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What is Job Satisfaction?[1]

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Despite considerable interest in the study of job satisfaction and dissatisfaction, our understanding of these phenomena has not advanced at a pace commensurate with research efforts. It is argued that a major reason for this lack of progress is the implicit conception of causality accepted by most psychologists. It is called the policy of "correlation without explanation." The present approach to the topic of job attitudes emphasizes a more conceptual approach to the problem. Using Rand's theory of emotions as a starting point, the concepts of *satisfaction, dissatisfaction, value, emotion,* and *appraisal,* and their interrelationships are discussed. The present theory of job satisfaction is contrasted with previous theories. Data illustrating an approach to satisfaction based on the present theory are given. Other issues discussed are: value hierarchies; the dynamic character of values; overall job satisfaction; the Herzberg two-factor theory; the measurement of satisfaction and values; and rational vs. irrational values.

Since the publication of Roethlisberger and Dickson's *Management and the Worker* and Hoppock's monograph on job satisfaction in the 1930's, research on the topic of job attitudes has increased rapidly. As of 1955, over 2,000 articles had been published on this subject. The figure today may exceed 4,000.

Despite this proliferation of studies, our understanding of the *causes* of job satisfaction has not advanced at a pace commensurate with research efforts.

For example, there is still confusion over whether the determinants lie solely in the job itself (the "intrinsic" view), whether they reside wholely in the worker's mind (the "subjective" view), or whether satisfaction is the consequence of an interaction between the worker and his work environment.

Judging from the size of the research literature, this lack of progress

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is not due to an absence of interest in the subject of job attitudes. What, then, is the cause?

Before answering this question, let me recount the history of some of my own research in this and related areas. In 1963, I began to explore the correlates of task liking and satisfaction. Previous laboratory research by Gebhard (1948) and industrial field studies by Herzberg, Mausner, and Snyderman (1959) had indicated that task success was an important determinant of liking for the task and work satisfaction, respectively. My own work was intended as a follow-up of this research but was not guided, initially, by any explicit theory of attitudes.

Between 1963 and 1967, we conducted eight laboratory studies in this area. In each, the indivdual's rating of his "liking" for the task was correlated with the total (perceived) number of successes achieved by him on the task. Success was defined as reaching a quantitative performance goal *assigned by* E, or as solving an assigned problem (e.g., unscrambling a word). The between-subject correlations between perceived number of successes and task liking ranged from +.15 to +.60 in the eight studies, the mean being .41. In seven of the eight studies the correlation was statistically significant (the former seven studies are reported in Locke, 1965, 1966, 1967a). The mean correlation for three studies in which "personal satisfaction" was the dependent variable was .53.

While these results were far from negative, they left much to be desired. The magnitude of the correlations was highly irregular from study to study; only a small proportion of the variance in liking was being accounted for; and the results were not getting any better as time went on. Furthermore, we had not actually *explained* our results at all; we did not know *why* they came out as they did.

There was an epistemological premise governing our research which had not been identified; it concerned our implicit conception of causality and explanation.

In the 18th century, Hume argued that when one observed the motions of objects, all one could perceive were correlations in space and in time among them. He denied that one could observe any *necessary* (causal) connections between events in the universe. He concluded that the "law of causality" was unprovable and that true causal explanation was impossible.

Most scientists since Hume have been convinced by his argument.[2] In

[2] Hume was correct in asserting that causal connections cannot be *perceived*. His error was in assuming that the issue of causality could be dealt with at all at the perceptual level. The law of causality can only be understood and proved at the *conceptual* level (for details, see Branden, 1966b; Rand, 1957, p. 967). See also footnote 3.

accepting it, however, they faced another dilemma; for the goal of science *is* to explain the events of the universe. In order to direct (and justify) their research efforts, scientists had to formulate a conception of causality compatible with Hume's position. The currently prevalent view is expressed succinctly by Skinner: "The old 'cause-and-effect connection' becomes a 'functional relation.' The new terms do not suggest *how* a cause causes its effect; they merely assert that different events tend to occur together in a certain order" (1953, p. 23). The new policy can be described in short as one of "correlation without explanation." One observes sequences of actions *but does not attempt to identify the characteristics of the entities which made these actions possible.* Correlations between events are taken as the *end* point rather than the starting point of scientific research.

The concept of "correlation without explanation" as used here is not to be taken as synonymous with the correlational *method* of research. It is used in a wider sense. It concerns how (and whether) one *explains* one's results. The issue is: When a scientist observes a sequence of events (whether they be naturally occurring phenomena or experimental operations) is he content merely to *describe* the sequence or does he seek to *explain* it?

Note that in Skinner's descriptive behaviorism, the experimental method is employed consistently; yet so-called "explanations" are made only in terms of correlations among stimuli, responses and "reinforcements," never in terms of properties of organisms. Skinner has explicitly denied that he is interested in knowing *why* a "reinforcer reinforces" (1964, p. 104). The oft-heard accusation that he treats men and animals as "empty organisms" is justified, but the philosophical significance of this allegation is seldom recognized. It implies that Skinner believes either that organisms have no specific nature or that their characteristics are irrelevant to an understanding of their actions.

Observe further that all varieties of behaviorism purport to explain the actions of man without reference to his most distinctive attribute: his conceptual faculty—to the fact that he can think!

There are other, less obvious, ways in which the policy of correlation without explanation affects psychological research. Note that in the so-called "objective" approaches to personality, far more stress is placed on manipulating the numbers obtained from questionnaire responses than on determining what the responses mean. The focus is on what *other* responses these responses correlate with, not on the psychological processes which the responses are supposed to reflect.

For documentation of the lack of success of personality testing in industry, see Guion and Gottier's (1965) recent review.

Observe that in the area of worker selection there have been thousands of studies correlating test scores with performance ratings. But very few have been concerned with understanding the causes of the success and failure of predictions. Most research on "moderator" variables and biographical inventories has followed this same pattern. Much more attention has been paid to discovering *that* they "work" than in trying to discover *why* they work. Observe also, that our ability to predict and explain job performance has not increased substantially in the past 20 to 30 years.

It appears that to the degree that the method of "correlation without explanation" has been practiced, our ability to explain and predict behavior has failed to advance. Why?

In short, this procedure makes genuine understanding and valid scientific generalization impossible. If a scientist cannot specify (by reference to *some* attribute of the entity involved) why a cause causes its effect, he cannot demonstrate that it *is* a *cause* rather than a mere correlate. If he cannot identify the causes of a phenomenon, he cannot predict with certainty when it will occur in the future.

To explain the actions of objects, one must make reference to their *attributes and characteristics:*

> . . . what a thing can *do*, depends upon what it *is* . . .
> If iron is exposed to a certain temperature, it expands;
> if water is exposed to the same temperature, it boils;
> if wood is exposed to the same temperature, it burns.
> The differences in their actions are caused by differences
> in their properties . . . Causality proceeds from identity.
> (Branden, 1966b, p. 10, italics mine)

[The view that an understanding of causality requires the identification of the attributes of entities orginated with the ancient Greeks, especially Aristotle (e.g., his "formal" and "material" causes). Rand's modified (and more general) conceptualization is: "The law of causality is the law of identity applied to action." (1957, p. 962.) Windelband (1958, p. 410) points out that in the 17th century Galileo resurrected the view of causality held by the pre-Aristotelian Greeks (e.g., Heraclitus). Causality, in the latter view, pertained to the relationship among the motions of objects; causality was the relation of action to re-action. This is the view prevalent today. Randall (1960, p. 124) notes that it reflects only one of Aristotle's four causes: the "efficient cause" (or initiator of motion). This narrow view of causality was accepted by Hume, who argued that by observing actions and re-actions, one could not prove that necessary connections existed at all.]

