his review of the literature on "the predictability of employee tenure" Schuh (1967) has found that "intelligence and aptitude . . . are not consistently related to turnover." In other words, different studies have come out with different results as to the relationship between "objective (demonstrable) ability" and turnover. Thus the issue still remains open for investigation. Since none of the studies referred to considered "subjective ability" one may venture to approach the issue from this aspect of ability. Moreover, there is laboratory evidence that "self-perceived ability on experimental tasks was correlated with later performance on those tasks." (Friedman and Goodman, 1970)

Korman (1967) has also found among college students that those who "have made definitive occupational choices" tend to choose occupations that "make use of their . . . abilities." Such findings are in line with the present assumption that the subjective experience of the ability to do the job is part of the psychological thinking of the industrial worker about his job. The finding of the present study is that those who perceive their standing on the task relevant abilities as high tend to stay on whereas those who see themselves as low on those abilities tend to leave the job. It was also found among those who stay that their experience of the relevance of the specified abilities in their jobs is associated with their thoughts about quitting: the higher the perceived relevance the less the thoughts about leaving the job. It must be remembered that these respondents had previously rated themselves on these abilities. An explanation suggested is that the

worker is involved in and identified with the job situation which makes use of his self-perceived abilities.

The statistical analysis of the effect of SPART on turnover was carried out in three ways. The point-biserial r was calculated to probe the criterion-predictor relationship and a significant value of .27 was obtained, which corrected for attenuation becomes .34. The biserial r was also computed to be .34 and corrected for attenuation to be .41. All these were significant at .01 level. Finally the one way ANOVA, and the associated t-tests of the same data confirmed the existence of a significant relationship. It should be noted that these results apply to both men and women in the Predictive sample. The question whether the r's would be different for men or women taken separately remains to be answered. These relationships are significant but do not account for much of the variance in turnover.

All these statistics depict linear relationship. Might the relationship not be curvilinear? The answer to this question is: probably not. This is based on the computed eta (η) value of .25 which is not as large as the linear coefficients. One may speculate that when the context is a specific job, individuals high on the abilities involved in this job are likely to find the job interesting, challenging, and absorbing. Such individuals will seldom think of quitting, other factors remaining favorable. In other words the turnover-SPART relationship may in fact be linear. It is conceivable that the relation of SPART with other indices of job performance may be curvilinear. But this problem other investigators may wish to probe.

The SPART--Supervision Climate Interaction

The prediction that SPART will interact with Supervision Climate in their effect on turnover was not fulfilled. The issue may not be closed, however. Fleishman and Harris (1962) have found turnover to be "lowest" under combined supervision climates of "medium to high consideration together with low structure." The converse is obvious that turnover was highest under low "consideration" and high "structure." "Consideration," according to these authors, "includes behavior indicating mutual trust, respect, and a certain warmth and rapport between the supervisor and his group." "Structure," "includes behavior in which the supervisor organizes and defines group activities . . . and pushes for production." It was on the basis of such finding as this that it was assumed that the effect of SPART will be enhanced in a supervision climate characterized by high "consideration," but limited in a climate high in "structure." In fact Fleishman and Harris (1962) in their discussion of their findings speculate that "turnover may reflect escape from a problem situation which cannot be resolved in the absence of mutual trust and two-way communication."

The failure to find a significant interaction effect may have resulted from certain limitations of the study. The restriction of the analysis to the upper and lower thirds of the independent variables (SPART and Supervision Climate) did succeed in maximizing the difference between groups, especially on the SPART variable; but it also resulted in a considerable loss of subjects. The n in cells of a two-way matrix had to be reduced to five for an "equal frequency" ANOVA. There is also the possibility that the research measure of Supervision Climate

was not sensitive enough to reveal any effect. In these circumstances the interaction prediction still remains an open issue for future research.

The weak significant relationship found between SPART and turnover in this study shows that SPART can predict turnover. But much of the variance of turnover in particular situations may be accounted for by such variables as the level of employment in the economy, including the availability of other jobs, or by dismissal. Vroom (1964) makes these points, adding that the dismissal factor may have greater probability for workers with lower (task relevant) abilities than for those highly skilled in the job. The findings of this exploratory study are simple. SPART, the subjective aspect of task-relevant ability, is associated with labor turnover; but it does not account for the total variance of this criterion.

SPART and Other Variables

It was predicted that SPART will correlate with four other variables: education level, confidence in ability to do the job to be assigned, self-ranking in job performance, and self-rating on how fast one works. The predictions were all supported.

A predicted relation between SPART and educational level was based on Wesman's (1964) assumption that intelligence is the summation of heterogeneous domains of an individual's learning experiences. Thus "Verbal Ability" is conceived as a homogeneous domain of a learning experience; and so is Numerical Ability. A domain including "Verbal

Ability, Numerical Ability and a host of other specific abilities which an individual needs to deal successfully with his environment--"such a domain becomes heterogeneous. Wesman's emphasis on "learning experiences" leads one to expect a relation between one's self-perceived ability and his formal education level, since in Western cultures, at least, the school provides much of the opportunity for learning experience to occur. The confirmed relation, if replicated in other studies, would suggest another research problem: how does SPART develop?

Confidence in ability to do the job to be assigned was included in the study design to reflect that global conception of general ability. The confirmed relationship between this variable and the SPART measures may suggest that the latter are some measure of one's general confidence. However, that interpretation is not contrary to the view that the instrument is measuring self-perceived specific abilities. One may argue that general self-confidence is in part a function of self-perceived competencies in various fields of human activities. In other words, general self-confidence is in part a function of self-perceived task-relevant abilities. If such interpretation is accepted, then the SPART-Confidence relationship may be taken as another evidence of the validity of the SPART construct.

But there is another criticism--that the two variables may not reflect ability so much as a self-evaluation or social desirability factor: that is to say, that these variables are of a nature that stimulates people's tendency to say "nice things" about themselves. Such a criticism would also apply to the other two subjective criteria of performance: self-ranking on job performance and self-rating of how

fast one works. As the SPART score definition discussed earlier implies, one cannot deny the influence of the social desirability factor. But such influence may be at a minimum. The significant relations with turnover, with educational level and with the workers' perceived importance of the motive to acquire new skills--such correlations would lead one to say the SPART instrument was measuring a great deal more than a social desirability factor.

The finding that the workers' perceptions of the relevance of the specific abilities correlate with their turnover intentions, i.e., the higher they perceive these abilities to be involved in their job the less they think of leaving the job--this correlation further strengthens the contention that the instrument has tapped the workers' perceptions of task-relevant abilities. Brophy (1959), for example, found a significant relation between job satisfaction of nurses and the degree to which their job utilized their potentialities. Vroom (1964), commenting on these findings, quotes his own evidence in which a correlation of .59 was found between "opportunity for self-expression in the job and job satisfaction" for a group of blue collar workers. Since turnover intentions also mirror dissatisfaction with the job, the findings of the present study are consistent with those just quoted. This type of evidence strengthens the case that SPART is a measure of self-perceived task-relevant ability.

The association of SPART-"helpful" with turnover intentions underlines a secondary function for which this variable was designed. As noted in Chapter 3 it provided the last step to the definition of

SPART. The relationship with turnover intentions suggests that SPART-helpful may be a moderator in a SPART research.

