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Motivational processes in goal-setting theory

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Rice University, 1989
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MOTIVATIONAL PROCESSES IN GOAL SETTING THEORY

by

ROBERT E. LEWIS

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
DOCTOR OF PHILOSOPHY

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Motivational Processes in Goal Setting Theory

Abstract

The goal difficulty effect—the assertion that difficult specific goals lead to higher performance than vague or easy goals—has received a great deal of empirical support. Little research, however, has been directed toward discovering why this effect is obtained. This study reports an experiment designed to examine the extent to which the Valence-Instrumentality-Expectancy (VIE) and Naylor-Pritchard-Ilgen (NPI) theories of motivation can explain processes underlying the goal difficulty effect. Questions designed to elicit motivational force, as defined by NPI and VIE theories, were answered by 121 subjects who participated in a four (goal difficulty level) by two (experimental session) factorial experiment. Goal difficulty is not related to performance in this study. Although subjects in the hard goal condition achieved the highest performance in Session 2, subjects given easy goals increased their performance on the puzzles over experimental session slightly more than subjects given hard goals. Very hard goals failed to motivate high increases in performance and subjects given moderately hard goals exhibited a mean decrease in performance. NPI motivational force accurately predicted the direction of performance change across
sessions--positive force values are associated only with increases in performance whereas negative force values are associated only with performance decrements. VIE motivational force is not significantly related to performance. Though much work is needed to standardize and streamline the collection of NPI motivational components, NPI is likely to contribute to the understanding of the goal difficulty effect and the development of a goal process model.
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I would like to express special thanks to Bob Dipboye. I am leaving graduate school having accomplished all I had set out to do and the insights and instruction I received from Bob have much to do with that. I would also like to thank Barb Gaugler for the time and special care she took to read this thesis and many other of my papers. The clarity and style of many of my papers improved under her watchful eye and red pencil.

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Motivational Processes in Goal Setting Theory

Introduction

The authors of a comprehensive review of goal setting theory literature concluded that "The beneficial effect of goal setting on task performance is one of the most robust and replicable findings in the psychological literature" (Locke, Shaw, Saari, and Latham, 1981, p. 145). Locke et al. have a great deal of evidence to support their claim. Their review demonstrated that the goal difficulty effect—the hypothesis that difficult, specific, accepted goals lead to higher performance than vague, easy, accepted goals—is supported by 99 of 110 goal setting studies conducted during the period 1969-1980. It may be argued, however, that researchers have established the robustness of the goal difficulty effect while neglecting the processes underlying the effect. Though goal setting "clearly implie[s] cognitive activity by the individual" (Landy & Becker, 1987, p.32), relatively little effort has been invested in determining which cognitive components and processes cause goals to motivate higher performance (Campbell & Pritchard, 1976; Naylor, Pritchard, & Ilgen, 1980). This paper reports the results of an experiment designed to examine the extent to which cognitive processes specified by two motivation theories, Vroom's VIE theory (1964) and Naylor, Pritchard,
and Ilgen's theory of behavior in organizations (1980), can offer insight into the goal setting-performance process.

The theoretical formulations, empirical evidence, and problem areas associated with each theory will be reviewed briefly. Each theory's explanation for the goal difficulty effect will then be contrasted to yield experimental hypotheses.

**Goal Setting Theory**

Locke and his associates (Locke, 1968; Locke, Cartledge, & Knerr, 1970) have developed and extensively researched a theory relating conscious intentions to task performance called goal setting theory. According to Locke "the most immediate, direct motivational determinant of task performance is the individual's goal or intention" (Locke, Shaw, Saari, & Latham, 1981, p. 135) which is defined as the desired end state of an act. Goals affect performance "by directing attention and action, mobilizing energy expenditure or effort, prolonging effort over time (persistence), and motivating the individual to develop relevant strategies" to achieve the goal (Locke et al., 1981, p. 145).

Goal setting theory proposes that the motivation to change or establish a given set of behaviors is precipitated by a comparison of existents (e.g. rewards and other outcomes) with a desired state of the world. The recognition of an
actual-desired discrepancy leads to an affective state which can produce goal setting. Specifically, individuals are satisfied with their level of performance to the extent that it meets their anticipated performance level. Dissatisfaction ensues when performance is lower than anticipated and is remedied by raising the level of performance on subsequent trials to meet the goal. Lowering the goal or anticipated performance level is not considered because it is always assumed that the goal is accepted by the individual. This model is conceptually similar to various models of cognitive consistency and social learning theory.

Figure 1. The goal setting model (taken from Locke, Cartledge, and Knerr, 1970).
(Bandura, 1977) but has not been empirically tested by Locke or his associates. The theoretical model developed by Locke et al. (1970) is presented in Figure 1.

Two notes regarding goal setting should be mentioned here. The process of goal choice is explicitly outside the boundary of goal setting theory: "No attempt is made...to specify the ultimate roots or causes of the particular goals or intentions an individual develops on a task. Our interest here is only in the relationship between these goals and intentions, once established, and subsequent behavior" (Locke, 1968, p. 159). Thus when Locke claims that goals direct action he is referring to the strategic approach to a previously chosen act, not to a choice of one from a set of qualitatively different acts. Second, unlike most motivational theories, goal theory predicts performance, not effort. Locke chose to examine achievement instead of effort because "the results of outcomes of the behaviors are ordinarily either the ones intended or correlated with those intended (the correlation depending upon the individual's capacity, knowledge, ability, and the situation)" (Locke, 1968, p. 161). It is probably because of this orientation that goal setting research has proliferated; dependent variables are easily measured and researchers avoid the ambiguities of relating observed performance to effort. To
further reduce these ambiguities Locke has emphasized the need to control for ability and other individual difference variables when conducting goal setting research.

**Goal Attributes**

Not every goal will affect performance. The attributes of goals that determine how likely they are to lead to increased task performance are goal acceptance, goal specificity, and goal difficulty.

Goal acceptance is related to task performance for the obvious reason that goals rejected by an individual cannot be expected to motivate increases in performance. Failure to accept a goal implies that the individual either does not perceive the goal as capable of reducing the discrepancy between actual and desired states or does not perceive a discrepancy. Locke (1968) argues that studies which do not support goal setting theory often fail to ensure that the goals assigned to subjects were accepted by them. When data from his earlier studies was reanalyzed by Locke (1968), he found that goal setting hypotheses are supported for those individuals who indicate that their goals are acceptable. Locke contends that other data, if analyzed on the basis of goal acceptance instead of goal assignment, would support goal setting theory.

A second attribute of goals is specificity. General or
ambiguous goals couched in statements such as, "Do your best" or the standard speed-accuracy instruction, "Work as quickly and accurately as you can" do not allow the individual to determine unambiguously the level of performance required. Although these goals can be generally motivating they cannot enable the individual to determine how much the actual-desired discrepancy has been reduced. Accurate comparison of existents and performance may result only when the anticipated level of performance (the value standard) is explicit. Thus specific goals are a prerequisite to high levels of motivation.

Perhaps the most important attribute of a goal is its difficulty. Goal difficulty refers to a level of task completion (number of items completed, number of errors made) and is differentiated from task difficulty, which concerns the nature of the work to be accomplished (Locke et al., 1981). Difficult goals motivate greater performance than easy goals simply because they are more likely to cause an actual-desired performance discrepancy.

These goal attributes are generally not orthogonal. That is, full factorial designs comparing all combinations of factor levels are not of interest. Non-specific ("do best") goals are usually categorized as easy goals (which may or may not be specific). Unaccepted goals are not considered at
all. Thus, goal studies are primarily concerned with accepted specific goals that vary in difficulty and accepted non-specific goals that are easy.

**Empirical evidence**

Although the studies which have been conducted since 1968 have expanded and revised goal setting theory, its current structure is remarkably similar to Locke's original propositions (Locke, 1966; Locke & Bryan, 1970; Locke, Cartledge, & Knerr, 1970). The major elements of goal setting—goal acceptance, specificity, and difficulty—have received much research attention.

**Goal acceptance.** Erez and Zidon (1984) provide evidence for Locke's position that goals must be accepted to increase performance. Subjects in their study completed repeated trials of two tasks and rated their acceptance of the goals set for them by the experimenter. Goals were increased in difficulty as subjects completed each trial. It was thus possible to examine performance as a function of the extent to which subjects accepted the goal set for any given trial. Erez and Zidon found that goal acceptance decreased with increased goal difficulty. Performance increased linearly and significantly with goals of increasing difficulty as long as goals were accepted but decreased beyond the point at which subjects rejected the goals set for them. The authors
also found that the standard deviation of goal acceptance ratings for each level of goal difficulty increased as goal difficulty increased. The "small variance in acceptance within the positive zone suggests that subjects are more homogeneous in accepting attainable goals than in rejecting the most difficult ones" (p. 77).

**Goal specificity and difficulty.** In their review Locke et al. (1981) "found that 99 out of 110 studies found that specific, hard goals produced better performance than medium, easy, do your best, or no goals" (p. 131). However, difficult goals have not always resulted in higher performance than moderately hard goals (Motowidlo, Loehr, & Dunnette, 1978; Locke, 1982; Oldham, 1975). The inconsistent findings with regard to moderate goal levels may be due to definitional problems--there appear to be no widely accepted differences between levels of goal difficulty and no mention of minimum difficulty levels in the theory. Related to this point are the characteristics of the tasks used in the goal setting literature. Non-linearities in the goal difficulty-performance function may be due to task-related time or ceiling effects. Locke (1982) used a brainstorming/creativity task in which subjects had to list as many uses as could be made of an object or as many objects as could be described by a given adjective in a limited
amount of time. It is conceivable that, given more time, subjects could have attained higher performance levels with the higher goals. Similarly, non-linear functions would result when the task performance function reaches asymptote, whether due to task or operator characteristics. In this case the relation of moderately difficult to difficult goals would depend on where along the function the goals were set.

A third reason for the goal difficulty-performance inconsistency might be due to individual differences. It seems logical to predict that personality variables may limit the extent to which one will accept goals set by others or the extent to which one will direct effort toward or persist in obtaining difficult goals. Similarly, there may be individual differences in the extent to which persons are oriented toward formulating specific goals. Despite the variety of individual difference variables studied—education, race, need for achievement, need for independence, self-esteem, higher order need strength, and internal versus external locus of control (Locke et al. 1981; Beehr and Love, 1983)—Locke et al. (1981) conclude that no moderator of the goal difficulty effect has been consistently supported. The inability to relate individual differences to goals may be due mainly to two factors. First, most goals were assigned in these studies. According to Locke et al.
(1981) the demand characteristics associated with assigned goals effectively prevent the effects of individual differences from being manifested in performance. Second, most studies were designed primarily as studies of goal setting and were not specifically designed for a test of individual differences. Experimenters often did not (or could not) make theoretically-based predictions regarding the effect of the individual difference variable on performance. As a result, differing or no interpretations were offered for findings, or the individual differences were not measured consistently across studies. Although it is logical to think that individual differences will moderate the effect of goal setting on performance (which may be the reason so many studies have included them), it appears that no coherent findings will emerge until a sound theoretical and methodological framework is developed to incorporate individual differences within goal setting.

Research needs in goal setting

Progress in goal setting research will require better operationalization of goal setting constructs and more careful attention to possible moderating effects.

Ability. Ability has rarely been tested as a moderator of the goal effect. This is not surprising given Locke's position that ability is a contaminant to be partialled out of
the goal process rather than a variable with effects on goals that should be examined (Mento et al., 1980). Naylor et al. (1980) hypothesize that "the major source of influence of ability as it influences commitment to actual acts is to influence act-to-product contingencies" (p. 220). Since ability is intimately connected with expectancy and possibly with goal acceptance/commitment, it seem reasonable to examine the effects of varying ability levels on goals.

Hollenbeck and Brief (1987) found that subjects in self-set goal conditions who were high in task-specific ability set higher goals for themselves and that ability correlated highly with performance. Hollenbeck and Brief (1987) presented no results concerning the relationship between ability and probability of goal attainment. More work is clearly needed to establish the goal difficulty to ability-goal attainment-raw performance relationship.

**Goal difficulty.** The problem with goal difficulty as it is used now is two-fold: it lacks a standard definition and a standard calculation. Goal difficulty mis-specification occurs when a purported level of goal difficulty a) is not defined consistently across subjects and/or b) does not differ substantially from other purported levels of goal difficulty. "Difficult" goals have been defined as having a probability of goal attainment of 0.66 (Matsui et al., 1981),
0.37 (Mento et al., 1980), 0.32 (Latham, Mitchell, & Dossett, 1978), 0.55 and 0.58 (Latham & Yukl, 1976), and 0.10 and 0.45 (Dossett, Latham, & Mitchell, 1979). Definitions of "easy" and "moderate" or "moderately hard" goals vary as widely and a large number of studies fail to report the percentage of subjects who successfully attain their goals. Furthermore, little attention has been paid to differences between subjects in subjective goal difficulty and the relationship between objective and subjective goal difficulty and performance. There is obviously little agreement on what constitutes a given level of goal difficulty.

The second problem with goal difficulty concerns the way in which specific quantitative goals are calculated and assigned to subjects. One method is to pre-test a task on a group of subjects to obtain a performance distribution and randomly assign to subjects goals that correspond to the probability of success values generated from that pilot distribution (Locke, 1981; Hollenbeck & Brief, 1987; Motowidlo et al., 1978). A second method is to simply assign goals the experimenters think are hard or easy (LaPorte & Nath, 1976).

The use of these two methods to assign goals has typically resulted in a goal difficulty-ability confound. An example is provided in the study by Hollenbeck and Brief (1987).
They pre-tested a task to obtain a performance distribution and randomly assigned goals from that distribution to high and low ability subjects. Goal difficulty was analyzed by Hollenbeck and Brief as a main effect even though difficulty could not be defined (in terms of probability of goal attainment) consistently across persons. For example, an "easy" goal (a performance level achieved by most of the pilot subjects) may indeed be easy for highly able subjects but moderately difficult for those low in ability. Similarly, a hard or difficult goal may be only moderately difficult to the very able and impossible to (and possibly rejected by) those less able. Thus, the researchers who attempted to control for ability by varying goal difficulty appear instead to have confounded the two.

A third method of calculating goal difficulty is to randomly assign to subjects goals of a percentage increase in baseline performance. Because this third method accounts for differing ability levels between subjects and imposes a standard goal definition (i.e. "fifteen percent above baseline" ), it decreases the likelihood of gross goal difficulty mis-specification.

Goal acceptance and commitment. Goal setting manipulation checks typically involve asking subjects if they accepted or were committed to achieving the goal. It is rarely the case
that these questions are asked although commitment and acceptance may be affected by the goal manipulation. Goal acceptance has come to be regarded as the extent to which a subject accepts the goal as an initial referent. Goal commitment, on the other hand, is the extent to which effort is exerted and the goal acts as a referent throughout the task. However, the distinction between the two is not well maintained (Hollenbeck & Klein, 1987). Mento et al. (1980) found valence and expectancy to relate to goal acceptance and Hollenbeck found that expectancy and valence relate to goal commitment (Hollenbeck & Brief, 1987; Hollenbeck & Williams, 1987). It is likely that expectancies (and contingencies) and valences relate to goal acceptance and commitment; these relationships remain to be explored empirically.