An inevitable consequence of the persistent use of the policy of "correlation without explanation" is scientific uncertainty. It is *justifiable* uncertainty stemming from the fact that past findings are repeatedly contradicted by later findings.

Let us document this claim in the area of job attitude research. In 1957, Herzberg *et al.*, concluded from an examination of 23 correlational studies that there was a curvelinear relationship between job tenure and/or age and level of job satisfaction. No theoretical proof was given for this nor were the extent of individual differences mentioned. Eight years later, Hulin and Smith attempted to replicate this finding with four groups of workers in two plants. They were unsuccessful.

In the same book, Herzberg *et al.*, after examining 18 correlational studies concluded that there was "unequivocal" evidence for a positive relationship between job level and degree of job satisfaction. Hulin and Smith (1965) and Maas (1966) attempted to replicate this finding. They were unsuccessful. Further, Maas (1966) demonstrated that even the earlier findings on this topic could be attributed partly to a methodological artifact. Previous investigators had failed to differentiate between *evaluations* and *descriptions* of the job when composing questions to measure job satisfaction (on this issue see also Rosen and Rosen, 1955). They had not identified the nature of the process which they were purporting to measure. The psychology literature today is replete with examples like the foregoing.

The solution to this state of affairs is to seek explanations of behavior in terms of attributes of entities; and to identify the nature of the processes one is dealing with before attempting to measure them and to relate them to other processes. Conceptual analysis must *precede* explanation and measurement.

[Another epistemological premise responsible for the frequent failure of psychologists to understand the processes they are measuring is the belief that definitions should be "operational." In practice, this principle implies that scientists can define a term however they please so long as they define it operationally. Thus, definitions are tied to the measurement whims of particular scientists rather than to the facts of reality. The result is chaos in the realm of scientific concepts (e.g., see Efron, 1966). If one wishes to measure some phenomenon accurately, *one must first know what it is one wants to measure.* One must formulate a verbal or conceptual definition. On this basis, one *then* chooses a unit of measurement appropriate to the definition and proceeds to measure particular amounts of the phenomenon. The proce-

dure of operational definitions reverses this sequence and tells the scientist to measure the phenomenon *first* and *then* to formulate his definition of it. Just how he is supposed to decide *what* to measure, *how* to measure it, and *what* to call what that he has measured is never specified.]

The present paper is focused around the following issues: the nature of emotions and their relationship to evaluation; the implications of this analysis for an understanding of the concepts of job satisfaction and dissatisfaction; and the relationship of this theory to other theories. Illustrative data are presented. A variety of related issues are also discussed.

The major theoretical orientation of the present paper, as will become evident, stems from Objectivist philosophy and psychology (see Rand and Branden references to follow; the interpretations and applications are strictly my own).

I. WHAT ARE EMOTIONS?

By introspection, man can observe that he experiences different degrees of pleasure or displeasure on different jobs and/or with different aspects of the same job. Job satisfaction and dissatisfaction are, then, complex emotional reactions to the job. Let us now discuss the nature of emotions.

Man's consciousness has three basic biological functions (i.e., potentialities for action): a) cognition, the identification of existents (e.g., things, objects, actions, etc.); b) evaluation, the estimate of the beneficial or harmful relationship of perceived existents to oneself; and c) the regulation of action (Trichotomies similar or related to the foregoing have been offered by a number of philosophers and theorists; the present theory is based on the analysis by Rand, 1964, and discussed in Branden, 1966a). For experiments bearing on the third function see Locke (1968).

The faculty of cognition (sensation, perception, conception) enables man to discover what exists, but it does not tell him what action(s) to take with respect to this knowledge. It does not reveal the *significance* to him of the existents he perceives. The survival of every living organism, however, requires action, and action requires a selection among alternatives. To maintain its life an organism must take actions which will fulfill its needs. It must *evaluate* the objects and conditions which confront it, using its own life as the standard.

The physical sensations of pleasure and pain are biologically programmed evaluations which inform an organism as to whether its present state or course of action is life-enhancing or life-negating. These sensations play a crucial role in protecting man's life, but they are not in themselves sufficient to guide his actions through the course of a lifetime.

Past the level of sensations, man must discover what his life requires through a process of reasoning and the use of conscious foresight. He must *acquire* a code of values. (We will not be concerned here with the process of value acquisition in man. Suffice it to say that all men do acquire, by one means or another, an explicit or implicit code of values.)

A "value is that which one acts to gain and/or keep" (Rand, 1964, p. 15). "It is that which one regards as conducive to one's welfare" (Branden, 1966c, p. 1). The process of evaluation consists of estimating (consciously or subconsciously) the relationship between some object, action or condition and one or more of one's values. Evaluation, the making of value judgments, is a process of subjective (i.e., private), psychological *measurement* in which a *value* is the standard. In making a value judgment one is answering the questions: "Does this object (action, condition) enhance or threaten my values? Is it for me or against me according to *my* code of values?"

It can be observed by introspection that man cannot hold all of his values in focal awareness simultaneously. The same is true of his knowledge. We refer to values and knowledge of which we are capable of becoming conscious but of which we are not now aware, as being subconscious.

When a man encounters a new object, situation or problem, relevant knowledge and values ordinarily enter consciousness automatically. For example, when an unarmed hiker perceives a grizzly bear on the trail in front of him, he realizes, without the need for conscious reflection, the significance of the bear with respect to his own life and safety. He automatically appraises or evaluates the bear as dangerous. The emotional reaction he experiences is fear.

What then is the relationship of value judgments to emotions? Branden writes (based on a theory first presented in Rand, 1957, p. 947):

> [Man's] emotional capacity is [his] automatic barometer of what is *for* him or *against* him (within the context of his knowledge and values).
>
> The relationship of value-judgments to emotions is that of *cause* to *effect*. An emotion is a value-response. It is the automatic psychological result (involving both mental and somatic features) of a super-rapid, subconscious appraisal.
>
> *An emotion is the psychosomatic form in which man experiences his estimate of the beneficial or harmful relationship of some aspect of reality to himself* (1966c, p. 5).

Branden argues that all value judgments do not result in emotions. However, for our purposes, the issue of when evaluations do and do not produce emotions is unimportant. Suffice it to say that emotions are the product of value judgments. Nor are we concerned here with the re-

lationship between emotions and subsequent actions (for a discussion of this issue, see Branden, 1966d).

Man's most basic emotions are those of pleasure and displeasure, or joy and suffering. Pleasure is the consequence of (perceived) value achievement. "Happiness is that state of consciousness which proceeds from the achievement of one's values." (Rand, 1964, p. 28.) Displeasure or unhappiness proceeds from the (perceived) negation or destruction of one's values.

Because successful action is a requirement of man's life (a requirement of which he cannot help but be aware, implicitly or explicitly), in achieving his values he experiences his efficacy as a living being. "Happiness is the successful state of life" (Rand, 1964, p. 27).