Practical Implications

Although the original proposal for this study was designed at the abstract and academic level, its adaptation to the demands of an organization faced with an acute problem of labor turnover is itself an evidence of the practical utility of the variable hypothesized and investigated in this study. Consider first a pure selection problem in a social atmosphere in which there is public suspicion of "bias" against the use of "objective" tests of ability in the selection process. Assume then that the findings concerning the relation of SPART with turnover were replicated with consistent and positive findings; assume too that the investigations of relationship with other indices of job performance also produced consistent and positive results. One can then be encouraged to develop a more reliable SPART instrument for use in a pure selection battery, and also to devise procedures for controlling faking. Consider too the problem of personnel development. The individual's frank report of how much skill he possesses, how much need of a skill he has--such report may be useful in planning employee development programs. This is on the assumption that faking can be controlled, or that it will be minimal in conditions where the individual is convinced that the SPART inventory results would be used in his interests.

The concept of "ability" undoubtedly has a social value attached to it, and this in part explains the motivational potential which "ability" has. It appears that this potential is untapped when psychologists rely exclusively on the objective measures of demonstrable ability. One must remember that these objective measures are seldom fed back to the individuals from whom they were obtained, for example, in the selection process. The use of SPART in industry may release the motivational potential of the "ability" concept. The SPART stimulus item directs the respondent to look into himself, and report; assuming that his report is a frank account of his experiences one can start from such account to lead the individual to be aware of the social value attached to specified abilities; and when the individual is aware of the social importance of the abilities a need may be created to form part of the motivational force required for performance. Furthermore, the tendency not to feed back ability measures to respondents may be overcome by the use of SPART since there is no point hiding that information about a person which the person himself knows much about. There is an assumption here that a feedback of the SPART information would be motivating to the respondents; and the assumption is testable.

In summary, SPART can be useful in a selection process, in a training program, and in a counseling process for individual motivation. The construct may therefore be of practical significance to industrial organizations. This statement is however conditional upon consistent replications of the findings of this study.

Study Limitations

The practical implications outlined are conditional upon corroborating evidence from other investigations of the hypothesized variable. The limitations of the present study should be borne in mind both in criticizing its results and conclusions, and also in planning future research. First, it cannot be claimed that the six SPART measures used in the analysis of the results of this study are exhaustive of the task-relevant abilities in the job of automobile assemblers. The steps followed in the development of the SPART instrument may be followed, however, so as to make findings comparable. Furthermore, the conditions under which the instruments were administered were nonthreatening, i.e. the questionnaire results were not used for selection or other purposes which would motivate the respondents to put up defenses and fake; this was made clear in the general instruction to the questionnaire as described in Chapter II. The pay off from this is in the frank and consistent responses obtained in this project as evidenced by meaningful correlations (see the appendices). Not all testing conditions in industry may be as nonthreatening as this.

It must be remembered also that the measure of supervision climate may not have been sufficiently sensitive to be effective.

It was not feasible to obtain supervisory ratings of workers, but such ratings may also serve as an external index of job performance.

The index of primary concern in this study was turnover, which from its very nature limits the range of hypotheses that may be tested. The use of subjective index of performance has precedence in the study

by Georgopoulous et al. (1957) reviewed in Chapter I; but it is open to the type of criticism discussed earlier with respect to the social desirability factor. That this latter factor was not controlled reveals another limitation.

All these are the outstanding limitations which may have to concern other investigators planning replications of this study.

Suggestions for Further Research

The following plan of research may be outlined:

1) job analytic studies to determine behaviors to use as anchoring statements for the "how good are you . . ." stem of the SPART instrument; for an example the SPART item on Finger Dexterity as quoted earlier is anchored by the phrase "like repairing a watch." The anchors would of course be activities characteristic of the job studied. In this way the studies would also lead to the development of reliable indices of job performance appropriate for testing the SPART hypotheses. An associated development would be SPART measures applicable to job families rather than specific jobs--to make the instrument widely applicable.

2) a construct validation study involving objective measures of a specified list of specific abilities relevant in a particular job.

3) an investigation of the moderator effect of SPART-"helpful." The relation of this variable with turnover intentions as noted above suggests such an investigation may be worthwhile. Another moderator variable that may be investigated is sex.

4) a search for other behavioral correlates of SPART.

5) a search for organizational variables that may interact with SPART. The predicted interaction with supervision climate was not supported. The issue may not be closed in view of the limitations noted earlier. Research in this direction may reveal other organizational variables that may condition the effect of SPART.

6) lastly, the general hypothesis and theoretical rationale for this study provides testable research hypotheses other than the one involving SPART. Job performance is said to be determined by five components:

    a) SPART

    b) objective ability

    c) work motive (or motives)

    d) perceptions of performance as contingent, or expectations that performance will be contingent with work motive-satisfactions.

    e) organizational variables

The present study supports the hypothesis that (a) is a correlate of job performance. Empirical evidence reviewed in Chapter I support similar hypotheses for (b), (c), (d), and (e). Further work may be

necessary on (c) and (d) on the lines suggested by the present study. This would consist of first developing operational measures for these variables, and then seeking correlates in various indices of job performance.

It may be observed that (a) (SPART), (b) (work motives), and (c) (perceived performance-work motive satisfaction contingencies) are interesting in two ways. They may have motivating effects on job performance; also they are all on the phenomenological level, i.e. they depend on the perceptions and feelings of the individual. One is tempted to speculate that a fruitful research on these variables may lead to an extension of existing theories of the motivational determinants of job performance.

Theoretical Implications

As stated in Chapter I the general problem area into which the present study fits is the determinants of job performance with specific reference to the industrial setting. The investigation was being conducted on the functional relation between job performance and a variable, SPART, hypothesized to be one of the determinants. The research findings have thrown light on this variable, such that one can make a tentative theoretical proposition: the worker's perceptions of his possession of the task-relevant abilities are part of his motivation to perform on the task. But no further speculations as to the implications of this proposition will be made--until such a time as more

reliable and valid instruments are developed to operationally define SPART, and correlate it with various indices of job performance.

There is a secondary methodological implication of this study regarding the utility of factor analysis as a scientific tool for developing psychological constructs. Cattell (1959) has argued that the method is useful in this way. The workers' responses to the questionnaire items requiring them to say how "helpful" the specified, factor-derived abilities were in their jobs provide evidence that these abilities are psychologically meaningful. It seems therefore that one can continue the SPART research without any list of specified abilities. In this case one would base the stimulus items on the very activities that make up a job: for an example, "how good are you at aligning the wheels of an automobile?" The responses to such items, sampling the essential activities of a job, may then be correlated. Factor analysis of such data would define SPART. It is conceivable that such research may lead to an extension of, if not the development of a new psychological theory of human abilities.

Lastly, the phenomenological approach adopted here extends the self-concept theory, and recommends its use in Industrial Psychology. The implied assumption of this study is that SPART is a motivational variable. What this means is similar to the point made by Field, et al. (1963) that conceptions of the self have influence in the choice and planning of an individual's behavior. If so, the task as Field, et al. say is to "discover those concepts relevant to whatever behavior events are under study." SPART as here defined is such a concept.

Conclusion

This study was motivated by a desire to investigate the effect of self-perceived task-relevant ability in job performance. It is a logical procedure to plan first on developing reliable instruments for measuring the variable, and then to correlate its measures with certain indices of job performance. The research question has been answered for one group of subjects. Although the results tend to say that the self-concept of the worker regarding the abilities involved in his job have influence on his decision to stay on, or to leave the job, although the SPART measures correlate with educational level, with confidence in ability to do the job, and with subjective ratings of job performance, no attempt will be made to generalize these findings beyond the sample in which the investigation was carried out. This can be taken as a case study. There must be sufficient cases for generalized conclusions to be made. If the issues raised in this study were to stimulate further research one can think of a future date, however distant, when conclusions may be arrived on the effect of self-perceived task-relevant abilities on industrial job performance.