**Summary**

The goal setting hypothesis that difficult, specific, accepted goals lead to higher performance than easy, vague, or rejected goals is one of the most replicable effects in organizational theory. The goal effect has been generalized to field settings and is an implicit part of many popular motivational programs, such as management by objectives (MBO) (Miner, 1980). However, the characteristics of the tasks used in goal setting studies, the role of individual differences, and the calculation of goal difficulty levels
need to be considered more carefully in future studies. And despite researchers' success in documenting the goal setting effect the goal setting process remains poorly understood. Few studies have examined or hypothesized goal setting mechanisms (Campion & Lord, 1982; Naylor & Ilgen, 1984, Hollenbeck & Williams, 1987) and those that have have not tested Locke's model (Locke et al., 1970). This lack of attention to process illustrates a fundamental difference between content and process in motivation theories. Content theories, such as goal setting, are "concerned with trying to specify the substantive identity of the variables that influence behavior" (Campbell and Pritchard, 1976, p.65). Goal difficulty and goal specificity, for example, are two elements identified as being related to tasks in the goal setting taxonomy. Process theories attempt to outline the mechanism through which a particular choice is made. Knowing that difficult goals lead to higher performance is one thing; knowing how a difficult goal results in higher performance is quite another. The dominant process theory of motivation is VIE theory.

**VIE theory**

VIE theory (also called expectancy theory) was first formulated by Vroom (1964) to provide a general model for the interpretation of previous research in human motivation, job
satisfaction, and job choice. Expectancy theory is an individual-level cognitive theory which assumes that rational self-interested persons attempt to achieve goals valuable to them. The central problem, then, is how an individual chooses one from a number of alternatives, be they alternatives regarding job choice, effort level, or any other motivated activity. According to Vroom, the choice to engage in a task and the level of energy that will be expended in pursuit of a goal is determined by the probability that the effort will result in the goal (expectancy), the outcomes (positive and negative) that result from goal attainment (instrumentality), and the positive/negative affect attached to those outcomes (valence).

Vroom's theory is explicitly ahistorical. Motivation is a function of probabilistic events the individual perceives in the behavioral field. For this reason the three constructs of the theory—valence, instrumentality, and expectancy—pertain to anticipated consequences or outcomes. Vroom's (1964) original theory used two models, the valence and expectancy models, to predict choice and effort using the valence, instrumentality, and expectancy constructs. The valence model predicts the relative attractiveness of anticipated outcomes. The model assumes that outcomes are not desired because of any intrinsic attributes, but because
of "the anticipated satisfaction or dissatisfaction associated with other outcomes to which they are expected to lead" (Vroom, 1964, p. 15-16). Valent outcomes, then, are those that serve as means to other valent ends.

Specifically, the valence of a first level outcome (say, job performance) is the product of the instrumentality of that outcome for achieving other (second level) outcomes (such as pay or promotions) and the affect (valence) attached to those second level outcomes. Mathematically,

\[ V_f = \sum I_s V_s, \text{ where } \]

\[ V_f = \text{the valence for the first level outcome and } I_s \text{ and } V_s \]

are the instrumentalities and valences, respectively, for the second level outcomes.

The expectancy model predicts the motivational force driving a person to act. That is, given an outcome of a specific valence what is the effort one will choose to commit in order to attain that outcome? The expectancy model predicts that the level of effort (or motivational force) committed to achieve an outcome is a function of the likelihood that the effort will result in the outcome. Outcomes have greater motivational force, ceteris paribus, to the extent that they are perceived to be more likely.

Vroom borrows Lewin's (1951) concept of psychological
force to combine expectancies and valences in order to predict behavior. "Behavior on the part of a person is assumed to be the result of a field of forces each of which has direction and magnitude" (Vroom, 1961, p. 18). The expectancy model is operationalized

\[ MF_a = \sum E_f V_f, \quad \text{where} \]

\( MF_a \) is the motivational force to act, \( E_f \) is the expectancy that effort will result in first level outcomes and \( V_f \) is the valence of those first level outcomes, as defined in the valence model. Stated simply, the expectancy model says the force acting on a person to expend effort depends on how likely effort is perceived to result in an outcome(s) and the attractiveness of the anticipated outcome(s).

The assumptions that underlie VIE theory require that the items used to measure valences, expectancies, and instrumentalities have specific properties. For instance, multiplicative functions are central to expectancy theory. This provides enormous flexibility to the theory; outcomes that have no valence or outcome instrumentality are eliminated from the equation and the same absolute force is predicted for outcomes that are equally attractive or unattractive. However, the use of multiplicative models
requires that the model components be independent. Expectancies, instrumentalities, and valences, therefore, should be determined via separate items and should have zero correlation.

Related to the issue of multiplicative models is the measurement of VIE component scores. Vroom regards expectancies as probabilities. Thus the range of expectancy scores is zero to one and an expectancy can be estimated for various levels of anticipated effort expenditure. Unlike expectancies, instrumentalities and valences may have positive or negative values. That is, an outcome may result or not result from a given level of performance (have positive or negative instrumentality) and one may like or dislike that outcome (experience positive or negative valence). Thus an outcome with a given instrumentality will produce equivalent absolute first level valence whether the outcome is valued highly or loathed greatly. Similarly, when second level valence is held constant, the absolute first level valences of highly instrumental and highly non-instrumental outcomes will be equal. This case occurs when two businessmen, both of whom value profits greatly, disagree about the potential of two marketing strategies to return profits. These properties of the theory can result only when measures of instrumentalities and valences allow
negative as well as positive responses.

As noted earlier, Vroom's theory is future-oriented. The motivation to expend effort on a task, according to Vroom, depends on the expectancy, instrumentalities, and valence anticipated to occur when the task is completed, not on the current or past level of satiation. Thus, theoretically correct measures assess anticipated VIE variables and incorrect measures tap valences, instrumentalities, and expectancy at currently experienced levels.

VIE theory is also oriented toward the individual. The goal of expectancy theory is to explain individual choice decisions. Given a number of response alternatives the theory predicts that the alternative chosen will be the one with the highest (or least negative) force attached to it. Thus the theory predicts at the individual level and implies that tests of it should be conducted at the individual level.

The complexity of VIE theory assumes much cognitive effort on the part of the individual not only because of the complexity of the multiplicative operations required, but also because of the amount of information to be gathered. Simply assessing the valences and instrumentalities of outcomes and effort-outcome expectancies is time-consuming and effortful. VIE theory assumes that individuals can and will expend this effort at any given choice point. Lastly,
note that expectancy theory regards effort (or choice) as the dependent variable of interest. Vroom (1964) recognized that performance is based upon factors other than effort and formulated a separate performance model. As a result, a proper test of VIE theory predicts effort or choice. Predictions of performance will generally not be as accurate as predictions of effort or choice and are deficient tests of the theory.

VIE theory generated very little research immediately after its introduction and the theory was expanded and modified well before the valence and expectancy models and their components were properly tested. Porter and Lawler (1968) incorporated feedback loops, roles, and rewards into the theory. In doing so they made it dynamic and possibly more descriptive of the cognitive environment faced by workers on the job. Graen's (1969) modification more fully expanded the place of roles in the theory and the effects of internally and externally mediated outcomes on the work role. These modifications, however, have not generated a great amount of empirical research. Arguably, the most important extension was formulated by Galbraith and Cummings (1967), who combined the expectancy and valence models and produced the now familiar motivation equation $MF = EF \sum ISVS$. This equation more clearly distinguishes the typical first level
outcomes being predicted (effort and/or performance) from the second level outcomes used as predictors. Nearly all the expectancy research done today is conducted using the Galbraith-Cummings model.

Empirical evidence

Early tests of these models have provided moderate support for Vroom's theory. Correlations of the expectancy model ($\Sigma EV$) or the valence model ($\Sigma IV$) with supervisor or self-rated effort and performance are generally significant, but low to moderate in magnitude ($\rho = 0.20$ to $0.40$). Unfortunately, nearly all these studies are deficient methodologically and theoretically. For instance, as noted above, the valence model assumes that valence is based on anticipated affect and instrumentalities. Wanous and Lawler (1972) and Mitchell and Albright (1972), however, used measures of instrumentality emphasizing present rather than anticipated instrumentalities. Evans (1970) and Hackman and Porter (1968) combined expectancy and instrumentality measures. In doing so they violated the independence assumption of the multiplicative model and confounded the interpretation of their results. Finally, nearly all studies conducted prior to 1967, and a good number conducted thereafter, used a between-subjects analysis rather than the within-subjects analysis appropriate for an individual level theory. Given
the poor tests of Vroom's models it is impressive that they have achieved even a moderate level of support.

Subsequent to excellent literature reviews by Behling and Starke (1973), Mitchell (1974), and Campbell and Pritchard (1976), more rigorous and theoretically accurate tests of the expectancy postulates have been conducted. Between subject analyses are rarely reported despite the difficulties involved in collecting repeated measurements in motivation research. Because of these difficulties many recently published studies have been conducted using the information processing approach proposed by Zedeck (1977). The information processing approach is similar to the policy capturing approach used in decision theory. Subjects respond to repeated presentations of information varying expectancies, valences, and instrumentalities (You are likely to get a job offer from Company A which pays well but doesn't promote from within) with some judgment regarding motivated behavior (Would you take this job?). Researchers using this paradigm have studied occupational choice (Wanous, Keon, & Latack, 1983; Rynes & Lawler, 1983) and predicted effort expenditure (Harrell & Stahl, 1984). Although this approach satisfies the within-subjects design requirement and allows the specification of variance accounted for by VIE components the criterion is self-reported judgments of behavior, not
actual behavior (performance) or effort. Since this paradigm
requires large numbers of trials from each subject to gain
adequate statistical power it is unlikely that it will be
employed in studies measuring task performance.

Research since the late 1970's has also largely resolved
the controversy surrounding the properties of the scales used
to measure expectancy theory components. Schmidt (1973)
first noted that psychometrically valid transformations of
the multiplicative VIE components may result in drastic
changes in the correlation of the components with other
variables. Schmidt attributes this to the fact that
expectancy theory scales possess (at best) interval scale
properties whereas the theory demands ratio scales. Concern
with scale properties was reduced with the realization that a
within-subjects analysis would prevent part of the distortion
of transformations. The issue was finally resolved by Arnold
and Evans (1979), who showed that the variance accounted for
by non-ratio scale multiplicative components in a third
variable is invariant over transformations of the composite
when analyzed with hierarchical regression.

The validity and reliability of VIE scales have also been
examined. Several reviews (Campbell & Pritchard, 1976;
Mitchell, 1974) have noted that researchers tend to define
the VIE components idiosyncratically, which precludes an
examination of VIE component validity. Mitchell (1974) noted that experimenters have measured expectancy using probabilities, Likert scales, ranks, and paired comparisons (note that Vroom regards expectancies as probabilities). Instrumentalities and valences, which should be measured with a scale having positive and negative values, have been assessed with positive-value Likert scales, probabilities, ranks, paired comparisons, and forced distributions. Rarely have they been assessed with scales having both positive and negative values. Although often measured incorrectly, Mitchell (1974) describes the reliability of these measures as "rather good" (p. 1065). Ilgen, Nebeker, and Pritchard (1981) addressed the reliability and validity of properly defined VIE theory measures by conducting a simulation in which "employees" solicited through classified ads performed clerical tasks and completed multiple expectancy, instrumentality, and valence questionnaires. The questionnaires were designed to examine four methods of eliciting the instrumentalities and expectancies and seven methods of measuring the valence of four outcome classes (see Table 1 below). The ratings of expectancies, instrumentalities, and valences were repeated at a number of different outcome and effort levels throughout the work simulation. For instance, a probability method of assessing
expectancies had the "employees" assign numbers between 0 (no chance) and 100 (certain) to the questions "If you were to work at an average level of intensity for 60 minutes in an hour, what are your chances of" completing "11 blocks per hour?..15 blocks per hour?" (Ilgen et al., 1981, p. 202). A frequency method of estimating instrumentalities had the employees answer "Assume you completed 11 blocks per hour..for 100 different hours. How many times would you earn $2.00 per hour...2.75 per hour..." etc. (Ilgen et al., p.203).

Ilgen et al. (1981) found that the probability and frequency formats were the most reliable and valid methods of eliciting expectancies and instrumentalities. Attractiveness scales best measured valences. Interestingly, Ilgen et al. also found that expectancies measured by a single "high effort" rating to be as reliable as frequency and probablity estimates, a finding which begs further investigation in light of the suggestions by Ilgen et al. and Campbell and Pritchard (1976) that a range of effort levels should be examined.

Although many of the criticisms of VIE theory have been addressed successfully, a few problem areas remain. It was noted earlier that VIE theory demands that scales assess negative as well as positive instrumentality and valence.
Table 1. Methods of eliciting expectancies and valences and measuring the valence of four outcome classes investigated by Ilgen, Nebeker, and Pritchard (1981).

<table>
<thead>
<tr>
<th>Methods of eliciting expectancies and instrumentalities</th>
<th>Methods of measuring valence</th>
<th>Outcome classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>* frequencies verbal anchors</td>
<td>general (overall)</td>
<td>pay</td>
</tr>
<tr>
<td>* probabilities correlations</td>
<td>* attractiveness</td>
<td>co-workers</td>
</tr>
<tr>
<td></td>
<td>* behavioral anchors</td>
<td>recognition</td>
</tr>
<tr>
<td></td>
<td>paired comparison</td>
<td>from super.</td>
</tr>
<tr>
<td></td>
<td>dollar value</td>
<td>accomplish-ment</td>
</tr>
<tr>
<td></td>
<td>effort level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>performance level</td>
<td></td>
</tr>
</tbody>
</table>

Note: Asterisks denote the most valid and reliable methods of measurement.
Despite Mitchell's (1974) warning against using positively scaled measures these variables have not always been measured consistent with Vroom's theory. Positively scaled valence measures (Bieberman, Baril, & Kopelman, 1986; Wanous, Keon, & Latack, 1983; Matsui et al., 1981) and instrumentality measures (Matsui et al., 1981; Wanous et al., 1983; Kennedy, Fossum, & White, 1983) have been used in many recently published reports.

Vroom (1964) intended that the valence and expectancy models predict the effort that would be expended on a task or decision point. Although Vroom recognized that performance is based on factors beyond effort, most tests of expectancy theory have used performance as a dependent measure and are thus deficient tests of the theory. This is not necessarily a criticism of these studies since our understanding, hence measurement, of the construct of effort is greatly deficient. As Campbell and Pritchard (1976) noted, no acceptable definition of effort has been formulated and non-zero correlations of self-ratings of effort with self-reports of expectancies, instrumentalities, and valences presents obvious methodological problems. Supervisor and peer effort ratings are of no more use than self-ratings since, without adequate construct validity, it cannot be determined if one,
two, or all three measures are failing to tap "true" effort. It is of little wonder that researchers have chosen a more quantifiable variable, such as performance, as a dependent measure.

Two ways of reducing the effort-performance problem exist. The first is to employ as dependent variables tasks that have known performance characteristics. Many researchers have adopted this strategy by using tasks so simple that ability is presumed to add no variance to performance levels (Ilgen, et al., 1981; Matsui et al., 1981). As a result, any difference in performance is attributed to effort. This method can be further exploited by varying difficulty levels of the task through situational constraints, such as goals (Matsui et al., 1981) and examining the impact on performance. Little research along this line has been conducted. The second method is to examine expectancies other than effort and performance. Motivational force may be channelled to avenues other than choice and performance and performance may be the result of factors other than effort. Mitchell (1974) correctly noted that expectancy theory as currently tested is artificially constrained, but researchers have not undertaken the task of designing tests using other variables.

Summary
VIE theory is the dominant theoretical framework of research on motivated choice and effort. Measures that test the theory are valid and reliable, the theoretical components are psychometrically sound, and the theory has served as a valuable heuristic in broad areas of organizational psychology.

VIE theory, however, is somewhat limited in its application due to its inability to subsume many of the findings generated by the content theories (i.e. goal setting theory). VIE theory, then, has failed to tie together the significant body of motivational research. Thus, many of the concerns that prompted Vroom (1961) to develop his theory also prompted Naylor, Pritchard, and Ilgen (1980) to develop a general theory of behavior in organizations.