II. EMOTIONS AND JOB SATISFACTION

How then do we define job satisfaction and dissatisfaction? Job satisfaction is the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values. Job dissatisfaction is the unpleasurable emotional state resulting from the appraisal of one's job as frustrating or blocking the attainment of one's job values or as entailing disvalues. *Job satisfaction and dissatisfaction are a function of the perceived relationship between what one wants from one's job and what one perceives it as offering or entailing.*

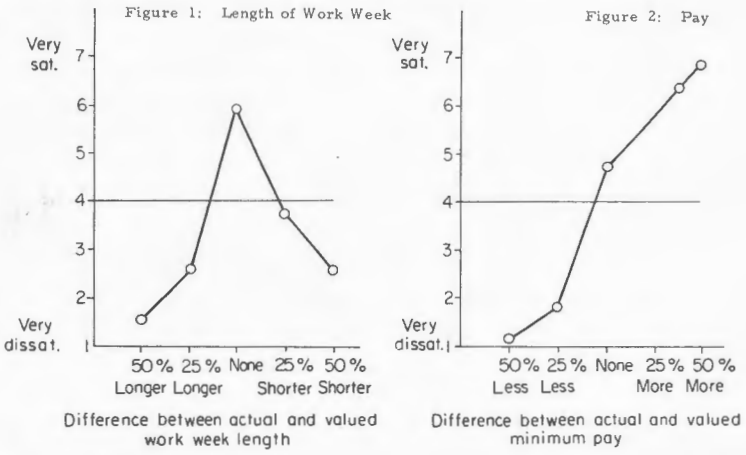
Note that there are three elements involved in the appraisal process (these elements are not experienced as separate during an emotional reaction but may be isolated by a process of abstraction): 1) the perception of some aspect of the job;

> [In this paper, the term perception will be used in its broad sense to include both: a) the awareness of existents (resulting from automatic integrations of sensations by the brain); and b) cognitive *judgments*. A cognitive judgment entails relating an existent to a cognitive (non-evaluative) standard. Thus, one sees objects in space, and one judges (estimates) their actual size and distance. One sees a man and estimates his height, education, and intelligence. Value judgments, in contrast to cognitive judgments, are estimates of the relationship of some existent or judged relationship to one's *value* standards (to normative standards). Thus, when one enters a room and says "It is over 90° in here," one is making a cognitive judgment. But when one says "It is *too* hot in here" one is making a value judgment. When one says "Jones is a fast worker" one is making a cognitive judgment. When one says "Jones is a *good* worker" one is making a value judgment. Cognitive judgments often have evaluative *connotations* due to having been associated frequently with a certain evaluation in the past (e.g., "He's a killer" is a cognitive judgment with strong negative connotations).]

2) an implicit or explicit value standard; and 3) a conscious or subconscious judgment of the relationship between (e.g., discrepancy between) one's perception(s) and one's value(s).

Let us illustrate the foregoing with some examples. (In these examples we will assume value importance is constant. More will be said about importance in a later section.) To predict a man's satisfaction with the length of his work week (divorced from the context of his job as a whole) we would have to know: 1) how many hours he (believed he) was working; 2) how many hours per week he wanted to work (ideally); and 3) the judged relationship (discrepancy) between these two figures. A sample function (using *anticipated* satisfaction as the dependent variable) is shown in Figure 1. Thirty white collar employees of a research firm in the Washington, D. C. area were asked to indicate their "ideal" work week length, and then to rate how satisfied they *would* feel with their actual work week if it were: a) 50% longer, b) 25% longer; c) the same length as; d) 25% shorter; and e) 50% shorter than this ideal length (all other factors, such as pay, remaining constant). The function indicates that there is an optimal length of work week with increasing deviations on either side of this figure being experienced as increasingly unpleasurable. (The shape of the function was the same for virtually all *S*s.)

This type of function, in which some optimal amount of a factor is most



FIGS. 1 AND 2. Relationship of percept-value discrepancy to satisfaction for working hours and pay.

valued with quantitative deviations in either direction being increasingly disliked should hold for the great majority of job aspects (e.g., variety, task difficulty, temperature of workplace, attention from supervisor, travel required, etc.).

There are significant exceptions to this bell-shaped function, however. One of them is pay. In our culture at least there is no limit to the amount of pay that most men would like (ideally) to have.

However, individuals do not use infinite wealth as their sole standard in evaluating their pay. They also appraise it in terms of the perceived discrepancy between it and the *minimum* pay required to fulfill their present wants (or their pay relative to that of other people around them doing similar work). Their pay satisfaction results from comparing their actual pay with both their "practical ideal" (minimum adequate) and the amount that would fulfill *all* of their economic wants (ideal maximum).

Figure 2 shows a pay satisfaction function for the same 30 employees used above. They were asked to indicate their minimum adequate pay, given their present needs, and to rate how satisfied they *would* be with: a) 50% less than this amount; b) 25% less; c) the same amount; d) 25% more, and e) 50% more than this amount.

In this case, the function is essentially linear. Getting less than the minimum leads to (anticipated) dissatisfaction. Getting the minimum amount of pay produces mild (anticipated) satisfaction; getting more than this amount produces increasingly greater satisfaction because it is closer to the ideal maximum.[3] (Virtually every subject in the above sample showed this linear function.)

> ["Equity theory" (e.g., Zaleznik *et al.*, 1958) would argue that pay satisfaction is a function of one's own pay in relation to the pay of those around one doing similar work and/or with similar "inputs" (e.g., age, experience, education, etc.). This theory implicity assumes that the only source of pay values is what others are getting. This assumption is questionable; people also consider their personal goals and aspirations in deciding how much money they want. Equity theory may well predict what pay one considers "fair," but one may not be fully satisfied with "fair" pay. Fairness is only *one* of the elements taken into account in arriving at a pay goal or value. Equity theory, then, we would view as a less general explanation of pay satisfaction than the present model.]

[3] In asking for ratings like this, one factor that has to be controlled is the individual's belief that too much pay would be *unjust* (and therefore dissatisfying). Though some individuals might well feel this way if overpaid, it is not relevant to the present issue where we are concerned with pay satisfaction all other factors being equal or held constant.

Discrepancy-satisfaction functions with other shapes are possible. But the essential point is that in all cases an individual's evaluation of an object or situation will be a function of the perceived relationship between what he perceives and what he values.

Values are not intrinsic; they do not reside in things independent of their perceived effects on man. Nor are values subjective; they do not reside solely in man's consciousness independent of any facts. Values pertain to a relationship between man (or a living organism) and the facts of reality (Rand, 1967, pp. 21 ff). Value judgments are estimates of the significance of perceived facts against a man's value standards.

The causes of job satisfaction are not in the job nor solely in man but lie in the relationship between them. The prediction of job satisfaction necessarily requires an interactive approach—not because 20 or 30 correlational studies have "proved" it, but because of the *nature* of man and of the evaluation process.

III. PRESENT THEORY VS. RELATED VIEWS

The idea that job satisfaction is the result of an interaction between the person and his environment is not, in itself, new. In 1939, Roethlisberger and Dickson wrote that workers' attitudes towards objects in the work environment "can be referred to the relation between an organism and its physical environment . . . " (pp. 261–262). Likert wrote in 1961 that: "The subordinate's reaction to the supervisor's behavior always depends upon the relationship between the supervisory act as perceived by the subordinate and the expectations, values, and interpersonal skills of the subordinate" (pp. 94–95). Rosen and Rosen (1955) view job satisfaction as a consequence of the discrepancy between percepts and value standards. Views similar in certain respects to the above have been expressed by Katzell (1964), Morse (1953), Smith, Hulin, and Kendall (in press), and Vroom (1964).

Despite these apparent similarities, there are significant differences between the present view and those offered by most other investigators.

For one, most previous theorists have not used the concept of *value* consistently, if at all. Two concepts often used in place of or as synonymous with value are those of *expectation* and *need*.