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APPENDICES

LIST OF APPENDICES

APPENDIX I

INSTRUMENTS

APPENDIX I

INSTRUMENTS

A. SELF-PERCEIVED TASK-RELEVANT ABILITIES (SPART)

1. First Administration

How good are you at doing each of the following?

(Indicate your answer by putting a check in one of the boxes to the right of each question.)

Skills:	Outstanding (1)	Very Good (2)	Above Avg. (3)	Average (4)	Below Avg. (5)
1. Solving arithmetic problems quickly					
2. Thinking through a difficult problem					
3. Using words to communicate to others					
4. Reading a map					
5. Checking written material for mistakes					
6. Doing jobs that require coordination of both hands and feet					
7. Using your fingers to work with small things, like repairing a watch					
8. Remembering the names of people you meet					
9. Spotting small mistakes in things					
10. Reacting quickly when you see a dangerous situation					

2. Retest Administration (order of items reversed)

Several weeks ago you were asked to fill out a research questionnaire as a part of the hire-in process. Part of that questionnaire asked you about your skills. Now that you have had some new experience, your idea of how good you are at things may no longer be the same.

So please tell us how good you now think you are at doing each one of the following things by putting a check in one of the boxes to the right of each skill.

Skills:	Outstanding (1)	Very Good (2)	Above Avg. (3)	Average (4)	Below Avg. (5)
1. Reacting quickly when you see a dangerous situation.					
2. Spotting small mistakes in things.					
3. Remembering the names of people you meet.					
4. Using your fingers to work with small things, like repairing a watch.					
5. Doing jobs that require coordination of both hands and feet.					
6. Checking written material for mistakes.					
7. Reading a map.					
8. Using words to communicate to others.					
9. Thinking through a difficult problem.					
10. Solving arithmetic problems quickly.					

3. The Job Relevance of the Abilities

This section asks you about the skills you actually use on the job you now have. In this part of the Questionnaire, we want to know how much your skills help in doing the job you now have.

Skills:	How Much the Skill Helps You To Do Your Job.			
	Very Helpful 1	Fairly Helpful 2	Not too Helpful 3	Not Helpful at All 4
1. Reacting quickly when you see a dangerous situation.				
2. Spotting small mistakes in things.				
3. Remembering the names of people you meet.				
4. Using your fingers to work with small things, like repairing a watch.				
5. Doing jobs that require coordination of both hands and feet.				
6. Checking written material for mistakes.				
7. Reading a map.				
8. Using words to communicate to others.				
9. Thinking through a difficult problem.				
10. Solving arithmetic problems quickly.				

4. Description of the Specific Abilities Implied in A 1.

The following definitions for the abilities included in the initial questionnaire (A 1 above) are quotations from two sources: Estimates of Worker Trait Requirements for 4,000 Jobs, U.S. Labor Department, Government Printing, 1957, and Fleishmen (1966). The letters E and F respectively are used to refer to these sources.

1. Numerical: Ability to perform arithmetic operations quickly and accurately (E)

2. Reasoning: Ability "to reason logically and to use good judgment in practical situations" Flanagan (1953)

3. Verbal: Ability to understand meanings of words and ideas associated with them and to use them effectively (E)

4. Perceptual (map reading): form perception--Perceptual sensitivity Ability to perceive pertinent detail in objects or in pictorial or graphic material. To make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines (E)

5. Clerical perception:
Ability to perceive pertinent detail in verbal or tabular material. To observe differences in copy, to proofread words and numbers and to avoid perceptual errors in arithmetic computation (E)

6. Motor coordination:
Ability to coordinate eyes and hands or fingers or fingers rapidly and accurately in making precise movements with speed (E) Multilimb coordination: ability to coordinate the movements of a number of limbs simultaneously (F)

7. Finger dexterity:
Ability to move the fingers, and manipulate small objects with the fingers rapidly or accurately (E)
The ability to make skill-controlled manipulations of tiny objects, involving primarily, the fingers (F)

8. Memory: Ability to remember

9. Alertness: Reaction time--the speed with which the individual is able to respond to a stimulus when it appears
[This ability was judged by the investigator to be involved in the dangerous or risky aspects of the automobile assembly job, e.g. assembling bodies and motors.]

B. MODIFIED LODAHL'S (1965) JOB INVOLVEMENT SCALE

The next group of items asks you how you feel about your job. Answer each item by indicating how much you agree with each of the statements below.

	Definitely Disagree 1	Inclined to Disagree 2	Neither Agree Nor Disagree 3	Inclined to Agree 4	Definitely Agree 5
1. Work here is so interesting that it is time to punch out before you know it.					
2. I feel bad when I make a mistake in my work.					
3. I sometimes show up for work a little early to get things ready.					
4. I make an extra effort to do my job right.					
5. I often discuss my work with people outside of (name of company).					
6. I'm really interested in my work.					
7. My job here at (name of company) means a lot more to me than just getting a paycheck.					
8. The most important things that happen to me are connected with my job.					
9. I am glad to get out of here at the end of the shift.					
10. I am careful to do only what the job requires and never anything extra.					
11. I don't much care what kind of job I do--just enough to get by.					

	Definitely Disagree 1	Inclined to Disagree 2	Neither Agree Nor Disagree 3	Inclined to Agree 4	Definitely Agree 5
12. Most things in life are more important than this job I'm on.					
13. My work is only a small part of me.					
14. I probably wouldn't keep this job if I didn't need the money.					
15. I am very good at doing all the things I have to do on the job.					

C. OTHER STUDY VARIABLES

1. (Educational level):
   How far did you go in school?
   1. Grade school
   2. Some high school but did not graduate
   3. Graduated from high school (include G.E.D. equivalency certificate)
   4. Technical school or junior college
   5. Apprenticeship training
   6. Attended college but did not graduate
   7. College graduate

2. (Confidence in ability to do the job)
   How much confidence do you have in your ability to do the job here at (name of company)?
   1. A great deal of confidence
   2. I am fairly confident
   3. I have little confidence

3. (Self ranking on job performance)
   In a group of 100 typical people on a job like yours, how do you think you would compare on job performance?
   1. At the top
   2. In the top 25
   3. In the top 50
   4. In the top 75
   5. In the bottom 25

4. (Self-rating on how fast one works on the job)
   How fast do you usually work?
   1. Much faster than most people
   2. Somewhat faster than most people
   3. At about the same pace as most people
   4. Somewhat slower than most people
   5. Much slower than most people

5. (Turnover intentions)
   Since you started to work at (name of company), have you ever thought of quitting?
   1. Yes, many times
   2. Yes, a few times
   3. Yes, but never seriously
   4. No

6. (Supervision climate--as inferred from the supervisor's perceptions of his supervision style)
   If a supervisor gives his people too much say in running his area, he will lose control of them.
   1. Definitely agree
   2. Inclined to agree
   3. Inclined to disagree
   4. Definitely disagree

7. How important is it to you that you get the following out of life in general?

develop myself by learning new skills

☐ 1. one of my greatest wants

☐ 2. want more than most people

☐ 3. want as much as most people

☐ 4. a little is enough for me

☐ 5. want very little or not all

NOTE: Indicate your answer by writing the number of the answer that best describes how you feel in the box preceding the statement.