The Naylor-Pritchard-Ilgen Theory

In their theory Naylor, Pritchard, and Ilgen (1980) draw largely from human judgment and decision-making research and expectancy theory to address the impact of self and environment on behavior. Like Vroom, Naylor and his colleagues rely on Lewin (1951) when they define the unit of behavior (the act) in terms of amplitude (the amount of resources committed to an act) and direction (the particular act chosen). The amplitude of an act is composed of two variables: time and effort. The decision to allocate these
resources to acts is seen as the central task in the theory. "Behavior...[is] viewed as being a problem of resource allocation on the part of the individual in which he or she has a wide variety of options available at any moment with regard to possible acts that can be performed (have resources allocated to them) and the amount of resources, which may or should be allocated to each option or act" (Naylor et al., p. 6).

What are the characteristics of the human resource allocator? Similar to expectancy theory, the Naylor-Pritchard-Ilgen (NPI) theory "assumes that man is rational...actions are explained best in terms of conscious, thinking acts on the part of the individual" (p. 2) and that "the individual acts in such a way as to maximize the amount of positive affect (or minimize the amount of negative affect) resulting in a selection of acts in which the individual will engage" (p. 269). The theory also accommodates assumptions regarding individual differences. Individual difference (ID) variables are internal constraints which act to moderate behavior principles. For instance, although the theory posits methods by which time and effort will be allocated to acts it does not predict how much time and effort people have to allocate. Time and effort are considered a function of the individual's internal limits,
which affect the resource allocation process differentially across individuals. Variables broadly classed as abilities, aptitudes, and personalities serve a similar moderating influence. Note that Naylor et al. classify short-term motivational states, such as the temporary need state, as an ID variable since these states differ across persons and influence the general principles in ways similar to the ID variables noted above. Finally, the theory assumes that humans live in a probabilistic environment and that the prediction of uncertain future events is crucial to motivated behavior. Thus people are viewed as maximizers, not satisficers. To the individual, all actions are maximizing because they, at any given time, are directed toward the option that appears to be the most efficient use of time and effort to satisfy the current goal state.

As might be expected of a cognitive theory an individual's perception of the world is central to NPI theory. Stimuli are generated by the environment via contingent (rewards and evaluations, etc.) and non-contingent outcomes. Both types of outcomes are apprehended, filtered, and distorted by the individual to form the four classes of perceived outcomes upon which behavior is based. These classes are perceptions of self, acts, products, and extrinsic outcomes. The self, acts, and outcomes have been discussed in some detail to this
point, but not products. Although the underlying concept in NPI theory is the allocation of resources to acts, acts are rarely observed or evaluated. In fact, an act is generally evaluated or observed via the measureable result of the act known as the product. The critical role of the perception of products as a dependent variable in NPI theory distinguishes it from other motivational theories that predict levels of effort expenditure. By avoiding the difficulty of operationally defining effort, NPI theory permits tests of motivation using more common and easily observed dependent measures.

Contingencies

The relationships among the four perceived outcome classes and two sets of evaluations (those generated by the self and those perceived from significant others) form four types of perceived contingencies: act-to-product contingencies, product-to evaluation contingencies, evaluation-to-outcome contingencies, and valence of outcome functions. Examples of the contingency functions are presented in Figure 2.

Contingencies are perceived relationships among pairs of perceived environmental outcomes. These relationships may be ascertained through direct experience, conversation with or instruction from credible others, and modeling. Typically, a contingency is viewed as a probabilistic function; that is, a
certain outcome, say food, has some probability of following an act that is higher for some acts (hunting or fishing) than others (daydreaming). In order to determine a distribution of expectancies, subjective probability estimates are obtained for a number of different acts (or at different levels of effort for a specific act). In expectancy theory these expectancies are multiplied by similarly determined valences to result in a measure of motivational force. The drawback of this approach becomes evident when one considers that the number of measures becomes very large when realistic levels of expectancies and valent outcomes are considered. Naylor and colleagues have expanded expectancy theory by relating classes of expectancies to form contingency functions. In NPI theory subjective uncertainty is treated as a bivariate density function expressing the relationship between the values of two variables. The theory assumes that individuals will conceptually derive best fitting functions to such probability relationships and then base their subsequent behaviors on the shapes of these subjective functions (Naylor & Ilgen, 1984). Thus, individuals do not attend to distinct probabilities (expectancies). Further, they do not attend to the fit of a function as much as to its perceived form. Naylor, Pritchard, and Ilgen assume this to be a tactic used by the
1. The act-to-product contingency.

2. The product-to-evaluation contingency.

3. The evaluation-to-outcome contingency.

4. The valence-of-outcome function.

Figure 2. Illustrations of possible act-to-product, product-to-evaluation, evaluation-to-outcome contingencies and valence of outcome function.
individual to reduce the cognitive complexity involved in computing expectancies, valences, and contingencies.

The act-to-product contingency measures "the relationship between the amount of personal resources (i.e. time and effort) devoted or committed to the act and the level of quantity and quality of the product produced" (Naylor et al., p. 173). Though acts encompass numerous components the one most important to motivation theory is the effort put into acts.

Product-to-evaluation contingencies measure the functional relationship "between the amount of the product produced and the favorableness of the evaluation" of the act (Naylor et al., p. 176). The evaluation may be generated by the self (typically for intrinsically motivating tasks) or by some significant other (for extrinsically motivating tasks).

The evaluation-to-outcome contingency relates "the favorableness of the evaluation to the outcome" (Naylor et al., p. 177). The evaluation considered in this contingency is a "global evaluation of overall performance on a set of performance dimensions" (p.178).

Contingencies may represent any functional relationship (may be of any form). For instance, act-to-product contingencies may be linear; that is, an individual perceives that a unit of commitment to an act results in a unit of
product. A supervisor may also evaluate increased production with increased units of favorableness up to a point and add increasing amounts of unfavorable evaluation at levels of the product beyond that point. This may occur when a supervisor feels that too fast a rate of production makes an accident or the production of shoddy parts more likely. In this case the product-to-evaluation contingency will be non-linear. More specifically, the form will be an inverted-U function. Evaluations will become increasingly favorable until the point at which the supervisor feels that an accident is likely and decreasingly favorable thereafter. If the individual feels that the supervisor doesn't control outcomes that are contingent on behavior the evaluation-to-outcome contingency will be flat. This is the case with fringe benefits, which typically do not depend on the individual's productivity once he/she has joined the organization.

Numerous factors may affect an individual's ability to perceive contingency relationships. Experience with a task or environment is related to the accuracy of perceived contingencies (Slovic & Lichtenstein, 1971) and contingencies are more easily and accurately formed in simple than in complex environments (Dudycha & Naylor, 1966; Peterson, Hammond, & Summers, 1965). Individual differences may also affect the perception of contingent relationships. As an
example, it is logical to suppose that cognitive complexity may be related to the extent to which a person will be able to perceive fine distinctions or subtle differences in contingencies among different outcomes or evaluators. Likewise, many personality variables are likely to affect the perception of contingencies. Although it is safe to assume that individual differences play some role in cognitions regarding contingencies there has been very little research directed toward the documentation and examination of these possible relationships.

There are other factors which affect the perception of specific contingencies. Act-to-product contingencies may be affected by the ability level of the individual, task difficulty, and feedback regarding the quantity of product produced. Product-to-evaluation contingencies may be affected by role clarity (the extent to which the individual knows which products he/she is expected to produce) and feedback regarding (a) the amount produced, and (b) some normative evaluation of that quantity. Normative evaluations of outcomes, of course, would also affect the formation of evaluation-to-outcome contingencies. As is true of the general factors affecting contingency perceptions, little empirical evidence testing the strength of these relationships exists.
Valence functions

The final "building block" concept in the motivation portion of NPI theory is the valence of outcome function. The three contingency functions discussed above fail to consider the attractiveness of the outcomes to the individual. An individual may correctly perceive act-to-product, product-to-evaluation, and evaluation-to-outcome contingencies and still not be motivated to perform well on the job because the outcomes are not attractive. A measure of outcome attractiveness is generally called valence. In NPI theory valence specifically refers to "the affect the individual anticipates he or she will experience when a given outcome is received" (p. 43). The given outcome is one from a range, thus valence of outcome functions relate levels of anticipated affect to levels of outcome.

As with contingency slopes, valence slopes represent the strength of the level of affect-level of outcome relationship and may be of any form. Differences in the attractiveness anticipated to result from changes in outcome levels or types may be evaluated across or within outcomes. Consequently, when the number of outcomes or outcome levels to be considered is greater than one a comparison of valence function slopes provides a more parsimonious explanation of
the relative attractiveness of changes in outcomes (and the subsequent allocation of resources across acts) than the point estimates of overall effort obtained from expectancy theory.

Utility functions and motivational force

The utility and motivational force concepts of NPI theory are closely related but have subtle, but not inconsistent, differences. Utilities are levels of anticipated affect; thus, what has been developed previously as the valence of outcomes function also comprises the first utility function. Three subsequent utility functions are formed by combining a previously derived utility function with a contingency relationship. These utility functions are the utility of evaluation, utility of products, and utility of acts. The process of computing utilities from contingencies is represented in Figure 3. The utility of evaluation combines the valence of outcome function with the evaluation-to-outcome contingency to express the utility associated with receiving various levels of evaluation. "The utility of a given level of evaluation can be thought of as the total anticipated attractiveness of the outcomes that will follow from that level of evaluation" (Naylor et al., 1980, p. 1980).

Utility of products function combines the utility of
Figure 3. The calculation of utilities from contingency functions (Figure taken from Naylor & Ilgen, 1984, p. 103).

evaluation function with the product-to-evaluation contingency to express the levels of evaluation anticipated to occur from levels of the product. That is, given levels of product (such as performance on a task) may result in
different levels of evaluation (good, bad, neutral) and may come from the self or significant others, such as supervisors.

Utility of acts expresses the utility of the level of product as a function of level of commitment to the act (often operationalized as the anticipated effort expenditure) by combining the utility of products function with the act-to-product contingency.

Consistent with the use of slopes in the interpretation of contingency relationships, the slopes of utility functions represent the strength of the affect-outcome/product/act relationship. These slopes define the "energizing or drive level construct in NPI theory"-called motivational force (Naylor & Ilgen, 1984). Unlike expectancy theory, which defines motivational force as a point estimate derived from point estimates of expectancy, instrumentality, and valence, NPI theory defines motivational force as the slope of a utility function. For example, the valence of outcome function relates changes in utility to changes in outcomes. This slope may be represented mathematically as,

\[
\frac{U_p - U_a}{O_p - O_a} = \frac{\Delta U}{\Delta O} = MF_{\Delta O}, \text{ where}
\]

Where \( U_p \) = the present level of utility, \( U_a \) = the anticipated level of utility.
utility, \( O_p \) and \( O_a \) = the present and anticipated outcome levels, respectively, and \( MF_{AO} \) is the motivational force attached to the anticipated level of outcome given the present level of outcome. The slopes of the evaluation, product, and act utility functions are similarly derived and are expressed:

\[
MF_{AE} = MF_{AO} \times C_{EO} = \frac{\Delta U}{\Delta O} \times \frac{\Delta O}{\Delta E} = \frac{\Delta U}{\Delta E} \quad \text{(Equation 4)}
\]

\[
MF_{AP} = MF_{AE} \times C_{PE} = \frac{\Delta U}{\Delta E} \times \frac{\Delta E}{\Delta P} = \frac{\Delta U}{\Delta P} \quad \text{(Equation 5)}
\]

\[
MF_{AC} = MF_{AP} \times C_{AP} = \frac{\Delta U}{\Delta P} \times \frac{\Delta P}{\Delta C} = \frac{\Delta U}{\Delta C} \quad \text{(Equation 6)}
\]

where \( E \) = the level of evaluation, \( P \) = the level of product produced, \( C \) = the level of commitment to the act, and \( C_{EO} \), \( C_{PE} \), and \( C_{AP} \) are the evaluation-to-outcome, product-to-evaluation, and act-to-product contingencies, respectively.

The motivational force to commit resources to an act may be more clearly expressed

\[
MF_{AC} = \frac{\Delta U}{\Delta C} = \frac{\Delta U}{\Delta O} \times \frac{\Delta O}{\Delta E} \times \frac{\Delta E}{\Delta P} \times \frac{\Delta P}{\Delta C} \quad \text{(Equation 7)}
\]
Thus, the slope of the utility of acts function ($M_{FC}$) represents the motivational force to engage in a task measured by the ratio of anticipated change in valence upon task completion to the anticipated level of commitment (effort) necessary to complete the task.

Summary

NPI theory is a major expansion of motivational theories. It is defined more explicitly and formally than preceding theories and permits researchers to contend with the simultaneous allocation of resources (time and effort) to response options—a more realistic goal than the single choice option of VIE theory. Although NPI theory has received in-depth theoretical treatment (Naylor et al., 1980; Naylor & Ilgen, 1984) the author is aware of no published research testing the theory.

Explanations for the Goal Setting Effect

Expectancy theory and NPI theory have been proposed as theoretical explanations for the effects of goals on performance (Matsui et al., 1981; Naylor et al., 1980; Naylor & Ilgen, 1984). This section briefly examines the expectancy, NPI, and goal setting theory explanations of the effects of goals, discusses possible confounds in previous research, and proposes an experiment to test rival goal setting hypotheses from expectancy and NPI theory.
Expectancy theory

Expectancy theory has been used extensively to document the goal setting and performance functions. Goal setting may be viewed as an elaboration of the component of VIE theory relating tasks to performance, demonstrating how motivational force is translated into action. Therefore, nothing in goal theory should contradict VIE theory. Hard goals, if they result in higher performance, should do so because they have higher motivational force. It is unclear whether this change in force is due reliably to an effect of goal setting on expectancy, valence, or both. Note that VIE theory does not predict that hard goals will necessarily result in higher performance. The effect depends on the way goals influence expectancies, instrumentalities, and valences. In fact, VIE theory accommodates the prediction that difficult goals will result in lower expectancies, hence lower performance, if instrumentalities and valences remain constant.

A typical goal-expectancy study was conducted by Matsui et al. (1981) who tested the effects of goal difficulty and the expectancy theory composite force on the performance of undergraduates completing a clerical ability laboratory task. Subjects with higher goals significantly outperformed those with lower goals and force was positively and significantly associated with goal level. Additionally the "force
difference between the two goals was significantly associated with performance difference" (p. 57). An examination of differences in the force change showed that the change in valence across goals was greater than the expectancy change; attainment of hard goals was perceived as more highly valent than attainment of easy goals.

Matsui et al. (1981) conclude that expectancy theory can predict the hypotheses generated by goal theory. Similar conclusions were reached by Arvey (1972) and Motowidlo, Loehr, and Dunnette (1978). Research by Mento, Cartledge, and Locke (1980), however, failed to support the expectancy theory hypotheses in two studies. Mento et al. (1980) found support for the goal difficulty hypotheses but failed to find an effect of subjective probability of success (expectancy) or valence on performance. Expectancy and valence did relate significantly to goal acceptance. To further muddle the situation, Hollenbeck and Williams (1987) and Hollenbeck and Brief (1987) showed significant effects of perceived past performance and expectancy, but not valence, on performance. Dachler and Mobley (1973) found inconsistent support for effects of goals on changes in VIE components or of VIE components on performance.