The view that evaluations results from a discrepancy between what is perceived and what is expected (e.g., see McClelland, Atkinson, Clark, and Lowell, 1953) is based on a failure to distinguish between cognitive and evaluative concepts. Expectation is a term denoting one's beliefs about what will occur in the future. What is expected, however, may or may

not correspond to what is wanted. Conversely, what is valued may or may not correspond to what is expected. Dismissals, business failures, and demotions, if disvalued, produce displeasure whether they are expected or not. Promotions, raises, and achievements in one's work, if valued, produce pleasure whether they are expected or not. Empirically, values and expectations often coincide, because most people value only that which they have some reasonable chance of attaining. But when values and expectancies are separated experimentally, it is found that values rather than expectations determine satisfaction (Locke, 1967b; for an example of a clear recognition of the distinction between expectations and *desires*, see Rosenberg, 1957).

The experience produced by a discrepancy between what one gets and what one *expects* is *surprise*. If the outcome is in the direction of what one *values* ("better than expected"), it is a *pleasant* surprise. If the outcome is in the direction of what one *disvalues* ("worse than expected"), it is an *unpleasant* surprise. (It is possible, of course, for a person to value or disvalue the experience of surprise itself. But this does not contradict the above argument.)

Some investigators have argued that satisfaction is a function of the discrepancy between needs and outcomes. Schaffer (1953) claims that "Overall job satisfaction will vary directly with the extent to which those needs of an individual which can be satisfied are actually satisfied . . . " (p. 3). Morse (1953) and Porter (1962) view satisfaction as the result of the degree to which job needs are perceived as being fulfilled on the job.

Biologically the concept of need derives from the fact that living organisms require certain objects and conditions to maintain their physical health and survival. The analogous meaning of need at the psychological level would pertain to the conditions required for a healthy consciousness. In both cases the concept refers to the *objective* requirements of an organism's well-being.

A conscious living organism may or may not be aware of all its needs. Need frustration produces discomfort, but it does not automatically produce a conscious desire for the needed object. A man, for instance, must learn to recognize and interpret hunger and thirst sensations. There are more subtle needs such as that for certain vitamins and minerals which are identified only after hundreds of years of scientific investigation. There are complex needs such as self-esteem whose nature many men never become aware of explicitly.

The concept of need should be (but in common usage often is not) distinguished from the concept of *wish* or *value*. A value is that which a man *actually* seeks to gain and/or keep or considers beneficial. A value presupposes an awareness, at some level, of the object or condition sought.

A need does not. Further, what a man wants or values may or may not be in his actual self-interest. Since men are neither omniscient nor infallible, they will not always seek values which in fact further and maintain their well being. Whether or not a man's values correspond to needs, it is his values which regulate his actions and determine his emotional responses. (The question of the difference in the quality of satisfaction produced by achieving rational and irrational values will be discussed in a subsequent section.)

A further difference between the present theory of job satisfaction and previous approaches concerns the failure of the latter to tie their claims to man's biological nature, i.e., to his need to take action in the face of alternatives. Previous investigators have not shown *why* value judgments were a requirement of man's life, nor have they recognized the relation between emotions and values. Thus, most insights about the nature of job attitudes have remained at the level of common sense hypotheses rather than being explicitly formulated causal principles.

This may explain why so few investigators have used the percept-value discrepancy model consistently to account for job satisfaction and dissatisfaction.

For example, Roethlisberger and Dickson (1939) evidently accept the interactionist view with respect to workers' evaluations of the physical environment but take a predominantly subjectivist position when it comes to explaining other attitudes. They emphasize the influence of the workers' hopes, fears, and fantasies irrespective of the environmental facts (see especially, p. 259).

One can also find research investigations based implicitly on the intrinsic theory of job attitudes. A recent book by Turner and Lawrence (1965), for example, attempted to find correlations between characteristics of the work task (or worker's perceptions of those characteristics) and job satisfaction without taking account of the worker's values. When the correlations failed to emerge as expected, the authors were forced to make far-reaching and often dubious inferences about individual differences in values in order to account for their results.

Another study (Zaleznik, Christensen, and Roethlisberger, 1958) attempted to predict job satisfaction from the workers' social status with equally disappointing results.

There have been numerous studies in which satisfaction has been correlated with such variables as age, tenure, pay, seniority, education, intelligence, Ethnic group, and religion, etc. *None* of these measures indexes values or perceptions directly and infallibly; thus it is not surprising that the correlations have been both low and inconsistent from study to study.

Vroom (1964) has offered one of the most consistent interactionist

models to date (since his view is similar to Peak's, 1955, the latter will not be discussed separately here). Nevertheless, there are significant differences between his model and ours. One difficulty with his model concerns the double usage of the concept of *valence*. On the one hand, the valence of an object or outcome is defined as one's *anticipated* satisfaction with something not yet attained (1964, p. 15). The term valence is also taken to be synonymous with one's *actual* satisfaction with objects which one *now* possesses (pp. 100–101).

Both usages of the term valence indicate that it refers to the *result* of an appraisal of some (anticipated or attained) object or situation. Vroom takes the individual's valence or liking for an object as the *starting* point of his explanatory scheme; a given valence is then explained in terms of other valences.

But there is no explanation of what an appraisal *is*, nor of where the *first* appraisal(s) or valences came from. Desires and satisfactions are not psychological primaries. They result from estimating the relationship between some perceived object or outcome and one's value standards. The causal concepts are perception, value and value judgment; the resultants are emotions such as desire, satisfaction, attraction, etc.

It should be noted that one could properly explain *some* of a man's *values* (i.e., his instrumental values) in terms of his estimate of the other values to which they lead. *Note:* not all values are instrumental values. Some objects or actions are valued as ends in themselves, e.g., works of art, romantic love.) To explain *why* a man *valued* a specific amount of pay for instance, one could examine the degree to which he saw this amount of pay as leading to other values (e.g., education, food, housing, vacations, travel, etc.). But this is a different matter from explaining a specific emotional reaction. To explain a man's *satisfaction* with his (present) pay, one would have to look at the relationship between his actual pay and his pay goal (i.e., value standard).

Vroom's model, in short, is not primarily intended to *explain* satisfaction at all (except in terms of other satisfactions). Rather its purpose is to account for choices and overt actions which stem from one's satisfactions and anticipated satisfactions.

An important distinction often overlooked by theorists (e.g., Vroom, 1960) is that between the *degree* to which a person values some particular amount of an element and the *amount* of that element he prefers. For example, two individuals could each prefer the same amount of participation in decision-making but the importance of attaining this amount might differ in the two cases.

It will be helpful at this point to observe that every value has two attributes: *content* and *intensity* (see Rand, 1966 for further discussion

of this issue). The content pertains to *what* the person wants to gain and/or keep; the intensity pertains to *how much* he wants to gain or keep it.

Porter measures satisfaction by subtracting (quantitative) percept ratings from "need" ratings. A problem with this procedure is that such scores do not reflect "need" importance, yet the latter also affects satisfaction. Furthermore, the discrepancy scores for different "needs" have no common denominator or attribute and thus are not directly comparable. (Both of these issues are discussed at greater length in a later section.)

Katzell (1964) recognized the distinction between content and intensity in his theoretical treatment of job satisfaction. He argues that a given amount of object-value discrepancy will produce different degrees of satisfaction depending on the importance of the value to the individual. Katzell's basic formula is $S = 1 - (|X - V|)/V$ where S = satisfaction, X = the amount of stimulus, and V = the amount most desired.

Importance is taken into account by multiplying satisfaction by the importance rating. The present theory takes a somewhat different view of the way in which value importance is reflected in satisfaction ratings. This issue will be dealt with at length in a later section.