APPENDIX II

COMPREHENSIVE TABLES

APPENDIX II

COMPREHENSIVE TABLES

TABLE 2A

INTERCORRELATION MATRIX OF SPART ITEMS: (First Administration Sample N = 123)

Var.	1	2	3	4	5	6	7	8	9	10
1	1.0000									
2	.5384	1.0000								
3	.2633	.4706	1.0000							
4	.2963	.5236	.4267	1.0000						
5	.2944	.4291	.4213	.4249	1.0000					
6	.1632	.4354	.4274	.4654	.4842	1.0000				
7	.1550	.3871	.3276	.3752	.5915	.4814	1.0000			
8	.0965	.1283	.1717	.2389	.4293	.2495	.2606	1.0000		
9	.2636	.4211	.3658	.2710	.5246	.2766	.5099	.3708	1.0000	
10	.1549	.3776	.4407	.3610	.4128	.5167	.3526	.3593	.5279	1.0000

Key to Table:

1. SPART Numerical
2. SPART Reasoning
3. SPART Verbal
4. SPART Perceptual (Map Reading)
5. SPART Clerical Perception
6. SPART Motor Coordination
7. SPART Finger Dexterity
8. SPART Memory of People's Names
9. SPART Perceptual Sensitivity
10. SPART Alertness

r at the .05 and .01 levels of significance*

df	.05	.01
100	.195	.254
125	.174	.228

*from Garett, H. E. Statistics in Psychology and Education (p. 201). New York: David McKay Inc., 1966.

TABLE 2B

VERIMAX ROTATED FACTOR STRUCTURE OF SPART ITEMS:
(First Administration Sample N = 123)

SPART Variables	I	II	III	IV	COMM
1	.0687	.9141	.0846	-.0579	.8509
2	.0211	.6620	.4986	-.2672	.7586
3	.1640	.2552	.7033	-.0922	.5951
4	.0367	.2898	.6657	-.2244	.5788
5	.3607	.2206	.2949	-.6702	.7150
6	.0851	-.0507	.7571	-.3748	.7235
7	.0978	.0460	.2549	-.8918	.8719
8	.8507	-.0001	.0829	-.1436	.7513
9	.5719	.2998	.1326	-.4979	.6824
10	.5666	.0269	.6225	-.1001	.7193
11 HI. LOAD.	.8507	.9141	.7571	-.8918	
12 PROPVAR.	.1552	.1567	.2331	.1797	
13 CUM P.V.	.1552	.3119	.5450	.7247	

Key to Table:

1. SPART Numerical
2. SPART Reasoning
3. SPART Verbal
4. SPART Perceptual (Map Reading)
5. SPART Clerical Perception
6. SPART Motor Coordination
7. SPART Finger Dexterity
8. SPART Memory of People's Names
9. SPART Perceptual Sensitivity
10. SPART Alertness

TABLE 2C

INTERCORRELATION MATRIX OF SPART ITEM: (Retest Administration, Sample N = 90)

Var.	1	2	3	4	5	6	7	8	9	10
1	1.0000									
2	.6709	1.0000								
3	.3851	.2917	1.0000							
4	.3571	.3750	.2251	1.0000						
5	.5221	.4135	.4965	.2843	1.0000					
6	.4389	.3942	.3368	.2119	.1985	1.0000				
7	.4355	.4886	.3563	.1966	.3724	.3875	1.0000			
8	.3968	.3935	.3620	.1463	.5090	.3614	.4950	1.0000		
9	.5649	.5726	.3358	.4782	.2951	.5125	.4413	.4277	1.0000	
10	.4690	.4838	.2749	.1870	.2684	.5333	.4771	.3041	.5653	1.0000

Key to Table:

1. SPART Alertness
2. SPART Perceptual Sensitivity
3. SPART Memory of People's Names
4. SPART Finger Dexterity
5. SPART Motor Coordination
6. SPART Clerical Perception
7. SPART Perceptual (Map Reading)
8. SPART Verbal
9. SPART Reasoning
10. SPART Numerical

r at the .05 and .01 levels of significance

df	.05	.01
80	.217	.283
90	.205	.267

TABLE 2D

VARIMAX FACTOR STRUCTURE OF SPART:
(Retest Administration Sample N = 90)

SPART VARIABLE	I	II	III	IV	COMM
1	.3340	-.1080	-.4819	-.5693	.6795
2	.3530	.1078	-.4936	-.6103	.7524
3	.2342	-.8639	-.1368	-.2153	.8663
4	.0760	-.1594	-.8991	-.0102	.8397
5	-.0964	-.5035	-.2630	-.6747	.7873
6	.8286	-.2558	-.0966	-.0976	.7709
7	.4290	-.0789	-.0194	-.6611	.6277
8	.2057	-.2832	.0365	-.7334	.6618
9	.6040	-.0700	-.5241	-.2964	.7322
10	.7714	.0057	-.1299	-.3070	.7063
11 HI LOAD.	.8286	-.8639	-.8991	-.7334	
12 PROP VAR.	.2179	.1205	.1675	.2365	
13 CUM P.V.	.2179	.3384	.5059	.7924	

Key to Table:

1. SPART Alertness
2. SPART Perceptual Sensitivity
3. SPART Memory of People's Names
4. SPART Finger Dexterity
5. SPART Motor Coordination
6. SPART Clerical Perception
7. SPART Perceptual (Map Reading)
8. SPART Verbal
9. SPART Reasoning
10. SPART Numerical

TABLE 2E

INTERCORRELATION MATRIX OF SPART ITEMS (First and Retest Administrations, Sample N = 57)

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1.0000																			
2	.4844	1.0000																		
3	.3045	.4948	1.0000																	
4	.2586	.4968	.4090	1.0000																
5	.3787	.4159	.4553	.4457	1.0000															
6	.3755	.4844	.3625	.4489	.4848	1.0000														
7	.2174	.3932	.3320	.3272	.4896	.4915	1.0000													
8	.1918	.2270	.1195	.3217	.4397	.3594	.3484	1.0000												
9	.2134	.5440	.3900	.2804	.5169	.2985	.5621	.2720	1.0000											
10	.1651	.5227	.4943	.4887	.5242	.6320	.4826	.4520	.5538	1.0000										
11	.2801	.4742	.4217	.4382	.4760	.4645	.2855	.2395	.5259	.7356	1.0000									
12	.2584	.4265	.3631	.5038	.4722	.2393	.2074	.2708	.5767	.5660	.7424	1.0000								
13	.1262	.2384	.1296	.4815	.4391	.3048	.0201	.5890	.3113	.3675	.3457	.3311	1.0000							
14	.0929	.3758	.4311	.3182	.4793	.4759	.4749	.3790	.4684	.4556	.3460	.3734	.3033	1.0000						
15	.1576	.3577	.2383	.5834	.4171	.5304	.2343	.4147	.3895	.5226	.5573	.5929	.5238	.4729	1.0000					
16	.1688	.1941	.3263	.3114	.3933	.2393	.1116	.2273	.1904	.4360	.4482	.3545	.2850	.1916	.1503	1.0000				
17	.3457	.4891	.3251	.6194	.2753	.3300	.0724	.1366	.3210	.3775	.4729	.5134	.3342	.1273	.5290	.4053	1.0000			
18	.1037	.2387	.5571	.3602	.3973	.2511	.0328	.2367	.2753	.4365	.4099	.4428	.3432	.2927	.4487	.3651	.4925	1.0000		
19	.1757	.5991	.5992	.3943	.5145	.4269	.4042	.3328	.6138	.6833	.7124	.6354	.4059	.5712	.4870	.4409	.4517	.5571	1.0000	
20	.6398	.5132	.3762	.3864	.3597	.4004	.1240	.2605	.3275	.4265	.5882	.4660	.3352	.1513	.4450	.4451	.5661	.3894	.5293	1.0000