At first glance, VIE theory appears not to have clarified the goal-performance process at all. The theory fails to
state which VIE components will be affected by goals and how and the empirical studies offer no insight into this question. A more critical look at the studies cited reveals that they suffer from incomplete measures, incorrect tests of hypotheses, and misspecification of goal difficulty. Only Matsui et al. (1981) measured the expectancy, valence, and instrumentality components of the theory and tested the multiplicative function $F=E \sum IV$. All remaining studies measured expectancy, some measured valence, and none measured instrumentality. When expectancy and valence were measured each was correlated separately with performance, but not their product term. Thus, many of the conclusions presented by those studies are based on deficient tests of VIE theory. Additionally, levels of goal difficulty are markedly inconsistent across studies. The probability of goal success ranges from 0.96 to 0.66 for easy goals and 0.79 to 0.028 for hard goals (Mento et al., 1980; Matsui et al., 1981). Other researchers (Motowidlo et al., 1978; Hollenbeck & Williams, 1987; Hollenbeck and Brief, 1987) fail to indicate objective goal difficulty. Given this lack of agreement over (and hesitance to report) so critical a concept to goal setting it is dangerous to draw inferences across studies.

In addition to these problems, VIE theory was operationalized inappropriately in many studies for testing
goal processes. With the exception of Matsui et al. (1981) these studies measured point estimates of expectancy and valence, derived a single measure of force, and correlated it with a single goal level. Because pre-post experimental designs were not used in these studies no inferences regarding the process of goal setting are possible and the analyses of VIE motivational force are conducted between subjects. Furthermore, only two goal levels were manipulated between subjects in many of these experiments, precluding an analysis of non-linear effects of force or goal difficulty.

Although Matsui et al. (1981) properly manipulated goals and force as within-subject variables they confounded level of effort and goal level, a common error first reported by Campbell and Pritchard (1976). Campbell and Pritchard noted that the goal difficulty hypothesis may or may not contradict the expectancy effect depending on whether subjects perceived the real goal as the numerical goal set by the experimenter or showing a high level of effort to the experimenter. Matsui et al. (1981) asked subjects to rate their expectancy of goal attainment by indicating "the extent to which the exertion of their highest level of effort would result in the attainment of the goals assigned" (p.56). Is the experimenter demand to show effort or reach a goal? The level of effort hypothesis would explain nicely Locke's
(1982) finding that patently impossible (but accepted) goals lead to high performance.

**NPI theory**

Naylor et al. (1980) state that motivational force "may be conceptualized as the slope of the function describing a composite contingency relationship between resources committed to the act and amounts of affect anticipated from the committing of various levels of resources to the act" (p. 189). They hypothesize a specific effect for goal setting: "goal setting creates a large increase in the utility of the level of the product represented by the goal" (p. 275). The goal not only becomes the new standard by which performance is evaluated, but increases the importance of the region of performance around the goal. Levels of performance below the goal return to the individual levels of utility that are far less than those earned by levels of performance above the goal. The effect of goals, then, is to change the product-to-evaluation contingency from an ogive or linear function to a step function. Because the kinked function described by NPI theory is likely to have a steeper slope than the pre-goal product-to-evaluation contingency the change to a step function should have the effect of increasing the slope of the utility of acts function, which represents an increase in motivational force.
Goal setting is thus presumed to have a cognitive effect on the evaluation of the products generated by performance—that is, an effect on instrumentality. This hypothesis is supported by the results of Matsui et al. (1981), who found that changes in $\Sigma IV$, but not expectancy related to performance, but differs from an hypothesis derived from a goal-commitment model developed by Hollenbeck and Klein (1987), which posits that both expectancy and valence determine goal commitment.

**Goal setting theory**

Locke's body of work provides a third viewpoint of the goal effect. The goal setting model (see Figure 1) indicates that goals, in part, provide a value referent, possibly where none existed previously. In the industrial setting the goal set by a supervisor presumably indicates the expected level of performance. The employee evaluates his/her performance in relation to that goal, which is presumed important to the individual. In this respect, Locke's and the NPI explanations of the goal effect are identical. But Locke also regards goals as having "energizing" and "directive" functions that affect the intensity of task performance and the aspects of the task to which the individual attends (Locke, 1968; Locke & Bryan, 1969; Locke et al., 1970). More recently, Locke et al. (1981) elaborated this hypothesis,
"Goals affect performance by directing attention, mobilizing effort, increasing persistence, and motivating strategy development" (p. 125). Thus, Locke hypothesizes that goals affect performance via instrumentalities and expectancies, though empirical tests of goal setting have been built around the latter mediator. Locke's tests that have involved an expectancy theory comparison (Mento et al., 1980) have manipulated or held constant $\Sigma IV$ to examine the relationship between goal, expectancies, and performance. Keeping valences and instrumentalities constant implies that the main influence of goals is on the act-to-product contingencies. With this in mind one can appreciate Locke's concern with the expectancy effect and the relative predictiveness of expectancies and goal difficulty on performance. Locke's energizing hypothesis predicts that hard goal assignment changes the way in which expectancies are assigned to performance levels. Levels of performance previously considered unlikely may become more likely when increased attention is directed toward task completion. Although Naylor, Pritchard, and Ilgen do not predict effects of goals on expectancies (act-to-product contingencies), NPI theory can accommodate this hypothesis. Given the centrality of the notions of personal resource allocation and behavioral efficiency to NPI theory it is plausible to expect a shift in
the act-to-product contingency if goals truly sharpen attention to the task at hand.

Summary

Theoretical and empirical support is found for three contrasting predictions relating goal setting, contingencies (expectancies and valences), and performance:

1. Goal difficulty levels affect expectancy (act-to-product contingency), valence (valence of outcome function), and goal commitment, which affect performance (Hollenbeck & Williams, 1987). Precisely how goals affect expectancies and valences is unclear; Hollenbeck and Klein (1987) do not state specific hypotheses, others (Dachler & Mobley, 1973; Locke, Frederick, Lee & Bobko, 1984) suggest a positive relationship between expectancy, valence, and commitment.

2. Goals change the product-to-evaluation contingency (an aspect of instrumentality) such that levels of performance below the goal are evaluated less favorably and levels above the goal are evaluated more favorably than pre-goal evaluations (Naylor et al., 1980),

3. Goals change the product-to-evaluation contingency through goal clarification and the act-to-product contingency (expectancy) by increasing behavioral efficiency, which is presumably reflected by an increase
in goal commitment and higher performance (Locke et al. 1981).

The Present Study

The present study is designed to replicate the goal difficulty effect (Hypothesis 1), test the effect of motivational force and goals on performance (Hypothesis 2), determine the effect of goals on motivation theory components (Hypothesis 3), and the effect of those components on performance (Hypothesis 4).

1. More difficult goal levels will result in higher performance than less difficult goal levels.

2. The motivational force values derived from NPI theory and expectancy theory will be positively related to changes in performance over experimental session and goal difficulty level. That is, there will be a main effect of motivational force values on performance and motivational force by goal difficulty interactions. It is not clear whether NPI or expectancy theory will account for more variance in performance over experimental session or which will be more sensitive to different goal levels.

3. The assignment of goals will cause the a change in two contingency functions over experimental session.
Specifically, product-to-evaluation contingencies will change from a linear or ogive function to a step function; that is, subjects will increase the evaluation attached to levels of performance above the goal and decrease the level of evaluation attached to performance below the goal relative to pre-goal levels of evaluation. Second, subjects will perceive that greater performance will result from a given level of effort (act-to-product contingencies will become elevated). Goals are also expected to affect other mediators of the goal difficulty effect. Goal difficulty level will be positively correlated with instrumentalities and valences and negatively correlated with expectancies, goal acceptance, and goal commitment.

4. Expectancies; instrumentalities; valences; valence of outcome functions; act-to-product, product-to-evaluation, and evaluation-to-outcome contingencies, as well as goal commitment, will correlate positively with performance.

Method

Subjects

Subjects are 121 undergraduates who volunteered to participate in return for one hour credit in their psychology department subject pool. Sixty-three subjects are female and 45 are male. Thirteen subjects failed to indicate their
gender. One subject inadvertently failed to give complete NPI contingency data and is not included in the regression analyses.

Materials

The subjects' task was to complete a series of hidden word puzzles. These puzzles are matrices of letters within which are buried target words spelled forward, backward, up, down, or diagonally. All target words were listed below the puzzle. Target words could share letters in common; the letters for any given word, however, were always contiguous. The target words for a given puzzle were semantically related to a common theme (i.e., train travel, the solar system, anniversary gifts). Samples of the puzzles are included in Appendices A and B. Subjects were to search the puzzle and circle a word when it matched one in the target list.

Design and procedure

The design is a 4 (goal difficulty level) x 2 (experimental session) factorial. The goal difficulty factor is between-subject; experimental session forms a repeated measure over two sessions. In Session 1, baseline performance was collected, after which estimates of the four NPI components (effort, evaluation, outcomes, and satisfaction) of various performance levels (baseline, 25% below, 25% above, and 50% above baseline) were rated.
Subjects were told that the first session would primarily involve acquainting them with the task. After brief instructions explaining the puzzles subjects were told that they would have three and one-half minutes to complete each puzzle and that they would be told by the experimenter when to start and stop. Subjects completed four different puzzles, scoring each immediately after completing it from an answer sheet provided by the experimenter. After finishing the fourth puzzle subjects concluded the first session by completing the estimates of the NPI components.

Goal manipulations were introduced in the second session. Goal difficulty levels were easy (performance equal to the lowest of that subject's four puzzles completed in Session 1), moderately difficult (equal to baseline average performance), difficult (15% above baseline average performance), and extremely difficult (30% above baseline average performance). These goal levels were chosen to result in probabilities of success of 0.8, 0.5, 0.2, and less than 0.2 for easy, moderately difficult, difficult, and very difficult goals, respectively. The ratings of the 4 NPI components at performance levels about the goal were collected in Session 2, as were expectancies for goal attainment, goal acceptance, goal commitment, and goal and task difficulty (see Appendix B). Goal commitment was
measured using a five point scale (1=none, 2=some, 3=moderate, 4=high, 5=very high). Goal acceptance was measured dichotomously (yes/no). Goal and task difficulty were measured on identical four point scales (1=not difficult, 2=slightly difficult, 3=difficult, 4=very difficult).

Subjects were randomly assigned to goal difficulty conditions after the first experimental session but prior to the second. The second session was conducted one to five days after the first. Subjects were given feedback regarding their performance in the first session in the form of the mean number of words found in the four puzzles completed in Session 1. They then worked on another puzzle to reacquaint themselves with the task and task strategies they may have learned in Session 1. Next, subjects were told their goal. Each goal was stated in terms of the specific number of words they were to find in the upcoming puzzle. Below the goal were the contingency and valence questions. Subjects were told, "Before you attempt to reach your goal I'd like you to answer questions very similar to the ones you answered last time. Remember that last time you answered them with respect to your performance on the four puzzles you completed last time. Now, I'd like you to answer them again with respect to your goal."
When subjects completed the valence and contingency questions they began their final puzzle. During the final few minutes of the session subjects rated goal and task difficulty and answered a goal process question ("Did you try to reach your goal? If so, what motivated you to try. If not, when did you stop trying? Why?"). Subjects were debriefed and dismissed at the conclusion of the experiment.

Subjects worked on a total of six puzzles; four in Session 1 and two in Session 2. The last puzzle in Session 2 served as the measure of performance under the goal manipulation. Puzzles were counterbalanced over sessions and each puzzle appeared roughly equally as the goal-related puzzle.

Calculation of derived measures

Numerous contingency functions and motivational force values were calculated and compared in different ways to test the hypotheses outlined earlier. Because these comparisons are complex and potentially confusing the measures derived to test them are explained here.

For all analyses, performance is defined as the number of words found in the puzzles assigned to subjects. VIE motivational force, as defined by Galbraith and Cummings (1967), will be calculated using the F=EIV formulation (subjects in this study estimated instrumentalities and valences of outcomes globally, not individually). Subjects'
responses to the Session 2 expectancy of goal attainment question (see Appendix B) and level of valence and instrumentality questions provide the inputs for this measure. Thus, if a subject estimated that he/she would reach the goal 70 times out of 100, and that reaching the goal would result in mostly positive outcomes (rating = 25) and great satisfaction (rating = 40), the VIE motivational force measure would equal $(0.7)(25)(40) = 700$.

Since expectancies are assessed only for goal attainment (Session 2), only one VIE force measure can be derived. NPI theory requires obtaining two estimates of force, the force to (1) achieve baseline performance and (2) attain the goal. The difference between these two point estimates is the motivational force to move from baseline performance to the performance level required by the goal. As can be seen in Equation 7, motivational force as defined by NPI theory can be reduced to the ratio of the difference in reported utility (operationalized here as satisfaction) to the difference in reported commitment to the act (expected level of effort, see Appendices A and B). If a subject reports that satisfaction is zero for baseline performance but 30 for attaining the goal, and that the level of effort expended to reach these performance levels would rise from 40 to 80, NPI motivational force for that subject is $(30 - 0)/(80 - 40) - 30/40 = 0.75$. 
The extent to which NPI and VIE motivational force valences are related to changes in performance over experimental session is examined with the analyses reported under Hypothesis 2.

The nature of the change in contingency functions, raised in Hypothesis 3, is examined by comparing the contingency functions derived from the range of responses given to the four NPI component questions in each experimental session. The inputs for the direct comparison of the act-to-product and product-to-evaluation contingency functions are taken directly from the ratings of effort and evaluation for performance at baseline, 25% below, 25% above, and 50% above baseline performance in Session 1 and at similar intervals about the goal level in Session 2. The act-to-product contingency, for instance, is calculated by examining the perceived change in the product level (the number of words found in the puzzle) that would result from perceived changes in effort expenditure. The subject represented in Figure 4 responded that 3, 6, 7.5, and 9 words would be found at 45, 80, 90, and 100 effort levels, respectively, in Session 1. After a goal level was introduced, the subject responded that 4, 7, 9, and 11 words would be found at 30, 75, 80, and 95 effort levels, respectively. Functions are similarly derived for product-to-evaluation contingencies by plotting the
change in level of evaluation over changes in product, as displayed in Figure 4.

The effect of goals on VIE components (expectancy, instrumentality, and valence) and NPI component slopes (the act-to-product, product-to-evaluation, evaluation-to-outcome, and valence of outcome functions) is tested in Hypothesis 3. Expectancies, instrumentalities, and valences are taken from the subjects' assessments of the effort, outcome, and satisfaction levels, respectively, that are anticipated to occur with goal attainment in Session 2 (see Appendix B). NPI slopes are, as defined in Figure 3, simply ratios of changes in effort,
evaluation, outcomes, and satisfaction over different levels of performance. They are operationalized in this study as follows:

Act-to-product contingency:

Session 2 performance - Session 1 performance
Session 2 effort level - Session 1 effort level

Product-to-evaluation contingency:

Session 2 evaluation - Session 1 evaluation
Session 2 performance - Session 1 performance

Evaluation-to-outcome contingency:

Session 2 outcome level - Session 1 outcome level
Session 2 evaluation - Session 1 evaluation

Valence of outcome function:

Session 2 satisfaction - Session 1 satisfaction
Session 2 outcome level - Session 2 outcome level

Note that all Session 1 assessments are made relative to the baseline level of performance and all Session 2 assessments are relative to the goal.

Data analyses

All hypotheses regarding the effect of NPI and expectancy theory and goal difficulty on performance are tested with repeated measure regressions. Changes in the form of the act-to-product and product-to-evaluation contingency slopes over experimental session will be classified by the author and tabulated.
All tests of Hypothesis 3 will control for the effect of ability to more accurately examine the effect of goal difficulty levels on the mediators and components of motivational force. These hypotheses will be tested by regressing those mediators on baseline performance and goal difficulty and referring to relevant correlational analyses. The effects of the mediators and components on performance will be tested with multivariate regressions of Session 1 and Session 2 raw performance on the variables.