Aside from the fact that it will not explain attitudes toward pay,[4] there are two important critiques to be made of Katzell's model: a) his formula is based on actual $X - V$ discrepancies whereas it is clearly the individuals' *perceived* discrepancies that determine affect; b) Katzell's formula indicates that the more one wants of some element (holding importance constant) the less dissatisfying a given discrepancy will be. This is analogous to a Weber function for evaluation, e.g., the more of something one wants, the less "noticeable" will be a given amount of deficit. Katzell offers no evidence for this assumption, however; thus, there is no need to dispute it here.

IV. SOME ILLUSTRATIVE DATA

When the implications of the foregoing theory for the understanding of satisfaction became clear, we embarked upon a new line of research. We began using a value-percept discrepancy model to predict satisfaction.

[4] If one were to use the individual's "minimum" pay goal in the formula, this would mean that getting more than the minimum would produce less satisfaction than getting the minimum itself; this is clearly fallacious. If, on the other hand, one were to plug in "infinite" pay, the formula would be insoluble. And if one plugged in a very large figure, e.g., a million dollars, the denominator of the right hand term would be so large in relation to the numerator that individual differences in pay satisfaction would be negligible.

Two initial studies[5] were concerned with student satisfaction with their hour exam grades. Undergraduates in two different courses were asked to indicate (anonymously) what grade they would consider "minimally" adequate on the exam. The algebraic difference between this grade and their obtained grade was correlated with grade satisfaction. (The algebraic difference rather than the absolute difference was used because grade evaluations are made similarly to pay evaluations. Students typically judge their grades against both their "minimal" standard and the "ideal" standard of "A." Thus, positive discrepancies are experienced as pleasurable.) The discrepancy-satisfaction correlations were +.70 ($N = 83$) and +.69 ($N = 157$) in the two courses, respectively. In the latter study valued grade was measured both before and after the exam was given. The results were the same in both cases. (The above r's and all r's reported henceforth are significant at $p < .01$ or better unless otherwise specified.)

We also made several retrospective studies of job attitudes. In one,[6] students were asked to make ratings for each of eight job elements (pay; prestige; chance to use special abilities; freedom from supervision; chance to learn new things; chance to exercise leadership; chance to contribute to important decisions; leisure time) for their most recent summer job. For each element they were asked to rate directly the degree of discrepancy between the amount of the element they actually had on the job and the amount they should have had (ideally). These ratings were correlated with ratings of satisfaction with the element. (For sample item, see Table 1, "Cartledge–Derlega Study.") The mean between-subject correlation, averaging the r's for the eight elements, was —.61 ($N = 62$).

In another study[7] students were asked to indicate for each of 10 aspects of the work itself on a summer job (e.g., variety, safety, difficulty, etc.): a) the amount they perceived that they were getting; b) the amount they believed they should have been getting (ideally); and c) their degree of satisfaction with that aspect. (For sample item, see Table 1, "Harbaugh–Farr Study.") The absolute difference between the perception and value ratings was correlated with the corresponding satisfaction rating for each element. The mean r, between-subjects, averaging across the ten elements, was —.81 ($N = 72$).

[5] I am grateful to Norman Cartledge of the University of Maryland for helping to collect and analyze these data.

[6] This study was carried out by Norman Cartledge and Valerian Derlega of the University of Maryland.

[7] This study was carried out by Thomas Harbaugh with the help of James Farr of the University of Maryland.

TABLE 1
SAMPLE ITEMS FROM STUDIES OF JOB SATISFACTION[a]

Cartledge–Derlega Study

A. How great a discrepancy existed on your job between the extent to which you wanted to exercise leadership and the extent to which you were able to?

_____:	_____:	_____:	_____:	_____:
no discrepancy	some discrepancy	moderate discrepancy	large discrepancy	very large discrepancy

Harbaugh–Farr Study

A. My job gives me a chance to learn new things
1. never
2. about once a year
3. about once every few months
4. about once a month
5. about once a week
6. about once a day
7. all the time

What is your job like? _____
What *should* it be like? _____

Mobley Study

A. How often do you have rest breaks?
1. Never
2. Less than once a day
3. Once a day
4. Twice a day
5. Three times a day
6. Four times a day
7. More than four times a day

What is your job like? _____
What *should* it be like? _____

[a] *Note:* Satisfaction in all studies was measured by means of a 7-point verbal scale ranging from "very dissatisfied" to "very satisfied."

In a similar study[8] 25 rather than 10 dimensions of the work itself were rated as above, again using students considering their summer jobs. (For sample item, see Table 1, "Mobley Study.") The absolute discrepancy vs. satisfaction correlation, between subjects, averaged across the 25 elements, was —.72 ($N = 72$).

Clearly these results were an improvement over our earlier findings where individual differences in values were not considered. If we had used only the perception ratings as predictors, in the last two studies discussed above, the mean correlations with satisfaction would have been only .51 and .50, respectively.

Despite these improvements, the correlations explained, on the average,

[8] This study was carried out by William Mobley of the University of Maryland.

only about 50% of the variance in satisfaction. But there were other refinements to be made. A factor not controlled in these studies was that of individual differences in the interpretation of the satisfaction scale (typically we used a seven-point, verbally anchored, bipolar scale). Since there is no specifiable unit with which to measure satisfaction, there is no guarantee that individuals who check the same point on a given scale actually *experience* the same degree of satisfaction. In other words, all between-subject comparisons of this type contain potential measurement errors.

Such errors can be largely avoided by computing within-subject correlations, e.g., by ranking the satisfaction ratings a given individual makes for the various job elements and comparing them with the rank of the value-percept discrepancy scores for these same elements. All one need assume in this case is that the *relative* satisfaction ratings given by each person are valid.

In the last three studies of job attitudes cited above, the mean within-subject correlations between discrepancy and satisfaction were —.76 and —.72, and —.70 respectively.

The use of within-subject correlations did not improve the results substantially; however, the above procedures contained yet another source of error. There was no common unit in terms of which discrepancy scores on *different* dimensions could be compared. How do we know, for example, that a percept-value discrepancy score of say "two units" on job variety is really equivalent to a discrepancy of "two units" job safety?

Even if there were a common unit, a person might experience *different* degrees of satisfaction with the *same* amount of discrepancy because of differences in the *importance* of the values involved. For instance, a thousand dollar negative discrepancy in pay would be more dissatisfying to a person who considered pay to be very important than to one who considered it unimportant.

Both the above problems can be attacked by computing *within-subject* satisfaction ratings for different amounts of the *same* element. This avoids the problem of comparing discrepancy scores for different values, and also that of between-subject differences in value importance. It does not, however, rule out *within-subject* importance changes.

In a recent study[9] we assigned 20 subjects specific reaction times to try for on a visual reaction time task. Each person tried for the same reaction time 40 times in a row and was paid a small monetary bonus (5¢) each time he hit within + or —20 ms. of this target score. In this study the mean within-subject correlation (using trials as the unit of analysis) between perceived absolute discrepancy (3-point scale) and satisfaction (3-point scale) was —.92.

[9] This study was run and analyzed by Mrs. Claramae S. Knerr of the University of Maryland.

The student and laboratory data, of course, may not be representative of the findings that would be expected with full-time employed adults. However, in the study described in Part II above, the 30 research firm employees rated their *anticipated* satisfaction with different amounts of pay and different work week lengths. Within —*S* rank order correlations ($n = 3$) were computed between satisfaction and deviation of pay (algebraic) and work week length (absolute) from the individual's value standard. The mean rho was +.99 in both cases.

Although the above correlations are higher than one would expect to obtain using a between-subject design and measuring present rather than anticipated satisfaction, it illustrates a point. It demonstrates that if one knows *what* to look for, *what* the extraneous sources of variance are and how to control them, that satisfaction can be explained and predicted.