Key to Table:

1. SPART: Numerical
2. SPART: Reasoning
3. SPART: Verbal
4. SPART: Perceptual (Map Reading)
5. SPART: Clerical Perception
6. SPART: Motor Coordination
7. SPART: Finger Dexterity
8. SPART: Memory of People
9. SPART: Perceptual Sensitivity
10. SPART: Alertness
11. Retest SPART: Alertness
12. Retest SPART: Perceptual Sensitivity
13. Retest SPART: Memory of People
14. Retest SPART: Finger Dexterity
15. Retest SPART: Motor Coordination
16. Retest SPART: Clerical Perception
17. Retest SPART: Perceptual Map Reading
18. Retest SPART: Verbal
19. Retest SPART: Reasoning
20. Retest SPART: Numerical

r at the .05 and .01 levels of significance

df	.05	.01
50	.273	.354
60	.250	.325

TABLE 2F

VARIMAX ROTATED FACTOR STRUCTURE OF SPART ITEMS:
(First and Restest Administrations, Sample N = 57)

SPART Var.		I	II	III	IV	V	VI	VII	COMM.
	1	.9254*	-.1363	.0914	.0244	-.0346	-.0713	.0384	.8917
	2	.5311*	-.3931	-.0242	.3706	-.2215	-.3083	-.0649	.7228
	3	.2411	-.3440	-.0891	.1639	-.7793*	-.1104	.1441	.8515
	4	.1827	-.2333	.2148	.1081	-.2110	-.7243*	.0687	.7195
	5	.2744	-.4373	.4500*	.2589	-.3156	-.0429	.1960	.6759
	6	.2214	-.6738*	.1503	-.0399	-.0375	-.4860	.2370	.8210
	7	.1161	-.8527*	.0579	.2152	-.0092	.0168	-.0023	.7905
	8	.0881	-.2962	.8171*	.0683	.0099	-.0800	.1268	.7904
	9	.1737	-.3917	.1669	.7582*	-.1642	.0125	-.0834	.8204
	10	.0137	-.5165*	.1667	.4393	-.1542	-.3425	.4366	.8195
	11	.1573	-.2023	.0582	.6687*	-.0804	-.3564	.4421	.8452
	12	.1292	-.0249	.1575	.7705*	-.1647	-.3421	.1610	.8060
	13	.0631	.0506	.8071*	.1739	-.1164	-.3229	.0869	.8135
	14	-.1047	-.5879*	.3082	.2676	-.3766	-.1155	-.0776	.6844
	15	-.0023	-.1763	.3776	.3603	-.0899	-.7134*	-.0300	.8214
	16	.1319	-.0253	.1546	.1344	-.2361	-.0633	.8437*	.8316
	17	.3514	.1202	.0128	.2700	-.2450	-.6857*	.1756	.7720
	18	.0010	.0897	.2061	.2011	-.7559*	-.3119	.2189	.8076
	19	.1031	-.3059	.1621	.6122*	-.4514	-.1893	.2648	.8150
	20	.6750*	.0320	.1423	.3031	-.1314	-.3081	.3532	.8058
HI. LOAD	21	.9254	-.8527	.8171	.7705	-.7793	-.7243	.8437	
PROP. VAR.	22	.1035	.1382	.1022	.1467	.0980	.1286	.0780	
CUM. P.V.	23	.1035	.2417	.3439	.4907	.5886	.7172	.7953	

Key to Table:

1. SPART: Numerical
2. SPART: Reasoning
3. SPART: Verbal
4. SPART: Perceptual (Map Reading)
5. SPART: Clerical Perception
6. SPART: Motor Coordination
7. SPART: Finger Dexterity
8. SPART: Memory of People
9. SPART: Perceptual Sensitivity
10. SPART: Alertness
11. Retest SPART: Alertness
12. Retest SPART: Perceptual Sensitivity
13. Retest SPART: Memory of People
14. Retest SPART: Finger Dexterity
15. Retest SPART: Motor Coordination
16. Retest SPART: Clerical Perception
17. Retest SPART: Perceptual Map Reading
18. Retest SPART: Verbal
19. Retest SPART: Reasoning
20. Retest SPART: Numerical

TABLE 2G

INTERCORRELATION MATRIX FOR LODAHL'S AND SPART ITEMS

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.0000														
2	.2251	1.0000													
3	.3598	.2343	1.0000												
4	.2081	.3814	.3830	1.0000											
5	.2584	.1829	.3560	.1643	1.0000										
6	.7123	.3054	.4087	.2485	.4121	1.0000									
7	.5238	.2698	.4175	.3761	.1098	.6502	1.0000								
8	.5746	.2394	.2667	.1150	.1499	.5872	.4934	1.0000							
9	-.1981	.0848	.0110	.0726	.1342	-.1272	-.3045	-.0728	1.0000						
10	.1741	-.0668	-.2025	-.1877	-.0680	.0161	-.0216	.0727	.0601	1.0000					
11	.1572	-.0214	-.0159	-.1377	.1732	.0169	-.0664	.1773	.2435	.2925	1.0000				
12	-.1544	-.1427	-.1709	-.1483	.0850	-.3054	-.4833	-.3094	.3327	.0741	.3499	1.0000			
13	-.0405	-.1313	.0435	.0473	.0854	-.1595	-.2253	-.2072	.1846	-.0611	.2814	.4851	1.0000		
14	-.1233	-.0742	-.0593	-.0051	-.0289	-.3068	-.4816	-.1562	.2693	-.0717	.1801	.4248	.3301	1.0000	
15	.0279	.1672	.3089	.2460	.1963	.0936	.0349	-.0154	.2729	.1503	.0569	.2857	.1155	.1353	1.0000
16	-.0630	-.0997	-.1622	-.2123	.0722	.0149	-.2444	-.0991	-.0469	-.0471	.0283	.0588	.0735	-.0282	-.1589
17	-.0130	-.1451	-.1165	-.1657	.0885	-.0299	-.3599	-.1426	.0903	-.0578	.2253	.2736	.2000	.1651	-.0275
18	-.1359	-.0274	-.2704	-.0317	-.0763	-.1882	-.2592	.0158	.1337	-.0550	.0725	.0586	.1410	.0560	-.0178
19	-.2364	-.0056	-.2447	-.1125	.0117	-.2405	-.4124	-.3185	.0107	-.1959	-.0803	.2244	.0258	.0333	-.0147
20	-.1209	-.0478	-.3837	-.0870	-.0245	-.0433	-.2131	.0351	.0504	-.0216	.0037	-.0458	-.0080	-.1377	-.1658
21	.0354	-.2444	.0673	-.0514	.1023	-.0082	-.0691	-.0472	.1592	.1511	-.0194	-.0019	.0412	-.0647	-.1034
22	.2478	-.0622	.0108	.0078	.0597	.1276	-.1296	.0270	.0536	.0449	.0209	.0324	.0848	.0284	-.0638
23	.1045	-.1122	-.1414	-.2072	-.0120	.0664	-.0399	.2345	-.0612	.0080	.0814	.0035	-.1111	-.0812	-.1716
24	.1048	.0435	-.0550	-.0615	-.0191	.0105	-.1344	-.0972	.0348	-.0496	.1682	.0742	.0345	.0570	-.0961
25	.1143	-.1817	-.0808	-.1433	-.0398	.0123	-.0998	-.0126	-.0126	-.0333	.0417	-.0795	-.0755	-.1085	-.2349
26	-.1143	-.1022	-.3161	-.1941	.0126	-.1045	-.3656	-.0680	.0410	-.0625	.0742	.1364	.0741	.0004	-.1320
27	-.0799	-.1165	-.2668	-.1870	.0541	-.0228	-.3257	-.0818	.0355	-.0061	.0998	.1111	.1042	-.0037	-.1434
28	-.1626	-.0876	-.3287	-.1679	.0181	-.1405	-.4150	-.1453	.0650	-.0751	.0636	.1580	.1176	.0234	-.1056
29	.7151	.5277	.6675	.5321	.5258	.8227	.7177	.6379	-.0356	-.0697	.0685	-.2547	-.0961	-.2176	.3540
30	-.0712	-.1006	-.1043	-.0884	.1029	-.2579	-.4606	-.1601	.5810	.3473	.6137	.7582	.6384	.6628	.2124
31	.5959	.4094	.5324	.4210	.5364	.5743	.3519	.4705	.3358	.1573	.4498	.2515	.3178	.2244	.4518