Results

Task characteristics and manipulation checks

Task difficulty. Subjects perceived the word puzzle task as moderately difficult ($\bar{M} = 2.3$, $SD = 0.77$). The baseline mean number of words found in each puzzle and its standard deviation are presented in Table 2. Multiple correlated $t$-tests controlling for experimentwise error were computed to determine objective puzzle difficulty. Baseline performance on two puzzles (Groups and Anniversary Gifts) was significantly higher than performance on the remaining puzzles ($t(107) = 13.01$ and $6.17$, $p's < .05$, respectively), indicating that puzzles are not equally difficult. This difference, though statistically significant, is not extremely large (see Table 2) and the six puzzles are roughly equally distributed over both experimental sessions and the
Table 2. Baseline means and standard deviations of number of words found in puzzles.

<table>
<thead>
<tr>
<th>Puzzle</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>6.95</td>
<td>2.16 a</td>
</tr>
<tr>
<td>Trains</td>
<td>8.17</td>
<td>2.15 a</td>
</tr>
<tr>
<td>Anniversary Gifts</td>
<td>10.60</td>
<td>1.56 b</td>
</tr>
<tr>
<td>Groups</td>
<td>9.07</td>
<td>2.43 b</td>
</tr>
<tr>
<td>Traits</td>
<td>6.89</td>
<td>2.58 a</td>
</tr>
<tr>
<td>Astronomy</td>
<td>6.83</td>
<td>2.52 a</td>
</tr>
</tbody>
</table>

Note: Means with dissimilar superscripts are significantly different.
four goal conditions. Differential puzzle difficulty, therefore, is not expected to be a threat to the internal validity of the experiment.

**Goal difficulty.** Objective and subjective goal difficulties were compared to assess real versus perceived differences among goal difficulty levels. Objective goal difficulty for each goal level is the ratio of the number of subjects who attained the goal to those assigned the goal. Subjective goal difficulty was assessed via the ratings made by subjects in Session 2. The means of objective and subjective goal difficulty and the means and standard deviations of the specific numerical goal assigned to subjects, by goal difficulty level, are presented in Table 3.

Both objective and subjective goal difficulty differed significantly as a function of goal level [objective goal difficulty $F(3,117) = 6.8, p < .01$; subjective goal difficulty $F(3,115) = 9.72, p < .01$]. In terms of objective goal difficulty, nearly ninety percent of subjects given easy goals attained their goal whereas only thirty-eight percent of subjects given very hard goals were successful. These success rates are higher than the intended success rates of 0.8 and < 0.2, respectively. Hard goals were attained at a slightly higher rate than moderately hard goals (.65 v. .51), though this difference is not statistically significant.
Easy goals are thus objectively easier than the moderately hard and very hard goal levels and are perceived so by the subjects. There were no statistically significant differences in objective or subjective difficulty for the moderately hard, hard, and very hard goal levels. The objective difficulty of hard goals (.65) is far higher than had been anticipated even though the level of performance required to meet this goal is greater than the performance required to achieve easy and moderately hard goals. A possible explanation for this result is that the moderately hard and hard goals assigned to subjects are not sufficiently dissimilar. As seen in the last column of Table 3, the difference between moderately hard and hard goals is less than either standard deviation associated with the means of these goal levels. It may be that these two goal levels are simply too similar to expect performance differences based on the numerical goals assigned.

Hard goals were achieved at a far higher rate (.38) than had been expected (0.2) whereas the objective difficulty of the moderately difficult goals matched the intended difficulty (0.5). Post hoc Tukey HSD tests revealed significant differences between the objective goal difficulty of easy and very hard goals and easy and moderately hard
Table 3. Means of objective goal difficulty and subjective goal difficulty and mean and (standard deviation) of the numerical goal assigned to subjects by goal condition.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Objective Difficulty</th>
<th>Subjective Difficulty</th>
<th>Numerical Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>.89 a</td>
<td>1.58 a</td>
<td>5.76 (2.08)</td>
</tr>
<tr>
<td>Moderate</td>
<td>.51 b</td>
<td>2.48 b</td>
<td>8.39 (1.75)</td>
</tr>
<tr>
<td>Hard</td>
<td>.65 ab</td>
<td>2.28 b</td>
<td>9.28 (2.29)</td>
</tr>
<tr>
<td>Very Hard</td>
<td>.38 b</td>
<td>2.74 b</td>
<td>10.41 (2.03)</td>
</tr>
</tbody>
</table>

Note: Objective and subjective goal difficulty means with dissimilar superscripts are significantly different at p < .05 using Tukey's HSD for post-hoc analyses.
goals. Post hoc Tukey HSD tests also revealed significant differences in subjective goal difficulty among conditions. Easy goals were rated significantly easier than the harder goal levels, which did not differ significantly among themselves (see Table 3).

**Intercorrelations of experimental variables.** The intercorrelations of experimental variables are displayed in Table 4. Although VIE theory components should be independent, valence is positively related to instrumentality ($r = .54, \ p < .01$). Expectancy is not correlated highly with either valence or instrumentality. VIE force is correlated significantly with valence ($r = .78, \ p < .01$) and instrumentality ($r = .74, \ p < .01$). NPI components are not highly related except for the slopes of the valence of outcome function and the product-to-evaluation contingency ($r = .52, \ p < .01$), violating the assumption of the independence of multiplicatively combined components.

Commitment to attaining the goal is correlated positively with valence and instrumentality ($r$'s = .36 and .42, respectively, $p$'s < .01), the numerical goal assigned ($r = .20, \ p < .01$), and VIE motivational force ($r = .41, \ p < .01$). Commitment is negatively related to the slope of the product-to-evaluation contingency ($r = -.22, \ p < .05$). Subjects in general reported fairly high goal commitment ($M = 3.88, \ SD = \ldots$)
The theory values of outcome function and GPR is the goal attainment ratio.

Evaluation-outcome contingencies, respectively. YO function is the NPI

Note: CPE, CAP, and CEO are the product-sequential, act-to-product, and

<table>
<thead>
<tr>
<th>14 Goal commitment</th>
<th>13 NPI force</th>
<th>12 VIE force</th>
<th>11 YO function</th>
<th>10 CEO for goal</th>
<th>9 CAP for goal</th>
<th>8 CPE for goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.05</td>
<td>0.03</td>
<td>0.06</td>
<td>0.05</td>
<td>0.02</td>
<td>0.02</td>
<td>0.05</td>
</tr>
<tr>
<td>1.44</td>
<td>0.16</td>
<td>0.03</td>
<td>0.10</td>
<td>0.02</td>
<td>0.02</td>
<td>0.05</td>
</tr>
<tr>
<td>0.03</td>
<td>0.22</td>
<td>0.13</td>
<td>0.17</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>0.06</td>
<td>0.13</td>
<td>0.13</td>
<td>0.17</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>0.05</td>
<td>0.13</td>
<td>0.13</td>
<td>0.17</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>0.02</td>
<td>0.13</td>
<td>0.13</td>
<td>0.17</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>0.05</td>
<td>0.13</td>
<td>0.13</td>
<td>0.17</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Factor 7

10 9 8 7 12 11 10 9 8 7

* p > .05; ** p > .01
and only three subjects failed to accept their goals.

Tests of research questions

**Hypothesis 1.** There is a significant assigned goal difficulty x experimental session interaction \[\chi^2(3,104) = 2.89, p < .05\], see Table 5]. Post hoc tests reveal significant improvements over session for subjects with easy and hard goals (Tukey's HSD, \(p < .05\)). Mean performance by goal session and goal difficulty, however (see Table 6), does not show the typical goal difficulty effect. Subjects with easy goals had greater improvements in performance over session (mean improvement = 1.63 words) than subjects with hard and very hard goals (mean improvements = 1.54 and .44 words, respectively). Moderately difficult goals are associated with a decrease in performance (mean decrement = .2 words).

**Hypothesis 2.** As shown in Table 5, NPI motivational force is significantly related to performance \[\chi^2(1,104) = 11.86, p < .01\], as is the NPI force x goal difficulty interaction \[\chi^2(3,104) = 4.56, p < .01\]. NPI force is also significantly related to both Session 2 performance and the specific numerical goal assigned to subjects (\(r's = .23\) and \(.24, p's < .01\), respectively, see Table 4). Mean NPI force values by goal difficulty are listed in Table 6.
Table 5. Regression of raw performance on the experimental variables.

<table>
<thead>
<tr>
<th>Factor</th>
<th>df</th>
<th>SS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal condition</td>
<td>3</td>
<td>20.95</td>
<td>.88</td>
</tr>
<tr>
<td>VIE motivation</td>
<td>1</td>
<td>5.97</td>
<td>.73</td>
</tr>
<tr>
<td>NPI motivation</td>
<td>1</td>
<td>94.29</td>
<td>11.86**</td>
</tr>
<tr>
<td>VIE x Goal</td>
<td>3</td>
<td>29.08</td>
<td>1.22</td>
</tr>
<tr>
<td>NPI x Goal</td>
<td>3</td>
<td>108.29</td>
<td>4.56**</td>
</tr>
<tr>
<td>VIE x NPI</td>
<td>1</td>
<td>.46</td>
<td>.01</td>
</tr>
<tr>
<td>VIE x NPI x Goal</td>
<td>3</td>
<td>1.88</td>
<td>.08</td>
</tr>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>104</td>
<td>826.57</td>
<td></td>
</tr>
<tr>
<td>Session</td>
<td>1</td>
<td>6.85</td>
<td>1.3</td>
</tr>
<tr>
<td>Session x Goal</td>
<td>3</td>
<td>45.27</td>
<td>2.89*</td>
</tr>
<tr>
<td>Session x VIE</td>
<td>1</td>
<td>11.83</td>
<td>2.27</td>
</tr>
<tr>
<td>Session x NPI</td>
<td>1</td>
<td>4.96</td>
<td>.95</td>
</tr>
<tr>
<td>Session x VIE x Goal</td>
<td>1</td>
<td>4.83</td>
<td>.31</td>
</tr>
<tr>
<td>Session x NPI x Goal</td>
<td>3</td>
<td>29.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Session x VIE x NPI</td>
<td>1</td>
<td>1.34</td>
<td>.26</td>
</tr>
<tr>
<td>Session x NPI x VIE x Goal</td>
<td>3</td>
<td>3.75</td>
<td>.24</td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>104</td>
<td>543.4</td>
<td></td>
</tr>
</tbody>
</table>

Model $R^2 = .27$

* $p < .05$, ** $p < .01$
Table 6. Means (standard deviations) of performance as a function of experimental session and NPI motivational forces as a function of goal difficulty level.

<table>
<thead>
<tr>
<th>Goal level</th>
<th>Session 1</th>
<th>Session 2</th>
<th>NPI force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>7.85 (1.74)</td>
<td>9.48 (3.4)*&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.36 &lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Moderate</td>
<td>8.29 (1.77)</td>
<td>8.09 (2.9) &lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.34 &lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hard</td>
<td>8.02 (2.01)</td>
<td>9.56 (2.3)*&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.57 &lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>V.Hard</td>
<td>7.97 (1.49)</td>
<td>8.41 (2.9) &lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.61 &lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: Performance means with asterisks significantly differ as a function of experimental session. Column means with dissimilar superscripts differ significantly. All post hoc tests are Tukey HSD tested at $p < .05$. 
Surprisingly, the average value of motivational force as defined by NPI theory (the slope of the goal-related utility of acts function) varies inversely with positive changes in performance over session. Although this is not the pattern of results expected, it is striking that when the motivational force to achieve the goal is positive, as it is for easy, hard, and very hard goals, performance increases over session. The only goal level associated with a decrease in performance (moderately hard goals) is also associated with a negative NPI slope (motivation to decrease performance).

VIE motivational force does not significantly predict performance, nor does it interact with any other experimental variable to predict performance. Interestingly, the NPI and VIE motivational force scores are not highly correlated ($r = .05$, ns, see Table 4), indicating that NPI force is not simply accounting for the variance common to both motivational force values.

**Hypothesis 3.** The product-to-evaluation and act-to-product contingencies were graphed for individual subjects as a function of experimental session. Examples of these graphs are contained in Figure 5. Changes in product-to-evaluation contingencies over session were classified into one of the eight categories listed in Table
7, which also contains the classification of act-to-product contingencies by goal condition.

The "NPI kinked function" category contains those subjects whose second session contingency functions display the step function predicted by Naylor et al. (1980). Elevated and deflated functions are those second session contingencies which are wholly above or below the first session contingencies, respectively. The converge high and converge low categories contain functions that are affected by ceiling effects (converge high) or floor effects (converge low).

Contingency changes which could not be interpreted without ambiguity are placed in the "other function" category. Functions which could not be interpreted because of intransitivities were tabulated separately. The ninth classification—i.e., intransitive functions—is redundant with other categories and was included simply as a measure of the extent to which subjects' responses were intransitive.

Changes in the product-to-evaluation contingencies are not the changes predicted by NPI theory. The second session contingencies of only five subjects display a step function. The large majority of subjects given easy goals report elevated contingency functions, indicating that they valued a given product (the number of words found) more highly after a goal was set than before. There appears to be no consistent
Table 7. Classification of product-to-evaluation and act-to-product product contingencies by goal condition.

<table>
<thead>
<tr>
<th>Function Class</th>
<th>Easy</th>
<th>Moderate</th>
<th>Hard</th>
<th>V.Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPI kinked function</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Elevated function</td>
<td>21</td>
<td>8</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Deflated function</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>No change</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Converge high</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Converge low</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Other function</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Intransitive not</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interpretable</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Intransitive</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function Class</th>
<th>Easy</th>
<th>Moderate</th>
<th>Hard</th>
<th>V.Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPI kinked function</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Elevated function</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Deflated function</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>No change</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Converge high</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Converge low</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Other function</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Intransitive not</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interpretable</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Intransitive</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 5a. Product-to-evaluation contingency classed as kinked.

Figure 5b. Product-to-evaluation contingency classed as kinked other.
Figure 5c. Act-to-product contingency classed as elevated.

Figure 5d. Act-to-product contingency classed as deflated.
**Figure 5e.** Product-to-evaluation contingencies classed as no change.

**Figure 5f.** Act-to-product contingencies classed as intransitive and not interpretable.
**Figure 5g.** Product-to-evaluation contingencies classed as converge high.

**Figure 5h.** Product-to-evaluation contingencies classed as converge low.
pattern to the changes in contingencies for subjects in the remaining goal conditions.

Most subjects with very hard goals had elevated act-to-product contingency functions, indicating they felt the same amount of effort would result in higher performance in Session 2. Subjects with hard goals were as likely to have elevated act-to-product contingencies as no change in contingencies at all whereas one-third of the subjects with easy goals reported deflated functions. Subjects with deflated functions believe that a given effort level will result in lower performance in Session 2.