V. FURTHER ISSUES

We have established the general principle that satisfaction is the result of value achievement and that the phenomenon can be studied experimentally. However, there are a number of problems to be solved before we will be able to account fully for a person's overall satisfaction with his job.

The Dynamic Character of Values

Values differ in level of abstraction. A man's widest, most abstract values are his moral values, which in turn depend upon his moral code (Rand, 1966). An individual's specific values or goals are determined by his abstract values within the limits of what is available. One can distinguish, for example, between the value of money to a person and the specific amount of pay he will seek at a given time on a given job. The latter will depend on the former, and on the individual's estimate of his "market price" and/or his conception of a "just wage."

An individual's job satisfaction can be predicted and explained in the short range by taking account of his specific goals. To achieve this in the long run, however, one would have to consider his wider values. For these wider values determine what *future* goals a person will seek after achieving his *present* goals. For example, consider a man who values money highly and who has just received a desired raise. Although his immediate response will be one of satisfaction, he will not *remain* satisfied indefinitely with this amount of pay. He will soon set a minimal goal level that is higher than his present salary. Similarly, a person who

values challenging work will not remain satisfied with repeatedly succeeding at a task that was *initially* difficult for him. He will eventually demand work which is more difficult than his present assignment.

The phenomenon of goal change can be observed on a small scale in certain level of aspiration experiments. In a recent study, Cartledge (1968) assigned 20 *S*s specific, quantitative, end goals on an addition task. A total of 10, 6-minute trials were allowed to reach these cumulative scores. Those *S*s who were assigned (and accepted) hard end goals ($N = 10$) set higher trial goals (sub-goals) on the task than did *S*s who were assigned (and accepted) easy end goals ($N = 10$). The setting of sub-goals was governed by the subjects' long range purpose on the task.

Satisfaction with single trial performance in this study was a joint function of two factors: (a) the individual's perception of the *instrumentality* of his single trial performance in achieving his end goal; and (b) his goal-performance discrepancy on that trial. This latter finding was due to the fact that individuals attained a sense of "achievement" from reaching their sub-goals independent of their role in facilitating end goal attainment. ("Efficacy" was probably the wider value involved here.) The median multiple correlation, within *S*s, between the above two variables and single trial satisfaction was .82. (This R was not calculated in Cartledge's original analysis.)

In a follow-up study[10] (incorporating methodological refinements), 20 *S*s were given hard or easy cumulative end goals on a reaction time task (i.e., they had to accumulate a certain total amount of reaction time over a series of 20 trials). The median within-*S* multiple R between perceived sub-goal-performance discrepancy plus perceived instrumentality, and single trial satisfaction was .89 (using data from the last 10 trials).

The dynamic character of job values can be observed every day in real life situations. In spite of this, the factors which affect changes in job goals have been given very little attention in job satisfaction research. Relevant studies would include: 1) identifying the relationship between the setting of specific goals and the individual's abstract values, in the context of his perception of the situation; 2) identifying factors which cause the individual to modify his abstract values. Especially crucial here would be the study of individual differences in methods of thinking (i.e., psycho-epistemology, Branden, 1964b).

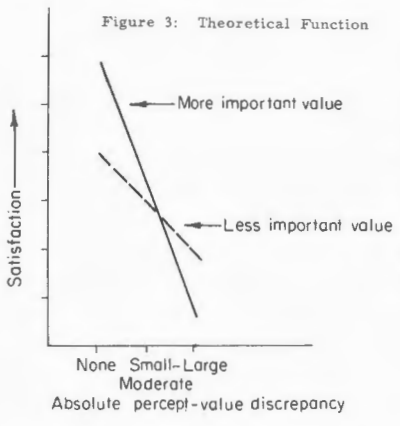
Value Hierarchies

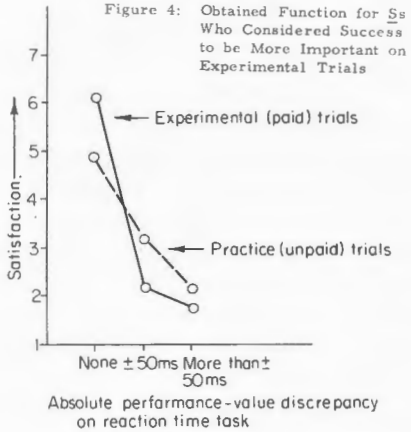
Individuals hold their values in a hierarchy; they value some things more than others. If this were not so, men would be so overwhelmed by

[10] This study was run by Norman Cartledge and Claramae Stevens of the University of Maryland.

conflicts that they would be unable to act at all. Furthermore, men differ from each other in the degree to which they value things.

It was noted earlier that the same degree of discrepancy between perception and value could result in differing degrees of satisfaction depending on the importance of the value to the individual. A theoretical function showing satisfaction as a function of value-percept discrepancy for two levels of value importance is presented in Figure 3. Note that attaining and failing to attain a *more* important value produces more satisfaction and more dissatisfaction, respectively, than do the same outcomes with respect to a *less* important value.





FIGS. 3 AND 4. Theoretical and obtained functions relating percept-value discrepancies to satisfaction as a function of importance.

An empirical function is shown in Figure 4.[10] Twenty-one *S*s were instructed to press a switch between 450 and 550 milliseconds after a visual stimulus (light) was presented. They were told whether they were within the target range, off (on either side) by 1 to 50 ms., or off by more than 50 ms. Half the time the *S*s were paid nothing for success ("practice trials"), and half the time they were paid 25¢ to 35¢ for success ("experimental trials").

Seven *S*s said after the experiment that it was more important to them to succeed on the experimental than on the practice trials. For these individuals, mean satisfaction ratings were calculated for each outcome, for the practice and experimental trials separately. The results in Figure 4 show a significantly steeper slope ($p < .01$) in satisfaction ratings for the "experimental trials" than for the "practice trials." Success caused more satisfaction and failure more dissatisfaction on the trials considered more important.

The same finding emerged for the 14 *Ss* who claimed that it was *equally* important to them to succeed on the paid and nonpaid trials. However, the difference in slope was considerably (and significantly, $p < .02$) smaller for this group than for those who valued success more on the paid trials.

The above results indicate that satisfaction with some object or situation is a function not only of the *amount* of discrepancy between percept and value, but of the *importance* of that value to the individual.

Every experience of satisfaction or dissatisfaction reflects a dual value judgment: the *degree* of value-percept discrepancy and the relative *importance* of the value to the individual. Since both attributes of value, content and intensity, are involved in determining emotional reactions, both must be considered when explaining such reactions.

It is important to recognize that value importance may vary as a function of the total amount of the value already possessed by the individual. In making actual choices people typically have to judge between the relative importance of *specific increments or decrements* of different values, *not* between the *total* amounts involved. For example, a man might consider pay an important value up to a certain minimum, but further pay increments might be valued less than, say specific changes in the work content. Conversely, there might be a salary so low that no amount of positive change in work content could compensate for it.[11]

Changes in importance should be revealed by *changes* in the *slope* of percept-value discrepancy vs. satisfaction function. The overall slope of such a function would reveal only the *average* importance of the value to the individual, not necessarily the importance of obtaining some particular amount.

Overall Job Satisfaction

A job is not an entity but an abstraction referring to a combination of tasks performed by an individual in a certain physical and social context for financial (and other) remuneration. Since a job is not perceived or experienced as such, it cannot initially be evaluated as a single unit. Overall job satisfaction is the sum of the evaluations of the discriminable elements of which the job is composed.