Key to Table:

1. Lodahl's "job interesting"
2. Lodahl's feel bad with work mistake
3. Lodahl's show up for work early
4. Lodahl's extra effort to do job
5. Lodahl's discuss work outside
6. Lodahl's really interested in work
7. Lodahl's job means more than paycheck
8. Lodahl's most important things connect job
9. Lodahl's glad at end of job shift
10. Lodahl's do nothing extra than required
11. Lodahl's don't care about job
12. Lodahl's most things more important than job
13. Lodahl's work only a small part
14. Lodahl's wouldn't keep job but for money
15. Lodahl's very good at doing job
16. SPART: Alertness
17. SPART: Perceptual Sensitivity
18. SPART: Memory of People
19. SPART: Finger Dexterity
20. SPART: Motor Coordination
21. SPART: Clerical Perception

TABLE 2G (Cont.)

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1.0000														
.6709	1.0000													
.3851	.2917	1.0000												
.3571	.3750	.2251	1.0000											
.5221	.4135	.4965	.2843	1.0000										
.4389	.3942	.3368	.2119	.1985	1.0000									
.4355	.4886	.3563	.1966	.3724	.3875	1.0000								
.3968	.3935	.3620	.1463	.5090	.3614	.4950	1.0000							
.5649	.5726	.3358	.4782	.2951	.5125	.4413	.4277	1.0000						
.4690	.4838	.2749	.1870	.2684	.5333	.4771	.3041	.5653	1.0000					
.7895	.7393	.6606	.5800	.7648	.4617	.5552	.6671	.6375	.4696	1.0000				
.8838	.8297	.4723	.4070	.7789	.4139	.5188	.5212	.5738	.4890	.9204	1.0000			
.8085	.7509	.6681	.6349	.7481	.4364	.5077	.4960	.6226	.4617	.9777	.9260	1.0000		
-.1644	-.1645	-.1843	-.2931	-.1848	-.0532	.0396	-.0396	-.0577	-.1141	-.2472	-.2060	-.2778	1.0000	
.0128	.2816	.1165	.0239	-.0486	-.0050	.0521	.0521	.1106	-.0645	.0760	.0939	.1032	-.1798	1.0000
-.1392	.0308	-.0915	-.2476	-.1964	-.0508	.0684	.0684	.0183	-.1431	-.1735	-.1252	-.1837	.7826	.4717

22. SPART: Perceptual (Map Reading)
23. SPART: Verbal
24. SPART: Reasoning
25. SPART: Numerical
26. Sum of Six SPART Items (A, P, Mem., F, K, & V)
27. Sum of three SPART Items (A, P, & K)
28. Sum of five SPART Items (A, P, Mem., F, & K)
29. Lodahl P: Sum of #s 1-8, 15
30. Lodahl N: Sum of #s 9-14
31. Lodahl T: Sum of #s 1-15

r at the .05 and .01 levels of significance

df	.05	.01
80	.217	.283
90	.205	.267

TABLE 2H

VARIMAX FACTOR STRUCTURE OF LODAHL'S AND SPART ITEMS:
(Sample N = 90)

	I	II	III	IV	V	VI	VII	VIII	IX	COMM.
1	-.1648	.8266	-.0415	.1545	-.1261	.1309	.0672	-.1783	-.0292	.8062
2	.0997	.1900	-.0063	.0362	.0312	.8210	.1393	.0152	.1721	.7717
3	-.0511	.5130	-.0205	-.3524	.4663	.1456	.2119	.1837	-.0945	.7166
4	.0577	.2628	.0702	-.3253	-.1232	.6614	-.1080	.1799	-.2567	.7457
5	-.0619	.2479	.0360	-.0464	-.0745	.0637	.7758	.1465	-.1110	.7140
6	-.0552	.7706	.1870	-.0001	-.0541	.1831	.3427	-.1122	.0847	.8055
7	.1628	.6802	.4614	-.0841	-.1877	.2023	-.0004	-.0838	.0184	.7927
8	.1353	.7854	.0616	.1265	.2297	.0336	.0316	.0652	.1724	.7438
9	-.0215	.1777	-.2377	.1469	.0597	.1125	.1522	.8163	-.0260	.8165
10	-.0048	.0827	-.0366	.8156	-.0663	-.0301	-.1448	.0154	.0893	.7078
11	-.0597	.1471	-.1952	.6331	.0728	-.0645	.2544	.2067	-.3223	.6850
12	-.0396	.3020	-.6313	.1779	.0011	-.1155	.2786	.0882	-.3195	.7238
13	-.0287	.0962	-.2811	.0046	.0326	-.0339	.0890	.0041	-.8746	.8642
14	-.0232	.1439	-.7619	.0886	-.0919	.0099	-.2057	.1097	-.1902	.7087
15	.1599	.0855	-.4523	-.2906	-.1166	.2121	.3331	.3315	.0399	.6030
16	-.6703	.1381	.0725	-.0024	.3822	-.0665	.2097	-.1676	-.0639	.7004
17	-.7139	.1089	-.2335	.1204	.2458	-.0778	.2123	-.0923	-.1228	.7256
18	-.2916	.1053	-.0009	-.0621	.6850	.0844	-.1778	.2507	-.1822	.7039
19	-.4464	.5107	-.1493	-.1229	.1519	.2103	.2554	-.2482	.1598	.7170
20	-.2615	.1127	.1358	.0089	.8268	.0277	.0790	-.0440	.0134	.7923
21	-.7084	.0200	.1888	-.2091	.0425	-.2579	.0015	.3655	-.0636	.7875
22	-.6296	.2522	-.2181	-.1543	.3295	-.0560	-.1027	-.0097	-.0384	.6553
23	-.3995	.2604	-.1277	-.0331	.6030	-.2701	-.0208	-.0438	.2288	.7360
24	-.8494	.0558	-.0666	.1325	.1044	.1857	-.0107	-.0365	.0490	.7958
25	-.7870	.0287	.2024	.0863	.0306	-.1498	.1581	.0926	.0387	.7271
HI. LOAD.	.8494	.8266	-.7619	.8156	.8268	.8210	.7758	.8163	-.8746	
PROP. VAR.	.1535	.1370	.0746	.0648	.0900	.0628	.0551	.0516	.0525	
CUM. P.V.	.1535	.2905	.3651	.4299	.5199	.5827	.6377	.6894	.7418	