The assignment of goals significantly predicts valence \( [F(3,115) = 4.36, p < .01] \), the NPI valence of outcome function \( [F(3,116) = 2.85, p < .05] \), and expectancy ratings \( [F(3,116) = 6.01, p < .01] \). Assigned goal difficulty level is highly correlated with expectancy and valence (see Table 4) and instrumentality \( (r = .21, p < .05) \). Mean values of VIE and NPI components are displayed in Table 8. The valence associated with easy goals is significantly lower than that associated with harder goal levels. Very hard goal valences are significantly higher than moderately hard goal valences, neither of which are significantly different than the valence associated with hard goals. Expectancy ratings decreased significantly over easy, moderately hard, and hard goal
<table>
<thead>
<tr>
<th>Goal</th>
<th>Expectancy</th>
<th>Valence</th>
<th>Instrumentality</th>
<th>VOR</th>
<th>CFP</th>
<th>CEO</th>
<th>Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Hard</td>
<td>68 b</td>
<td>11.96 d</td>
<td>7.53</td>
<td>0.05</td>
<td>38.3</td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>Hard</td>
<td>67 c</td>
<td>11.56 e</td>
<td>0.08</td>
<td>0.06</td>
<td>3.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>75 d</td>
<td>17.56 c</td>
<td>0.00</td>
<td>0.33</td>
<td>3.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>83 a</td>
<td>16.68 a</td>
<td>-0.10</td>
<td>0.52</td>
<td>3.79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Means with differing letters differ statistically at p > .05, Tukey's HSD

Table 8. Means of expectancy, valence, instrumentality, commitment, valence of evaluation to-outcome, outcome to-evaluation, and product-to-evaluation. And the product to-product, and outcome functions and the product to-evaluation, acco-to-product, and outcome.
levels. These results provide evidence independent of the direct ratings of goal difficulty that the goal manipulations were somewhat successful. Mean valence of outcome slope is negative for easy goals and positive, though decreasing in magnitude, for moderately hard, hard, and very hard goals (see Table 8). The NPI contingency function slopes and goal commitment are not significantly affected by goal difficulty level. The lack of variance in goal acceptance precludes an examination of that variable.

It is interesting to compare the expectancy values listed in Table 8 with the objective goal difficulty values listed in Table 3. If the expectancy values are divided by 100 they are directly comparable to objective goal difficulty and provide an additional measure of subjective goal difficulty. Subjects accurately perceived their probability of attaining an easy goal but grossly overestimated their chances of meeting harder goals. Unlike the subjective difficulty ratings, the expectancy ratings for moderately hard goals differ significantly from the expectancies assigned to hard and very hard goals. Subjects were therefore able, in some capacity, to distinguish between easy, moderately hard, and harder goal levels.

**Hypothesis 4.** Multivariate tests of Session 1 and Session 2 performance regressed on goal commitment and the NPI and
VIE components reveal that changes in valence predict the increase in performance across session \( F(2,111) = 5.8, p < .01 \). No other variable predicts performance change over session.

**Analysis of open-ended responses**

Responses to the open-ended questions "Did you try to reach your goal? If yes, what motivated you to try? If no, when did you stop trying?" and "Why?" were classified by the experimenter into the fourteen categories listed in Table 9. Some subjects gave more than one reason for their performance, thus the total number of responses (154) is greater than the number of subjects. The frequency of responses, by category and goal level, is included in Table 10. Prototypical responses of each category are listed in Table 9 to highlight differences among categories. The "Goal is motivating" category is distinguished from "Goal set standard" on the basis of whether the goal was specifically mentioned as the motivating reason behind performance or whether performance was due to other factors related to the goal. For instance, comments such as, "I may as well have tried" seem to lack a motivational component and are classed in the "Goal set standard" category.

"Pride/Self satisfaction/Prove to self" contains responses that refer to motivating factors other than the goal, namely,
those factors that pertain to the personal satisfaction of
doing well on the task. This category is distinguished from
"Better baseline performance" by the fact that the latter
contains a specific reason other than the goal that is not
necessarily related to self satisfaction. The other
categories are described aptly by the prototypical responses
in Table 9.

Twenty-three percent of all responses fell into the "Goal
is motivating" category. Responses indicating pride in doing
well or proving performance capability to oneself comprise
the category with the second highest percentage of responses
(18%). The next four most populous categories contain a
relatively equal number of responses ("Goal set standard",
"Avoid failure", "Better baseline performance", and
"Experimenter demand"). The remaining categories have
comparatively few responses.

The distribution of responses does not appear to differ as
a function of goal difficulty level. Category functions were
thus collapsed across goal levels and the relationship of
category response (primary motivating factor) to goal
attainment was explored. Goal attainment is here defined as
the extent to which subjects met or exceeded the specific
numerical goals assigned to them. The ratio of raw
performance in Session 2 to the numerical goal assigned
<table>
<thead>
<tr>
<th>Category</th>
<th>Prototypical response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal is motivating</td>
<td>&quot;The actual setting of the goal [motivated me].&quot;</td>
</tr>
<tr>
<td>Goal set standard</td>
<td>&quot;...lack of anything better to do.&quot;</td>
</tr>
<tr>
<td>Avoid failure</td>
<td>&quot;...the strongest motivational factor was fear of failing to reach the goal.&quot;</td>
</tr>
<tr>
<td>Pride, Prove to self</td>
<td>&quot;...the idea of accomplishing what I set out to do.&quot;</td>
</tr>
<tr>
<td>Curiosity</td>
<td>&quot;I was curious as to how well I could do.&quot;</td>
</tr>
<tr>
<td>Better baseline performance</td>
<td>&quot;I got tired of getting only seven words...and wanted to do well on the last puzzle.&quot;</td>
</tr>
<tr>
<td>Liked task</td>
<td>&quot;I think word puzzles are great. You’ve motivated me to run out and buy a word puzzle book.&quot;</td>
</tr>
<tr>
<td>Experimenter demand</td>
<td>&quot;I thought we were supposed to [reach our goals].&quot;</td>
</tr>
<tr>
<td>Table 9 continued</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>Not uncooperative</td>
<td></td>
</tr>
<tr>
<td>/bad subject</td>
<td></td>
</tr>
<tr>
<td>Competition with others</td>
<td></td>
</tr>
<tr>
<td>Task easy</td>
<td></td>
</tr>
<tr>
<td>Need for achievement</td>
<td></td>
</tr>
<tr>
<td>Just didn't try</td>
<td></td>
</tr>
<tr>
<td>Too much luck involved</td>
<td></td>
</tr>
</tbody>
</table>

"I can understand how frustrating uncooperative subjects can be."

"I felt like I was competing against the other participants and wanted to find more words than they.

"Because the task was easy"

"inner drive"

"Just didn't"

"There seems to be an element of luck that dissuades me from committing to a goal."
Table 10. Frequency of responses to open-ended motivational questions by response category and goal level.

<table>
<thead>
<tr>
<th>Category</th>
<th>Easy</th>
<th>Moderate</th>
<th>Hard</th>
<th>V.Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal is motivating (36)</td>
<td>9</td>
<td>6</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Goal set standard (19)</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Avoid failure (15)</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Pride, Prove to self (28)</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Curiosity (8)</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Better baseline performance (17)</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Liked task (2)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Experimenter demand (16)</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Not bad subject (2)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Competition with others (2)</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Task easy (1)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Need for achievement (5)</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Just didn't try (2)</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Too much luck involved (1)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: Parentheses contain row totals.
comprises the goal attainment ratio (GAR). A GAR equal to one indicates that a subject exactly met his/her goal. Values of GAR less than one indicate that goals were not attained and values above one indicate the extent to which subjects exceeded their goals. Table 11 displays goal attainment frequencies (a dichotomous classification of whether subjects attained their goal or not) and the mean and standard deviation of the goal attainment ratio. As may be perceived by scanning down the goal attainment columns in Table 11, subjects across categories are more likely to have achieved their goals than not. Mean goal attainment ratios tend to be close to 1, indicating that most subjects performed at or near their goal levels in Session 2. Subjects who reported responding to experimenter demand exceeded their goals by the greatest amount (GAR M = 1.68, SD = 1.43). The large standard deviation is due to one subject who performed poorly in the baseline session and well on the goal task for a goal attainment ratio of 7. With this outlier excluded the goal attainment ratio is still highest for those subjects responding to experimenter demand. Curiously, those subjects who reported a need for achievement as their primary motivator are least likely to have attained their goal. Four of 5 subjects in this category failed to attain their goal and the mean goal attainment ratio is the
Table 11. Frequency of goal attainment and mean and standard deviation of goal attainment ratio by response category and goal level.

<table>
<thead>
<tr>
<th>Category</th>
<th>Goal Attainment</th>
<th>GAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attain</td>
<td>Not Attain</td>
</tr>
<tr>
<td>Goal is motivating</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Goal set standard</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Avoid failure</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Pride, Prove to self</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Curiosity</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Better baseline performance</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Liked task</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Experimenter demand</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Not uncooperative/bad subject</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Competition with others</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Task easy</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Need for achievement</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Just didn't try</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Too much luck involved</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: GAR = goal attainment ratio. Values in parentheses exclude outlier.
Table 12. Regression of raw performance on the experimental factors with the hard goal level eliminated.

<table>
<thead>
<tr>
<th>Factor</th>
<th>df</th>
<th>SS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal condition</td>
<td>2</td>
<td>9.46</td>
<td>.62</td>
</tr>
<tr>
<td>VIE motivation</td>
<td>1</td>
<td>.39</td>
<td>.05</td>
</tr>
<tr>
<td>NPI motivation</td>
<td>1</td>
<td>49.1</td>
<td>6.43*</td>
</tr>
<tr>
<td>VIE x Goal</td>
<td>2</td>
<td>15.89</td>
<td>1.04</td>
</tr>
<tr>
<td>NPI x Goal</td>
<td>2</td>
<td>95.7</td>
<td>6.26**</td>
</tr>
<tr>
<td>VIE x NPI</td>
<td>1</td>
<td>.77</td>
<td>.10</td>
</tr>
<tr>
<td>VIE x NPI x Goal</td>
<td>2</td>
<td>1.39</td>
<td>.09</td>
</tr>
<tr>
<td>Error</td>
<td>76</td>
<td>580.83</td>
<td></td>
</tr>
<tr>
<td>Session</td>
<td>1</td>
<td>7.33</td>
<td>1.3</td>
</tr>
<tr>
<td>Session x Goal</td>
<td>2</td>
<td>30.01</td>
<td>2.65 p = .07</td>
</tr>
<tr>
<td>Session x VIE</td>
<td>1</td>
<td>9.99</td>
<td>1.77</td>
</tr>
<tr>
<td>Session x NPI</td>
<td>1</td>
<td>5.79</td>
<td>1.02</td>
</tr>
<tr>
<td>Session x VIE x Goal</td>
<td>1</td>
<td>4.64</td>
<td>.41</td>
</tr>
<tr>
<td>Session x NPI x Goal</td>
<td>2</td>
<td>26.28</td>
<td>2.32</td>
</tr>
<tr>
<td>Session x VIE x NPI</td>
<td>1</td>
<td>.55</td>
<td>.10</td>
</tr>
<tr>
<td>Session x NPI x VIE x Goal</td>
<td>3</td>
<td>3.39</td>
<td>.30</td>
</tr>
<tr>
<td>Error</td>
<td>76</td>
<td>429.93</td>
<td></td>
</tr>
</tbody>
</table>

Model $R^2 = .26$

* $p < .05$, ** $p < .01$
lowest of all categories ($M = .82$).

**Dropping the hard goal condition**

Since the hard goal condition did not truly impose hard goals on subjects (as evidenced by the .65 probability of goal attainment) a set of regression analyses were run with this goal level eliminated. The result of the regression of performance on the experimental variables is presented in Table 12. The pattern of results for both dependent variables does not change markedly. The effect of NPI motivational force and the NPI by goal interaction on performance remain significant. The session by goal level interaction approaches significance (see Table 12).

**Discussion**

**Goal setting theory**

The goal effect hypothesized by Locke—specific difficult goals that are accepted result in higher performance than easy goals—is not supported in this study. Although subjects in the hard goal condition achieved the highest Session 2 performance, subjects given easy goals increased their performance on the puzzles over experimental session slightly more than subjects given hard goals. Very hard goals failed to motivate high increases in performance and subjects given moderately hard goals exhibited a mean decrease in performance over sessions. These results are
similar to those of Motowidlo et al. (1978), who also found curvilinear effects of assigned goal difficulty on performance and Locke (1982), who found that goals at the upper (more difficult) end of a goal difficulty distribution did not produce greater increases in performance than goals assigned from the lower (easier) tail of the distribution. It is not clear, from goal setting theory, why subjects with moderately hard goals should have experienced a performance decrement. The probability of attaining a moderately hard goal (0.51) is not unduly low and is greater than the probability of attaining a very hard goal (a condition which resulted in a mean increase in performance).

Motowidlo et al. (1978) suggest that critical thresholds of objective goal difficulty exist below which goals are accepted and above which they are rejected. They further suggest that these thresholds occur between objective probabilities of goal attainment of 0.5 and 0.2 and note "that observed performance when objective probability is 0.2 is irrelevant to goal setting theory because goals are not 'accepted' when goals are so difficult (p. 178). The vast majority of subjects in the Motowidlo et al. study indicated acceptance of the assigned goals. Note that these authors therefore hypothesize that goals are not truly "accepted" despite subjects' claims to the contrary. The prospect of
having to decide after the fact which subjects accepted or
rejected goals is probably not an effective method of
examining the relationship of objective and subjective
probabilities of success to performance.

**NPI and VIE theories**

It is more likely that an explanation for this odd finding
lies with factors not measured in most studies, such as the
motivational force values defined by Naylor et al. (1980,
1984). Since VIE and NPI theories do not predict increases
in performance if motivational force values are negative the
failure to find a goal difficulty effect should not preclude
analyses involving the motivational variables. Although
performance decreases as assigned goal levels increase from
easy, to hard, to very hard goals (see Table 6), motivational
force to achieve the goal (a positive NPI force value) is
always associated with an increase in performance and the one
instance of motivation to decrease performance (the negative
NPI force value associated with moderately hard goals) is
associated with a performance decrement. The accurate
prediction of the direction of change in performance as a
function of NPI motivational force values provides some
support for NPI theory. Much stronger support could have
been claimed had the magnitude of mean NPI force values
correlated positively with changes in performance.
Nevertheless, the association between the accurate prediction of the direction of change in performance across experimental session indicates that NPI theory is likely to contribute to the understanding of the goal effect.

The inverse relationship between positive force and performance is troubling and may be the result of subject unfamiliarity with the NPI theory contingency elicitation format or some form of rating bias. For instance, one subject commented that the estimation of the NPI components over different levels of effort and performance reminded him of a concept in physics known as "propagation of error". The subject felt that small errors committed early in the estimation process were not diluted by future estimates, but instead compounded the errors associated with future estimates. Increased experience with the rating scales may eliminate this source of error in estimates. Subjects may also have responded to experimenter demand with a positive response bias; that is, a tendency to report higher valence or instrumentality values for higher performance levels simply because the subjects thought that they should respond so or because it is logical to expect such relationships. This point will be examined more fully in the discussion of the responses to the open ended questions.

Although the NPI motivational force composite accurately
predicts performance increases and decrements, the components of NPI motivational force do not respond to goal setting as predicted by Naylor et al. (1980, 1984). Whereas goal difficulty levels relate significantly to the slopes of the valence of outcome functions, the pattern of mean valence slopes for moderately hard, hard, and very hard goals is opposite that which might be anticipated. Further, the product-to-evaluation contingency functions of very few subjects became kinked in response to a goal manipulation, as predicted by NPI theory. Product-to-evaluation and act-to-product contingencies tended to change linearly. However, the direction of this linear change, and the particular contingency affected, differed as a function of goal difficulty. Subjects with easy goals tended to have elevated product-to-evaluation contingencies and deflated act-to-product contingencies whereas subjects given hard goals reported elevated act-to-product contingencies. Thus, subjects given easy goals tended to value all levels of performance on the puzzle in Session 2 more highly and rate them more difficult to achieve than performance in Session 1. Subjects with hard goals had a tendency to report that given levels of effort would result in more product after the goal was assigned than before. This pattern of contingency changes may explain why subjects with easy goals achieved the
highest gain in performance, but does not resolve the
difficulties associated with the inverse relationship between
positive force values and performance. It is also difficult
to speculate why subjects with moderately hard goals
reported, on average, act-to-product contingencies with zero
slopes and negative values of NPI motivational force.
Furthermore, NPI theory cannot suggest an explanation for the
pattern of contingency function changes examined in
Hypothesis 3.