There has been considerable controversy regarding how the separate evaluations should be combined to arrive at a valid sum (Ewen, 1967).

[11] It would be misleading to assume that value importance necessarily decreases as an individual obtains more of a value. This opposite could as easily occur. Consider a man who saves for years in order to start a new business or to buy his own house. The *most* valued monetary increment in such a case will be the *last one*, the increment that makes possible the actual realization of his long range goal. By comparison the first increment saved in such a case would be valued very little.

A typical procedure is to have individuals rate their satisfaction with a fixed number of job elements (e.g., pay, work, supervision) and to sum the ratings, possibly weighting them according to their relative importance.

With respect to weighting, our previous analysis suggests that *importance is already included in and reflected by the satisfaction ratings* (to the extent that they are valid). Since value importance determines the degree of affect produced by a given amount of value-percept discrepancy, multiplying satisfaction scores by importance scores is redundant.

A valid overall index of satisfaction would, in the present view, be a sum of the evaluations of all job aspects to which the individual responds. It is important to note that all individuals may not seek the same *number* of values in their jobs. For instance, a surgeon will ordinarily seek a greater variety of values in his work than will be ditch-digger. A valid overall measure would still be a sum (*not* an average) of the constituent satisfactions. Negative evaluations (dissatisfactions) would, of course, be subtracted from the total.

The Problem of Measurement

No formula has been presented in this paper specifying the precise, mathematical relationship between value-percept discrepancy, value importance, and satisfaction. It has been argued that the third is a function of the first and second, but too little is known about the measurement of these variables to specify the form of the function.

Value (and percept) *content* can ordinarily be measured in physical units, the units in each case depending on the nature of the object or situation involved. For example, we can ask a man to specify his preferences with respect to pay, amount of travel, temperature, and work week length. The appropriate units would be dollars, miles (or number of trips), degrees, and hours, respectively. Percept content can be measured similarly. The percept-value discrepancies can also be expressed as cognitive judgments (e.g., "small" discrepancy, "moderate" discrepancy, "large" discrepancy, etc.) but this does not imply a common unit for all objects and situations. Discrepancy scores for different values are not directly comparable.

Intensity of satisfaction and value *importance* cannot be measured in terms of any known physical (or psychological) units. It would be an error to conclude from this that these concepts are not meaningful, however. By introspection it can be observed that men do experience different degrees of satisfaction and dissatisfaction and do value things to different degrees. (It should be possible to rate these factors on an ordinal scale.)

As indicated above, value importance could be inferred for a given individual by plotting a function relating percept-value discrepancy to satisfaction. The overall slope of the function would show the overall importance of the value to the individual, while the inflection points would reveal where value importance changed.

It should be noted that the maximum degrees of satisfaction and dissatisfaction obtainable from a given job element will not necessarily be the same for all persons—i.e., the scale intensity range will not be uniform for everyone, but will be governed by the importance of the value involved to the individual.

A Note on the Herzberg Two-Factor Theory

The points made heretofore have implications for Herzberg's (1959, 1966) theory of job attitudes. Herzberg has argued that factors related to the work itself (achievement, work content) can cause only (overall) job satisfaction but cannot cause job dissatisfaction, whereas factors extrinsic to the work (company policies, supervision) can cause (overall) job dissatisfaction, but not satisfaction.

Since, as we have seen above, overall job satisfaction is a function of satisfaction with the separate elements, the Herzberg theory boils down to the claim that certain elements or outcomes cannot cause satisfaction or dissatisfaction *at all*. Herzberg is arguing, in effect, that the *importance* of work content factors drops to 0 whenever content values are frustrated. He is claiming that although workers value success, they are indifferent to failure. Similarly, he is claiming that whenever extrinsic work values are fulfilled their importance drops to 0 so that no actual satisfaction results.

Although such outcomes may occur for certain individuals, Herzberg has offered no proof of this assertion. The fact that few people (allegedly) mention failure as a cause of job dissatisfaction does not necessarily mean that they are indifferent to failure; it could just as plausibly mean that *people do not experience failure very often* (e.g., because they choose jobs within their abilities). Furthermore, biases in Herzberg's classification system resulted in reported failures being typically classified into work context categories such as supervision and company policy rather than into the "failure" category.

It is not surprising therefore that nearly all the studies designed to test Herzberg's theory which have *not* used his method or his classification system have failed to support the theory (e.g., Ewen *et al.*, 1966; Friedlander, 1964; Graen and Hulin, 1968; Hulin and Smith, 1967; Lindsay *et al.*, 1967; Wernimont, 1966). A persistent finding of these studies is

that factors related to the work itself (e.g., achievement, failure) are potent determinants of *both* satisfaction and dissatisfaction.

Rational and Irrational Values

It was stated earlier that satisfaction was an automatic response to a value judgment. Does this mean that the quality and duration of the pleasure one experiences upon achieving a value (with a given importance) is the same regardless of the *nature* or *content* of the value(s) involved? Does it make any difference *what* one is seeking as far as one's emotional response is concerned?

Recall that man's need to make value judgments stems from his need to take actions which will sustain his life. To survive, at least *some* of man's values must be rational, that is, consonant with his objective needs (Rand, 1964). Thus, a man who has some irrational values will necessarily experience value conflicts. This means that achieving one value will necessarily negate another. To take an extreme example, consider an ascetic who has learned to value pain and physical suffering. Achieving painful, emaciated states will yield a degree of pleasure so such a person. But since achieving this value will necessarily cause physical discomfort, the total experience will not be one of noncontradictory pleasure but one of pleasure diluted with pain. Or to put it more simply, pain hurts, even if you like it!

Not all conflicts are between "moral" values and "physical" values, but the principle is the same in other cases. The value conflict may be revealed in the short duration, in the diminution of intensity, or in the unpleasant after-effects of value achievement (e.g., the hangovers and loss of self-confidence of an alcoholic; the increasing helplessness of a dope addict; the all-prevading boredom of the man who seeks totally unchallenging work).

To fully account for the effects of value achievement on job satisfaction, (e.g., to account for quality and duration, as well as quantity) one would have to take account of the nature of the individual's job values and identify any value conflicts. (For a fuller discussion of the issue discussed in this section, see Branden, 1964a.)

VI. CONCLUSION

Psychologists have long been convinced that the way to understand a phenomenon was first to measure it and then to correlate it with everything in sight. This has been the pattern followed in numerous studies of job satisfaction. It has not worked.

To understand a phenomenon, one must begin with a conceptual anal-

ysis. At least some of the attributes and characteristics of the process or entity being studied must be identified before specific amounts of it can be measured and related to other measures. But one cannot reverse this sequence. If one does not grasp something about the nature of that which one is measuring to start with, understanding will not be achieved by correlating an arbitrarily chosen measure of it with other arbitrarily chosen measures.

To explain job satisfaction, and other psychological phenomena, the policy of correlation without explanation must be abandoned. The first question a scientific investigator must ask is not "How can I measure it?" but rather, "What *is* it?"

REFERENCES

Branden, N. The psychology of pleasure. *The Objectivist Newsletter*, 1964, **3**, No. 2, 5–6. (a)

Branden, N. Psycho-epistemology. *The Objectivist Newsletter*, 1964, **3**, No. 10, 41–44. (b)

Branden, N. The Objectivist theory of volition. *The Objectivist*, 1966, **5**, No. 1, 7–12. (a)

Branden, N. Volition and the law of causality. *The Objectivist*, 1966, **5**, No. 3, 8–14. (b)

Branden, N. Emotions and values. *The Objectivist*, 1966, **5**, No. 5, 1–9. (c)

Branden, N. Emotions and actions. *The Objectivist*, 1966, **5**, No. 6, 7–11. (d)

Cartledge, N. Some determinants of goal-setting. Unpublished Master's Thesis, University of Georgia, 1968.