Key to Table:

1 Lodahl's "job interesting"
2 Lodahl's feel bad with work mistake
3 Lodahl's show up for work early
4 Lodahl's extra effort to do job
5 Lodahl's discuss work outside
6 Lodahl's really interested in work
7 Lodahl's job means more than paycheck
8 Lodahl's most important things connect job
9 Lodahl's glad at end of job shift
10 Lodahl's do nothing extra than required
11 Lodahl's don't care about job
12 Lodahl's most things more important than job
13 Lodahl's work only a small part
14 Lodahl's wouldn't keep job but for money
15 Lodahl's very good at doing job
16 SPART: Alertness
17 SPART: Perceptual sensitivity
18 SPART: Memory of People
19 SPART: Finger Dexterity
20 SPART: Motor Coordination
21 SPART: Clerical perception
22 SPART: Perceptual (Map Reading)
23 SPART: Verbal
24 SPART: Reasoning
25 SPART: Numerical

TABLE 21

A: INTERCORRELATION MATRIX OF BIODATA, SPAMT MEASURES AND TURNOVER
(Sample N = 123)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1.0000																		
2	.0532	1.0000																	
3	-.0459	-.1829	1.0000																
4	-.0962	-.2045	.3678	1.0000															
5	.3561	.2451	-.0201	-.2212	1.0000														
6	.2251	.1851	-.1121	-.0435	.3163	1.0000													
7	-.0495	-.0072	-.0634	-.0254	.1960	.1489	1.0000												
8	-.2176	-.0600	-.1277	-.0858	-.0522	-.1410	-.0009	1.0000											
9	.1343	.1586	.1493	-.0685	.0476	-.1209	.0021	.0775	1.0000										
10	-.2062	-.2333	.0446	-.0428	-.1702	-.0705	.0594	.1037	-.1762	1.0000									
11	-.1402	-.1169	.0759	-.0052	-.0031	-.0493	.0823	-.0266	.1231	.0977	1.0000								
12	-.0112	.0290	-.0805	-.0260	-.1587	.0489	-.0958	-.1128	.0805	.0326	.2326	1.0000							
13	-.1842	-.0477	-.0287	.0094	-.1667	.0642	.0407	-.0484	-.0541	.1126	.4046	.3814	1.0000						
14	-.1260	-.0512	-.0484	-.0689	.0400	.0675	-.0067	.0583	-.1714	-.0236	.1432	.0728	.1035	1.0000					
15	.0095	-.0444	.0746	.0214	-.0038	-.2180	-.0636	-.0419	.1631	.0851	.0945	-.0614	-.2118	-.2015	1.0000				
16	.0140	-.1380	.0683	.2441	-.0033	.2621	-.0413	-.0801	-.0257	.0667	.1170	.0870	.1729	.1519	-.1313	1.0000			
17	-.2538	-.3130	.2259	.2315	-.1140	.0480	.2163	-.0658	-.0542	.1466	.1538	.1425	.2208	.1565	-.0686	.3531	1.0000		
18	-.2845	-.3035	.1321	.2600	-.2260	-.0524	.2307	-.0851	-.0145	.0280	.2636	.1979	.1778	.0545	-.2397	.1226	.4199	1.0000	
19	-.1637	-.2405	.1539	-.2137	-.0568	.1298	-.2229	-.0811	.1697	.0486	.1867	.1344	.0622	.0068	-.0778	.2495	.4043	.4418	1.0000
20	-.1396	-.0589	-.0555	.0130	-.1705	.0119	.1377	.0678	.0923	-.0629	.1994	.0929	.0401	.0959	.0090	-.1024	.1805	.2431	.0971
21	.0445	-.0292	.2623	.1691	-.0289	-.0573	.0754	-.0151	.0905	.0829	.0581	-.0426	.1653	-.0481	-.0493	.0754	.1468	.2091	.2018
22	-.1031	-.1485	-.1442	-.0006	-.0061	.0877	.0705	-.0372	-.2734	.0653	-.0621	.1147	-.0556	.0706	.0112	.0431	.1310	.1465	.1398
23	.0415	-.0431	-.0026	-.0436	.1112	.1376	.0796	-.0421	.0029	.0932	.1853	.1964	.0450	.0960	-.0690	.2294	.1480	.1303	.2389
24	.0952	.1114	.0074	-.0659	.0375	.0891	-.0460	-.0254	.0059	-.1469	.0205	.0781	-.0611	.0995	.1514	.0219	-.0439	-.0398	.0421
25	.0567	.0699	.0696	.0402	-.0297	.0934	-.0053	-.1308	.1790	.0201	.0498	.1603	.0673	-.0871	-.0594	.0308	-.0319	.0265	.1464
26	-.0276	-.0371	-.1090	.0248	-.1292	.0707	.0715	.0443	.0036	.0912	.0372	.0892	.1271	-.0388	-.1915	.1223	.0990	.0913	.1240
27	-.0642	.0408	-.1211	-.1703	.0671	-.0173	.0934	.1741	-.0612	.0585	.0412	-.0532	.0217	.0819	-.1169	-.2008	-.1890	-.0647	-.1320
28	-.1288	.0269	-.1534	-.3095	.0893	.1126	.1425	.1829	-.2730	.2044	-.0539	-.0867	.1044	.2180	-.2308	-.0199	-.0887	-.0973	-.1624
29	-.0725	.0504	-.2662	-.1471	-.0077	.0750	.2196	-.0064	-.1894	.1475	.0454	-.0524	.0586	.2296	-.0839	-.0143	.0401	.0516	.0104
30	-.0474	.1388	-.2386	-.2136	.0105	.0775	.2420	.0648	-.0768	-.0516	.0393	.0304	.0382	.2271	-.2365	.0814	-.0042	.0723	-.0292
31	-.1601	-.0361	-.3090	-.2457	-.1244	.0190	.2703	.0583	-.1241	.1846	.1133	-.0113	.0132	.1417	-.1487	.1232	.0264	.1131	.0066
32	-.0005	.0527	-.2274	-.1861	.0842	.0593	.2358	.0267	-.2011	-.0745	.0501	.0577	-.0329	.2514	-.0382	.0988	.1268	.1533	.0183
33	-.1447	-.0283	-.2830	-.1657	-.1372	.0345	.2371	.0078	-.2445	.2501	-.0438	.0912	.0437	.1720	-.0504	-.0142	.1161	.1193	.0145
34	-.2548	-.1982	-.0316	.0065	-.1350	.0302	.2502	-.1206	-.1163	.1324	.1208	-.0644	.0646	.0793	-.1212	.0774	.1777	.2395	.2376
35	-.1413	-.0319	-.2217	-.1707	-.1818	.0596	.1837	.1571	-.2407	.2069	-.0833	-.1401	.0352	.2433	-.0643	-.0518	.0207	.0640	.0271
36	-.1464	.0048	-.0555	-.1862	-.0555	-.0381	.1823	.0466	-.2142	.0524	-.0537	-.0541	-.0410	.1734	-.1080	-.0405	.0540	.0482	.0470
37	-.1175	.0441	-.2250	-.2167	.0078	.0381	.2631	.0296	-.2516	.0584	-.0167	.0215	-.0090	.2709	-.0962	.0177	.0920	.0723	.0323
38	-.1385	.0226	-.2505	-.2285	-.0479	.0490	.2698	.0703	-.2780	.1096	-.2112	-.0913	.0044	.2940	-.0986	.0139	.0814	.0781	.0352
39	-.1599	-.0306	-.2562	-.2031	-.1005	.0523	.3133	.0230	-.2841	.1711	-.0140	-.0099	.0295	.2742	-.1133	.0261	.1305	.1542	.0842
40	.0394	.0596	.1372	.1117	-.1416	-.1336	-.1401	-.0502	.2844	.0110	.0241	.1547	.1540	-.0339	-.0174	.0255	.1023	.1097	.0544