Locke's belief that goals serve "energizing" and
"directive" functions may provide an explanation for this
aspect of the results. If goals provide a "value referent",
as hypothesized by Locke (see Figure 1), and individuals
attend primarily to the forms of contingency functions rather
than to their fit, as hypothesized by Naylor et al., then it
may be reasonable to expect that individuals will adjust
contingencies up or down to (a) establish equilibrium at the
new value referent, and (b) avoid the mental effort of
calculating a new contingency function form. In fact, Naylor
et al. (1980) speculate that the formation of contingency
functions is so complex that, once formed, they "become fixed
'template' strategies that are rarely updated or evaluated"
(p.19). This hypothesis is supported by the lack of a
significant effect of goal difficulty on changes in the
values of the contingency slopes (see Table 8). Hypotheses about which circumstances may be more likely to prompt an evaluation of contingency functions are developed later in the discussion.

The lack of a significant effect of objective goal difficulty on contingency slopes does not mean that changes in the elevation of the contingency functions over session did not occur since correlational results are insensitive to profile elevations. For this reason, changes in the form of the contingency slopes (see Table 7) were tabulated as a separate analysis. Campbell and Pritchard (1976) have advanced a "level of effort" hypothesis which may explain part of the pattern of contingency elevation changes. They argue that goal setting manipulations often confuse the attainment of a specific goal with showing to the experimenter a high level of effort. The responses to the open-ended questions provide some support for this position. Less than 25% of of all responses indicated that the goal was motivating to subjects. A surprising number of subjects (10%) responded that experimenter demand was the primary factor behind their attempt to reach their goal. Thus, pleasing external authorities by showing high levels of effort may only incidentally produce high performance. A more stringent test of this hypothesis would examine the
changes in the contingency functions and open-ended responses when patently impossible goals are assigned. Locke (1982) has shown that performance is related to goal difficulty level even when goals are ridiculously high. Should Locke's finding prove replicable, we should find that impossibly high goal levels are associated with high levels of commitment and goal acceptance and point to external sources of motivation. Since goal acceptance/commitment typically varies little in response to goal manipulations additional research should involve the manipulation of both commitment and goals (as in Erez & Zidon, 1984) to determine more accurately the role of commitment in the goal setting process.

The hypothesis that goals affect only expectancies and act-to-product contingencies, drawn from research by Mento et al., (1980, Study 1) is not supported in this study. Both act-to-product and product-to-evaluation contingencies were changed by goal manipulations and expectancies and valences are significantly correlated with goal difficulty and numerical goal level. Instrumentalities also relate positively to goal difficulty. Subjects saw the attainment of harder goals as being more valent and less likely than the attainment of easier goals. Meeting more difficult goals was also seen as more instrumental for gaining valent outcomes. These results corroborate those of Mento et al. (1980, Study
2), who found that valence correlated significantly with assigned probability of success, Mento et al. (Study 1), who found subjective probability of success to vary inversely with subjective goal difficulty, and Matsui et al. (1981), who found valences to vary positively and expectancies negatively with increased goal difficulty. The negative correlation of goal difficulty with expectancy obtained in this study, however, differs from the positive correlation between assigned probability of success and subjective probability of success found by Mento et al. (Study 2).

Perhaps previous attempts to hold instrumentalities and valences constant have overstated the expectancy/goal difficulty controversy. The goal setting model fails to specify how discrepancies between actual and desired states will be resolved except to say that the resolution is a cognitive activity. That valences and instrumentalities will hold constant when goal levels (hence expectancies) change is postulated neither by VIE theory nor goal setting theory. Attempts by goal setting proponents to hold valences and instrumentalities constant in order to compare changes in expectancies, goal difficulty levels, and performance have artificially constrained VIE theory. Future studies should permit all components of the VIE and NPI theories to vary.

The VIE composite motivational force failed to predict
performance and the individual VIE components are not related to performance in the goal session. This differs from the results of Matsui et al. (1981) who found VIE force significantly related to performance. One reason for the failure of VIE composite force to account for performance may be the high correlation between valence and instrumentality ($r = .54$, $p < .01$). It is not appropriate to combine components multiplicatively when they are not independent due to the excessive weight a multiplicative formula gives to the redundant variables. The VIE composite used in this study was thus improperly weighted and may have contaminated the results. It should also be noted that subjects in this study did not list and rate outcomes, instrumentalities, and valences separately, but gave one instrumentality and one valence rating for the global outcomes they thought they might receive by attaining their goal. Though this is not the preferred method of collecting VIE measures (Matsui et al., 1981), the technique was taken directly from the rating of instrumentality used in NPI theory. Part of the reason for using this method was that the collection of NPI data already constituted a burden on subjects. Perhaps the collection of VIE and NPI components in one sitting was too ambitious. Though the relationship between VIE and NPI components deserves further study, it may be feasible in the
future to study the two on a smaller scale than the one attempted here.

Motivational processes in goal setting

The use of open-ended questions in this study to elicit explanations for attempting to attain a goal is a step toward including more varied process measures in goal setting research. Responses to the open-ended questions do not appear to vary as a function of goal difficulty (see Table 11). This illustrates a potentially interesting dichotomy between those perceptions that are goal dependent (the contingency functions and VIE components) and the goal independent reasons for attempting goal attainment and may indicate some issues to be considered when examining the effect of individual differences on performance in a goal context. Can the individual difference variables affect the contingency perceptions? If so, does the effect vary by goal difficulty or task complexity? Are there personality characteristics that are reliably associated with the stated reason for pursuing a goal? The correlation of measured individual differences with goal difficulty levels and performance has not resulted in a coherent set of findings (Locke, et al., 1981). Incorporating individual difference variables with process measurement techniques, such as protocol analysis (Ericsson & Simon, 1984), promises to be a
powerful method of resolving the inconclusiveness surrounding the role of individual differences in goal setting theory.

Alternative dependent measures

Much goal setting research involves the regression of a raw performance score(s) on a categorically coded goal difficulty level and other independent variables of interest. Few studies have investigated the effect of goals on various aspects of performance such as quality versus quantity (Bavelas & Lee, 1978) or signal detection measures of bias and sensitivity (Lewis, 1988). An alternative dependent measure is the goal attainment ratio—the extent to which a subject met his/her specific numerical goal. This ratio may serve as an adjunct for assessing the effect of goals on performance since it explicitly accounts for the specific numerical goal assigned to subjects, unlike traditional methods of analysis which account only for performance increases due to goal difficulty levels. In this study, the goal attainment ratio permitted an examination of the extent to which subjects with different self-reported reasons for pursuing their goal (the categories listed in Table 10) achieved proportions of the goal. Subjects who reported that they wanted to avoid failure, respond to experimenter demand, achieve a standard, or meet the goal for pride or self-satisfaction tended to attain their goals to a greater
extent than subjects giving other reasons for their performance. Subjects responding to experimenter demand were most successful in exceeding their goals, even with one outlier removed. These subjects were not clustered in the easy goal condition, but were evenly distributed across goal difficulty levels. Although showing the experimenter a high level of effort does not appear to be a factor influenced by goals, it does appear to affect performance, providing evidence for the "level of effort" hypothesis of Campbell and Pritchard (1976).

**Directions for future research**

As stated previously, an insufficient number of dependent measures have been employed in the study of goal setting and future research should examine aspects of performance other than quantity. A related suggestion is the use of more varied tasks when studying goal setting. In the past, goal setting research has attempted to separate the effects of ability on performance from the effects of goals. For this reason researchers have chosen tasks which have a low ability component—word puzzles, anagrams, clerical ability tasks, etc. Because all subjects are assumed to have the ability to complete the tasks, differences in performance are presumed to be a function of motivation. Researchers using these tasks may have unwittingly compiled an impressive amount of evidence concerning the motivation to
perform dull tasks. The author is not aware of any challenging laboratory goal setting tasks such as those involving choice behavior or strategy development. Although a field study (Latham & Baldes, 1975) has examined the effect of goals in industry, it is not clear that the job studied was challenging or interesting to the workers. Further, field studies have tended to examine the effect of goals on performance for only a short period of time. Future research should address the effect of goals on the perception of job characteristics over time (Oldham, 1975). The "energizing" function of goals may serve to make routine tasks interesting; the competition between work teams sparked by goal setting observed by Latham and Baldes (1975) may also be a result of the "energizing" effect. Whether this effect exists and is maintained over time if it exists is unclear. Research on this topic, however, need not be limited to simple tasks. Repeated measure designs and advanced statistical techniques exist that permit the use of more demanding tasks and allow the analysis of multiple dependent measures. Task characteristics have been sorely neglected in goal setting and require a great deal more attention if the questions surrounding ability, task difficulty, and task complexity are to be resolved.

The "level of effort" hypothesis of Campbell and Pritchard (1976) has been referenced throughout this thesis. Ten percent
of the subjects in this study reported that experimenter demand was one of their primary reasons for attempting to reach their goal. That the performance of so many subjects was influenced by attempts to please an external authority and not by any apparent motivating aspect of the goal itself deserves further study. Perhaps the use of a relatively simple (and some would argue boring) task in this study eliminated in these subjects the intrinsic motivation necessary to change value referents or evaluation levels. Naylor et al. (1980) argue that intrinsic motivation depends on the evaluation given to the self based on performance. "When the person's own products are perceived, the person applies these to the self-role (the product-to-evaluation contingencies for self) to arrive at a self-evaluation...[a]s a result of this self-evaluation, the person gives himself or herself outcomes" (p. 184). If the task is perceived as trivial, or if the subject feels that high performance is only for the benefit of the experimenter, the subject may not be as likely to report a change in the product-to-evaluation contingency as when the task is intrinsically motivating. Thus, the "level of effort" hypothesis may result from a task that combines extrinsic motivation that is devoid of tangible reward and a lack of intrinsic motivation. This possibility may be investigated by eliciting the NPI motivation components with more complex and intrinsically motivating tasks.
The methods used to elicit NPI contingency and valence functions must also be examined. The feasibility of using intensive data collection techniques, such as those required by NPI theory, should be compared to methods that require less mental effort or fewer judgments on the part of the subject. Motivational force as defined by NPI theory, for instance, reduces mathematically from the multiplicative combination of the three contingency functions and one valence function to the simpler ratio $\Delta U/\Delta C$, where $\Delta U$ is the change in anticipated valence over performance levels and $\Delta C$ is the change in commitment (effort) to be directed toward the task. It may not be necessary for subjects to rate all contingency and valence functions at each choice point (a total of 32 ratings in this study). Adequate and reliable responses may be obtained if subjects are asked to rate only anticipated valence and commitment at each point, a tactic that would require only four responses in this experiment. Indeed, evidence from Ilgen et al. (1981) indicates that ratings of maximal effort are as reliable as the ratings of probability estimates made for multiple performance levels. To the extent that decision processes can be reduced during contingency and valence function elicitation subjects may express more confidence in their ratings (reduce the "propagation of error" feeling experienced by one subject) and reduce rating distortions.
As a final suggestion, the effects of goal setting on broader decision processes should be examined. Laboratory goal setting research has examined only the effect of goals on the performance of a task chosen by the experimenter. Although this is consistent with the concept of goal setting as an elaboration of the performance component of VIE and NPI theories, goals may affect the decision/choice process as well as the performance process. For instance, when choosing one from among a set of potential behaviors, do individuals apply the expectancy, instrumentality, and valence judgments to the performance component as well as the choice component? If so, to what extent does knowing that a difficult goal is attached to one task and not another affect the choice of a task and is the effect changed by repeated choice experiences? If two tasks are to be completed concurrently, how do goals affect performance? As noted earlier, little is known about the long-term consequences of goals on the performance of a task. Nearly nothing is known about the effect of goals on the allocation of resources among multiple tasks or the decision to engage in a given task in the future. Longitudinal and dual task paradigms may be helpful in exploring these issues more fully.

Conclusions

NPI theory promises to be a useful tool for exploring the processes underlying goal setting. Though the goal difficulty
hypothesis is not supported in this study, and NPI theory is supported weakly, NPI force correctly predicted the change in performance over experimental session and by goal difficulty condition. Stronger support would have been provided had the magnitude of NPI motivational force been more highly associated with the magnitude of performance change. Nevertheless, this finding should encourage researchers to replicate this experiment using a task known to be responsive to the goal effect.

Goal setting research, however, should not be limited to the use of simple tasks and pre-post experimental designs. Dual tasks, complex tasks, protocol analyses, and longitudinal designs should be employed to investigate the effect of goals on choice behavior, complex performance, and long-term motivation. These techniques may also provide further insights into the process of goal attainment and provide a framework for the study of additional variables. Individual differences, for example, may not have correlated highly with goal-induced performance in the past because of our inability to choose relevant individual difference variables on the basis of a known goal process. As a comprehensive theory of behavior, NPI theory provides a sound basis for the development of such a goal process model.
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industrial and organizational psychology. In M.D. Dunnette (ed.) Handbook of industrial and organizational psychology. Chicago: Rand McNally.


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Factors Society.


goals, the higher the performance." *Journal of Applied Psychology, 66*, 54-58.


analysis of a motivational technology. In Cummings, L.L. and Staw, B. (eds.) Research in Organizational Behavior, 6, 95-140.


test. Organizational Behavior and Human Performance, 32, 66-86.

Appendix 1

The following ten pages contain one of three configurations of instruments used in the first session to collect baseline performance scores on the puzzle tasks and NPI and VIE theory component assessments. The other two configurations differ only in the order of the puzzles.

The four puzzles are contained on pages 121-124. The assessments begin on page 125. The first rating is for effort levels (referred to as commitment in NPI theory) expended to achieve baseline performance and estimates of effort required at various performance levels. Following on consecutive pages are the questions used to assess evaluation, outcomes, and satisfaction (valence).

The first rating on each of pages 125-128 (i.e. "I would evaluate my current level of performance as") is used, in part, to calculate the NPI contingency and motivational force slopes. All four ratings contribute to the four points graphed to compare changes in contingency functions over experimental session (see Figure 4 and Appendix B).
Name: ____________________

The first session of the experiment involves completing several word puzzles. Afterward you'll answer a number of questions about the puzzles.

Word puzzles are matrices of letters that contain words within them. You've seen them in newspapers, etc. The words may be hidden reading left to right, right to left, or diagonally, but words are never hidden within other words (i.e. you cannot circle the word 'son' in 'sonnett' and count them as two words). The words you are to find will always be listed at the bottom of the page. The experimenter will tell you when it is time to stop each puzzle.