Efron, R. The conditioned reflex: a meaningless concept. *Perspectives in Biology and Medicine*, 1966, **9**, 488–514.

Ewen, R. Weighting components of job satisfaction. *Journal of Applied Psychology*, 1967, **51**, 68–73.

Ewen, R. B., Smith, P. C., Hulin, C. L., and Locke, E. A. An empirical test of the Herzberg two-factor theory. *Journal of Applied Psychology*, 1966, **50**, 544–550.

Friedlander, F. Job characteristics as satisfiers and dissatisfiers. *Journal of Applied Psychology*, 1964, **48**, 388–392.

Graen, G. B., and Hulin, C. L. Addendum to "an empirical investigation of two implications of the two-factor theory of job satisfaction." *Journal of Applied Psychology*, 1968, **52**, 341–342.

Gebhard, M. The effect of success and failure upon the attractiveness of activities as a function of experience, expectation and need. *Journal of Experimental Psychology*, 1948, **38**, 371–388.

Guion, R. M., and Gottier, R. F. Validity of personality measures in personnel selection. *Personnel Psychology*, 1965, **18**, 135–164.

Herzberg, F. *Work and the nature of man*. New York: World, 1966.

Herzberg, F., Mausner, B., and Snyderman, B. B. *The motivation to work*. New York: Wiley, 1959.

Herzberg, F., Mausner, B., Peterson, R. O., and Capwell, D. F. *Job attitudes: Review of research and opinion*. Pittsburgh: Psychological Service of Pittsburgh, 1957.

Hoppock, R. *Job satisfaction*. New York: Harper, 1935.

Hulin, C. L., and Smith, P. A. An empirical investigation of two implications of the two factor theory of job satisfaction. *Journal of Applied Psychology*, 1967, **51**, 396–402.

Hulin, C. L., and Smith, P. C. A linear model of job satisfaction. *Journal of Applied Psychology*, 1965, **49**, 209–216.

Katzell, R. A. Personal values, job satisfaction, and job behavior. *In* H. Borow (Ed.) *Man in a world of work*. Boston: Houghton-Mifflin, 1964. Pp. 341–363.

Likert, R. *New patterns of management*. New York: McGraw-Hill, 1961.

Lindsay, C. A., Marks, E., and Gorlow, L. The Herzberg theory: A critique and reformulation. *Journal of Applied Psychology*, 1967, **51**, 330–339.

Locke, E. A. The relationship of task success to task liking and satisfaction. *Journal of Applied Psychology*, 1965, **49**, 379–385.

Locke, E. A. Relationship of task success to task liking: A replication. *Psychological Reports*, 1966, **18**, 552–554.

Locke, E. A. Further data on the relationship of task success to liking and satisfaction. *Psychological Reports*, 1967, **20**, 246. (a)

Locke, E. A. The relationship of success and expectation to affect on goal-seeking tasks. *Journal of Personality and Social Psychology*, 1967, **7**, 125–134. (b)

Locke, E. A. Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance*, 1968, **3**, 157–189.

Maas, J. B. Satisfaction with work as indexed by income level. Unpublished Ph.D. Dissertation, Cornell University, 1966.

McClelland, D. C., Atkinson, J. W., Clark, R. A., and Lowell, E. L. *The achievement motive*. New York: Appleton-Century-Crofts, 1953.

Morse, N. C. *Satisfaction in the white-collar job*. Ann Arbor: Univ. of Michigan, Survey Research Center, 1953.

Peak, H. Attitude and motivation. *In* M. R. Jones (Ed.) *Nebraska symposium on motivation*. Lincoln, Nebraska: U. of Nebraska Press, 1955. Pp. 149–188.

Porter, L. W. Job attitudes in management: I: Perceived deficiencies in need fulfillment as a function of job level. *Journal of Applied Psychology*, 1962, **46**, 375–384.

Rand, Ayn. *Atlas shrugged*. New York: Signet, 1957.

Rand, Ayn. *Capitalism: The unknown ideal*. New York: Signet, 1967.

Rand, Ayn. The objectivist ethics. *In* Ayn Rand's *The virtue of selfishness*. New York: Signet, 1964. Pp. 13–35.

Rand, Ayn. Concepts of consciousness. *The Objectivist*, 1966, **5**, No. 9, 1–8.

Randall, J. H. *Aristotle*. New York: Columbia Press, 1960.

Roethlisberger, F. J., and Dickson, W. J. *Management and the worker*. Cambridge: Harvard U. Press, 1939.

Rosen, R. A. H., and Rosen, R. A. A suggested modification in job satisfaction surveys. *Personnel Psychology*, 1955, **8**, 303–314.

Rosenberg, M. *Occupations and values*. Glencoe: Free Press, 1957.

Schaffer, R. H. Job satisfaction as related to need satisfaction in work. *Psychological Monographs*, 1953, **67**, #14.

Skinner, B. F. Behaviorism at fifty. *In* T. W. Wann (Ed.) *Behaviorism and phenomenology*. Chicago: U. of Chicago Press, 1964.

Skinner, B. F. *Science and human behavior*. New York: Macmillan, 1953.

Smith, P. C., Hulin, C. L., and Kendall, L. M. *The measurement of satisfaction in work and retirement*. Chicago: Rand-McNally. (in press)

TURNER, A. N., AND LAWRENCE, P. R. *Industrial jobs and the worker.* Boston: Harvard Univ. Graduate School of Business Administration, 1965.
VROOM, V. *Some personality determinants of the effects of participation.* Englewood Cliffs, New Jersey: Prentice-Hall, 1960.
VROOM, V. *Work and motivation.* New York: Wiley, 1964.
WERNIMONT, P. F. Intrinsic and extrinsic factors in job satisfaction. *Journal of Applied Psychology,* 1966, **50,** 41–50.
WINDELBAND, W. *A history of modern philosophy,* Volume II. New York: Harper Torchbooks, 1958.
ZALEZNIK, A., CHRISTENSEN, C. R., AND ROETHLISBERGER, F. J. *The motivation, productivity and satisfaction of workers.* Boston: Harvard U. Press, 1958.

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A Test of the Progression-Regression Hypotheses in a Cognitive Inference Task[1]

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The study was designed to test the validity of the progression-regression hypotheses of Fitts *et al.* in the context of performance on a cognitive inference task. Using parabolas as stimuli, subjects were required to make predictive responses. The correct response for each parabola was based upon an equation which involved the first and second derivatives of each stimulus figure. Two groups of 11 subjects each experienced 12 days of training followed by 2 days of transfer under mild stress followed by 5 more days of transfer under heavier stress. The groups differed in degree of specificity of instructions. Evidence for the progression hypothesis was obtained in both groups, but no evidence at all was found for the regression hypothesis under the stress conditions.

Transfer functions are mathematical equations which describe observed system output as a function of some known system input. Human transfer functions have frequently been used as a method of studying man's ability to acquire and to maintain proficiency in system control tasks (e.g., see Briggs, 1964, for an overview of this research). These human transfer functions are typically obtained by setting the observed output equal to a mathematical expression containing variables representing both the known system input components and variables representing various human performance parameters. The human performance parameters either modify the input variables (i.e., represent the weights given the input components by the operator) or represent various characteristics of the human, such as reaction time, and are then fitted so as to minimize the residual between the mathematical expression and the

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