Key to Table:

1. Age
2. Number of dependent children
3. Educational level
4. Educational goal
5. Age at first job
6. Age at first full-time job
7. Full-time experience in skilled trades
8. Full-time experience in automobile factory
9. Any relatives work(ed) for company
10. Distance of home from plant
11. Expect: Person centered supervision
12. Expect: Smart supervisor
13. Expect: Fair supervisor
14. Expect: Clean work place
15. Expect: Noisy work place
16. Expect: Cooperative co-workers
17. Expect: Interesting job
18. Expect: Skill requirement of job
19. Expect: Personal satisfaction from job
20. Expect: To be moved from job to job
21. Liking being moved from job to job
22. Confidence in job ability
23. Reactions to interview
24. Workers' questions answered
25. Time waited for interview
26. Reaction to medical exam
27. SPAMT: Numerical IQ

TABLE 21 (Cont'd.)

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1.0000																				
-.2410	1.0000																			
-.0139	-.1369	1.0000																		
-.0332	.0775	.0608	1.0000																	
.0354	-.0065	-.2086	-.1026	1.0000																
.0061	.0739	-.0779	-.0417	.0288	1.0000															
.1153	.0021	.1852	.2527	-.0151	.0481	1.0000														
.0267	-.2141	.1719	.0058	-.1629	-.0387	-.0727	1.0000													
.0183	-.1576	.1815	.0385	-.2331	-.1013	-.1175	.5384	1.0000												
.2155	-.0181	.1688	.0255	-.0574	-.0592	-.0130	.2633	.4706	1.0000											
.0705	-.1361	.1640	.1262	-.0875	-.2594	-.0402	.2963	.5236	.4267	1.0000										
.0556	-.1003	.1518	.0891	.0361	-.1791	.0997	.2944	.4291	.4213	.4249	1.0000									
.0296	-.0810	.2545	.0918	.0057	-.1053	-.0513	.1632	.4354	.4274	.4654	.4842	1.0000								
-.0599	-.1226	.2258	.1788	-.1447	-.1278	.1087	.1550	.3871	.3276	.3752	.5915	.4814	1.0000							
-.0485	.1069	.0921	.0485	-.0420	-.0914	.1235	.0965	.1283	.1717	.2389	.4293	.2495	.2606	1.0000						
-.0050	-.0491	.1882	.0081	-.0309	-.0482	.1321	.2636	.4211	.3658	.2710	.5246	.2766	.5099	.3708	1.0000					
-.0207	-.0228	.1607	-.0366	-.0263	-.1072	-.1242	.1549	.3776	.4407	.3610	.4128	.5167	.3526	.3593	.5279	1.0000				
.0897	-.0507	.2427	.0325	-.0320	-.1138	-.0802	.2402	.5325	.7687	.5202	.5482	.8094	.4834	.3277	.4897	.8235	1.0000			
.0721	-.0602	.2550	.0290	-.0355	-.1076	-.0263	.2755	.5620	.7391	.5071	.6058	.7458	.5483	.3792	.6997	.8323	.9655	1.0000		
.0263	-.0428	.2612	.0749	-.0700	-.1309	.0370	.2607	.5312	.6570	.5161	.6858	.7171	.6971	.5860	.7205	.7775	.8971	.9501	1.0000	
.0465	.1643	-.2845	-.1239	.2104	.1483	-.0964	.0615	-.1255	-.2325	-.0763	-.1491	-.2051	-.1842	-.1596	-.1350	-.2173	-.2723	-.2634	-.2744	1.0000

28. SPART: Reasoning (R)
29. SPART: Verbal (V)
30. SPART: Perceptual (Map Reading) (Pmr)
31. SPART: Clerical Perception (CP)
32. SPART: Motor Coordination (K)
33. SPART: Finger Dexterity (F)
34. SPART: Memory of People
35. SPART: Perceptual Sensitivity (P)
36. SPART: Alertness (A)
37. Sum of 3 SPART (V, K, A)
38. Sum of 4 SPART (V, K, A, P)
39. Sum of 6 SPART (V, K, A, P, F, Mem.)
40. Turnover Criterion

r at the .05 and .01 levels of significance

df	.05	.01
100	.195	.254
125	.174	.228

APPENDIX III

DATA FOR COMPUTING SOME RELEVANT STATISTICS

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A. Data for Calculating Cronbach's (1951) Coefficient Alpha for the SPART Measures

	Variable	SPART First Administration, N = 123 S_i	SPART Retest Administration, N = 90 S_i	SPART-HELPFUL Retest Administration, N = 90 S_i
1.	Perceptual Sensitivity	0.9251	0.9881	0.8298
2.	Motor Coordination	1.0527	1.0367	0.9741
3.	Alertness	1.0987	1.0694	0.9023
4.	Memory of People's Names	1.0615	1.0193	1.0403
5.	Finger Dexterity	0.9930	1.1432	1.1463
6.	Verbal	1.0183 S_t	1.0808 S_t	1.1041 S_t
7.	Sum of the Six Measures (t)	4.2590	4.4728	3.9988

Formula:

$$\text{Alpha} = \frac{N}{N-1} \frac{(S_t^2 - \Sigma S_i}{S_t^2}$$

where: N = number of observations
S_i = Standard Deviation of Item Responses
S_t = Standard Deviation of Sum (test) Score

B. Data for Calculating eta (η) for the Turnover-SPART Relationship

From the one-way ANOVA results

Sum of Squares Between (SS_b) = 1.7561
Sum of Squares Total (SS_t) = 29.2683

Formula: $$(Eta)^2 = \frac{SS_b}{SS_t}$$

C. Data for Calculating Biserial Coefficient (r_b) for the Turnover-SPART Relationship

Let the continuous variable be Y and $\bar{Y}$, the mean Y score for all Ss and S_y the Standard Deviation.

The dichotomous variable be X (scored 1 for "stays," 2 for "quits."

M_1 is the mean of the Y score for Ss with X = 1
M_2 is the mean of the Y score for Ss with X = 2
p_1 is the proportion of all Ss with X = 1
p_2 is the proportion of all Ss with X = 2
Z is the ordinate of the normal curve at the point separating p_1 and p_2

$\bar{Y}$	S_y	M_1	M_2	p_1	p_2	Z*
17.5111	4.4728	19.9500	17.5240	0.6098	0.3903	0.3850

Formula: $$r_b = \frac{M_1 - M_2}{Z^* S_y} (p_1\ p_2)$$

*(See McNemar, 1963, pp. 190, 425).