I would like to start everyone at once so please don't turn the page until you are told to do so.
THE FOLLOWING FORTY WORDS ALL RELATE TO AUSTRALIA. PLEASE FIND AS MANY AS YOU CAN.

| A | U | A | E | T | A | L | P | C | O | D | U | T | Y | D | U | S | P |
| C | O | R | A | L | S | E | A | G | O | R | N | S | R | E | M | A | E |
| K | A | M | E | U | A | R | A | L | S | N | E | A | O | A | R | A | E |
| S | H | E | E | P | A | K | Y | P | A | N | T | O | L | B | I | L |
| T | E | L | T | T | A | C | E | E | I | O | V | I | N | S | T | O | C |
| O | L | B | S | O | O | R | A | G | N | A | K | A | N | N | I | S | H |
| P | R | O | U | S | T | H | I | O | E | D | I | A | L | E | D | A | T |
| S | O | U | P | H | E | R | A | L | A | O | Y | E | N | N | E | N | O | R |
| U | D | R | Y | N | O | R | U | D | R | S | R | S | P | U | S | T | E |
| T | A | N | T | B | O | O | M | E | R | A | N | G | W | Q | U | A | V |
| P | R | E | A | S | P | T | T | E | E | N | C | A | E | E | A | B | I |
| Y | E | E | L | L | R | A | T | E | B | R | L | A | N | T | I | E | R |
| L | A | H | P | E | R | T | H | E | N | L | Y | A | B | S | N | W | Y |
| A | C | T | S | E | A | E | B | R | A | N | B | E | E | V | A | R | A |
| C | U | E | E | U | S | I | T | B | C | S | I | B | E | T | M | A | R |
| U | D | F | Q | U | B | U | Y | N | I | O | I | S | T | K | S | S | R |
| E | S | S | E | H | C | N | A | R | I | R | A | L | E | R | A | B | U |
| P | A | R | R | O | T | S | B | A | T | H | E | L | A | S | T | L | M |

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<td>TENNIS</td>
<td>TRIBES</td>
<td>WALLABY</td>
<td>WATTLE</td>
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THE FOLLOWING WORDS RELATE TO TRAINS AND TRAVEL. PLEASE FIND AS MANY AS YOU CAN.

<table>
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<tr>
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<th>BERTH</th>
<th>BOARD</th>
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<td>RACKS</td>
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<td>WAITER</td>
<td>WHISTLE</td>
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NUMBER CORRECT: ____
THE FOLLOWING PUZZLE CONTAINS ITEMS GIVEN AS ANNIVERSARY PRESENTS.
PLEASE FIND AS MANY AS YOU CAN.

THBROQUEEPFEMUFREP
TRISTTIGLASSIRBMCE
SNIREHTAELEWSURAWAH
GERFNATCLEAIOTHNLR
NWINEIEFATOSHIOKN
IFLINALROCSTHVICK
RUUEUISEFRHRRCOOWEC
RRMELSCESSSTMOORREN
AWEILTAHAEETHOYPYEY
EROERRDERRPPCRRKFKODRS
MACAHECBRPARIWYARUT
SELSAEHTOLDOAJMINA
PODNSCTUIGIARMRMOL
WNYDEYTLSRRAVAELIONS
OPYLEANOEPRNNTNIE
ORIRUBYNCTHEBCARDG
DAYINORDEKSILVERSS
EVERFLOWERSALSDLOG

APPLIANCE   BRACELET   BRONZE    BROOCH    CANDY
CHINA       CLOCK      COOKWARE  CORAL     CRYSTAL
DIAMONDS    EARRINGS   EMERALD   FLOWERS   FRUIT
FUR         GLASS      GOLD      IVORY     JADE
LACE        LEATHER    LINEN     NECKLACE  PEARLS
PERFUME     PLATINUM   PORCELAIN POTTERY   RING
RUBY        SAPPHIRE   SILVER    WATCH     WINE
WOOD

NUMBER CORRECT: _____
THE FOLLOWING PUZZLE CONTAINS WORDS THAT DESCRIBE DIFFERENT KINDS OF GROUPS. PLEASE FIND AS MANY AS YOU CAN.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>OH</th>
<th>WEY</th>
<th>TINUM</th>
<th>MOC</th>
<th>ORE</th>
<th>EUG</th>
<th>AELTH</th>
<th>ASM</th>
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<td>CIR</td>
<td>CLEGB</td>
<td>WO</td>
<td>ML</td>
<td>NEMHOF</td>
<td>WMUC</td>
<td>SOH</td>
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<td>ARE</td>
<td>BIR</td>
<td>TTHA</td>
<td>QRS</td>
<td>AT</td>
<td>TDN</td>
<td>SS</td>
<td>ROGG</td>
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<td>THA</td>
<td>EW</td>
<td>WODA</td>
<td>ITROOP</td>
<td>E</td>
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<td>AOD</td>
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<td>KEHWAC</td>
<td>RETIN</td>
<td>NUEN</td>
<td>SUCUACGYTA</td>
<td>AILAILCD</td>
<td>DOBTHS</td>
<td>YOPER</td>
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<td>EHCI</td>
<td>OIETLHLIA</td>
<td>LSDIOGIISFNORIBSFV</td>
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<td>SH</td>
<td>E</td>
<td>FRITTLL</td>
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<td>TROOP</td>
<td>UNION</td>
<td>UNIT</td>
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NUMBER CORRECT: _____
I am interested in looking at how people view their performance and would like you to rate the word puzzles you just completed and your performance on them. The word puzzle is related to a number of different aspects of verbal and logic abilities. The fact that the puzzle involves finding words involves some verbal skills and that fact that they are hidden within other letters tests your ability to follow leads and develop strategies to find the proper word.

The most important thing tested by the puzzle, however, is EFFORT. The words hidden in the puzzles will always be listed at the bottom of the page. So no one has an advantage over anyone else. The task merely involves applying effort to uncover the words.
You will be rating a number of aspects of your performance over a number of different levels of performance and characteristics of the task. You now have completed four puzzles and have a good idea of how difficult they are.

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<tbody>
<tr>
<td>minimal</td>
<td>some</td>
<td>moderate</td>
<td>much</td>
<td>maximal</td>
</tr>
<tr>
<td>effort</td>
<td>effort</td>
<td>effort</td>
<td>effort</td>
<td>effort</td>
</tr>
</tbody>
</table>

The first thing I'd like you to do is think of the effort you put into the puzzles and rate the amount of effort you feel it took to complete the puzzles. Use the above scale to make any rating between 0 and 100 that describes your effort. The numbers and descriptions on the scale (and all subsequent scales) are there simply to help anchor everyone's responses.

The amount of effort I put into completing the puzzles: ______

Next, I would like you to guess how much effort it would require to achieve three different levels of performance—25% below your current level, 25% above your current level, and 50% above your current level. I know this is speculation but please make the best guess you can.

The effort required to perform 25% below current level is: ______

The effort required to perform 25% above current level is: ______

The effort required to perform 50% above current level is: ______
I'd like you to think next about how you would evaluate your performance on the puzzles. The scale below gives you an idea of the kind of evaluation I'd like you to make.

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<tbody>
<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>very poor</td>
<td>below average</td>
<td>average</td>
<td>above</td>
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<tr>
<td></td>
<td></td>
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</table>

First, I'd like you to think about how you'd evaluate your current level of performance and effort—that is, evaluate how you actually did on the task. Remember, you can use any number between 0 and 100 to make your ratings. Choose the number that is closest to your performance level.

I would evaluate my current level of performance as: ____

Now, I'd like you to think again and consider how you'd evaluate your performance if it was different than your current level. Think about the evaluation you would give to performance that is 25% below your current level, 25% above your current level, and 50% above your current level. Use the same scale above to assign a number between 0 and 100 to each evaluation.

I would evaluate performance 25% below my current level: ____

I would evaluate performance 25% above my current level: ____

I would evaluate performance 50% above my current level: ____
Please think now about some of the things you get out of doing these puzzles. You may enjoy doing word puzzles or you may want to find out how well you can do. You may find out that your verbal skills or your ability to find words in the puzzle is better than you thought. Maybe you need the extra credit you get for being here or hate that you have to fulfill experiment credit hours. Notice that some of these things you get may be positive and some negative.

With all this in mind, think about the kinds and amounts of things you may get out of completing the puzzle at your current level of performance (remember that some may be positive and some negative). Use the scale below to choose any number between -50 and +50 that best describes the kinds of things you get.

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<tbody>
<tr>
<td>-50</td>
<td>-25</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>all negative</td>
<td>mostly negative</td>
<td>equal</td>
<td>mostly positive</td>
</tr>
<tr>
<td>mostly positive</td>
<td>pos. + neg.</td>
<td>all positive</td>
<td></td>
</tr>
</tbody>
</table>

The things I may get from my current level of performance: ____

Once again, consider the other levels of performance and think of the number and kinds of things you would get if you performed below your current level, above your current level, and well above your current level.

The things I may get from performing 25% below current level: ____

The things I may get from performing 25% above current level: ____

The things I may get from performing 50% above current level: ____
The last thing I'd like you to think about is how satisfied you feel about your performance. For instance, you may feel satisfied about doing well or feel poorly about not doing as well as you had hoped. Think about how you feel about your current level of performance and use any point between -50 and +50 that describes your level of satisfaction.

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<tr>
<td>-50</td>
<td>-25</td>
<td>0</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>extremely dissatisfied</td>
<td>satisfied</td>
<td>extremely satisfied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dissatisfied</td>
<td>neutral</td>
<td>satisfied</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

My current level of performance make me feel: _____

Please think about how satisfied you'd feel about performing below, above, and well above your current level.

Performing 25% below my current level would make me feel: _____

Performing 25% above my current level would make me feel: _____

Performing 50% above my current level would make me feel: _____
Appendix 2

The following eight pages contain the instruments used to collect VIE and NPI components and performance scores in session 2. This appendix is the companion configuration to Appendix A.

The first page contains the feedback given to subjects and general instructions. The second page contains one practice puzzle completed by subjects before the assignment of goals. The following page alerts subjects to their goal and provides spaces for the ratings of effort required to achieve the goal and performance levels surrounding the goal. Pages 133-136 of this appendix are identical to the corresponding pages in Appendix A with three exceptions:

a) A goal is listed at the top of the page assessing effort.
b) Subjects rated their expectancy of success along with effort with their answer to the question "If you tried 100 times to reach this goal, how many times would you succeed?"
c) Ratings are made with respect to the assigned goal rather than baseline performance.

NPI contingency functions and slopes are derived from these ratings as explained in Appendix A. VIE components are assessed with the expectancy of success rating (expectancy), and the ratings of outcomes (instrumentalities), and satisfaction (valence) gained from meeting the goal.
The average number of words you found in the puzzles you completed last time is ____

This session involves solving puzzles similar to the puzzles you solved last time. The first thing I'd like you to do is to complete another puzzle for practice. You'll have three and one-half minutes to complete it, as you had for the others.
THE WORDS IN THE FOLLOWING PUZZLE ARE PERSONALITY TRAITS AND ARE LISTED AT THE BOTTOM OF THE PAGE.

D E R E C N I S I V E R D H C A L E
E L F A I T H F U L L I V E O I N T E
F E V I T A R E P O O C R N T A C L
F O D A T E D D O R I C A E E G O B
L I E D U C A T E D I N P S G A M A
I N C O M P E T I T I V E T R A P E
T T I D E R U S S A E A R G E I E G
N E S A L S H A R P E R P A N O T D
E L I C L U I N C T E A M D E I E E
I L V E R S F O D L A T U I S T N L
C I L R U E N E I E R S N T N T W
I G S H L F A A C A T A K E R E C O
F E T T I A B T M R E A L I I E D N
F N O D A L Y S I P U A C A L T L K
E T E D E S I O P V T O B I A L A A
I N A V O N U S L A E L S I D L E P
T E L B I S N O P S E R A E V E N D
A B L S U O I T I B M A T E R E D Y

ABLE  ALERT  AMBITIOUS  ASSURED  COMPETENT
COMPETITIVE  CONFIDENT  COOPERATIVE  CREATIVE  DECISIVE
DEDICATED  DETERMINED  EDUCATED  EFFICIENT  ENERGETIC
ENTHUSIASTIC  FAITHFUL  HONEST  INDUSTRIOUS  INGENIOUS
INTELLIGENT  KNOWLEDGEABLE  LOYAL  PATIENT
POISED  PREPARED  RELIABLE  RESOURCEFUL  RESPONSIBLE
SHARP  SINCERE  SKILLED  SMART  TALENTED
Your goal for this puzzle is: _____

You will be rating a number of aspects of your performance over a number of different levels of performance and characteristics of the task. You now have completed four puzzles and have a good idea of how difficult they are.

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<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>minimal</td>
<td>some</td>
<td>moderate</td>
<td>much</td>
<td>maximal</td>
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<tr>
<td>effort</td>
<td>effort</td>
<td>effort</td>
<td>effort</td>
<td>effort</td>
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</tbody>
</table>

The first thing I'd like you to do is think of the effort you would need to reach your goal. Use the above scale to make any rating between 0 and 100 that describes that amount of effort. The numbers and descriptions on the scale (and all subsequent scales) are there simply to help anchor everyone's responses.

The amount of effort it would take to reach my goal: _____

If you tried 100 times to reach this goal, how many times would you succeed? _____

Next, I would like you to guess how much effort it would require to achieve three different levels of performance--25% below your goal, 25% above your goal, and 50% above your goal. I know this is speculation but please make the best guess you can.

The effort required to find 25% fewer words than my goal: _____

The effort required to find 25% more words than my goal: _____

The effort required to find 50% more words than my goal: _____
I'd like you to think next about how you would evaluate your performance if you were to meet the goal. The scale below gives you an idea of the kind of evaluation I'd like you to make.

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<tbody>
<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>poor</td>
<td>below</td>
<td>average</td>
<td>above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>excellent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>average</td>
</tr>
</tbody>
</table>

First, think about how you'd evaluate your performance if you met the goal. Remember, you can use any number between 0 and 100 to make your ratings.

I would evaluate meeting my goal as _____ performance.

Now, I'd like you to think again and consider how you'd evaluate your performance if it was different than your goal. Think about the evaluation you would give to performance that is 25% below your goal, 25% above your goal, and 50% above your goal. Use the same scale above to assign a number between 0 and 100 to each evaluation.

I would evaluate finding 25% fewer words than my goal as: _____

I would evaluate finding 25% more words than my goal as: _____

I would evaluate finding 50% more words than my goal as: _____
Please think now about some of the things you get out of doing these puzzles. You may enjoy doing word puzzles or you may want to find out how well you can do. You may find out that your verbal skills or your ability to find words in the puzzle is better than you thought. Maybe you need the extra credit you get for being here or hate that you have to fulfill experiment credit hours. Notice that some of these things you get may be positive and some negative.

With all this in mind, think about the kinds and amounts of things you may get out of meeting your goal (remember that some may be positive and some negative). When you think of all these things try to determine whether they're all positive, all negative, or some mix of positive and negative. Use the scale below to attach a number between -50 and +50 to this.

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</thead>
<tbody>
<tr>
<td>all</td>
<td>mostly</td>
<td>equal</td>
<td>mostly</td>
</tr>
<tr>
<td>negative</td>
<td>negative</td>
<td>pos. + neg.</td>
<td>positive</td>
</tr>
</tbody>
</table>

The things I may get from meeting my goal: ____

Once again, consider the other levels of performance and think of the number and kinds of things you would get if you performed below your goal, above your goal, and well above your goal.

The things I may get from finding 25% fewer words than my goal: ___

The things I may get from finding 25% more words than my goal: ___

The things I may get from finding 50% more words than my goal: ___
The last thing I'd like you to think about is how satisfied you feel about your performance. For instance, you may feel satisfied if you meet your goal and dissatisfied if you don't. Think about how you feel about your goal and use any point between -50 and +50 that describes how you'd feel if you were to meet it.

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<tbody>
<tr>
<td>-50</td>
<td>-25</td>
<td>0</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>extremely dissatisfied</td>
<td>satisfied</td>
<td>extremely satisfied</td>
<td></td>
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</table>

dissatisfied   neutral   satisfied

Meeting my goal would make me feel: _____

Please think about how satisfied you'd feel about performing below, above, and well above your goal.

Finding 25% **fewer** words than my goal would make me feel: _____

Finding 25% **more** words than my goal would make me feel: _____

Finding 50% **more** words than my goal would make me feel: _____

Please circle your level of commitment to meeting the goal on the scale below.

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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>none</td>
<td>some</td>
<td>moderate</td>
<td>high</td>
<td>v. high</td>
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</table>