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I am submitting herewith a dissertation written by Carl W. Ericsson entitled "Application of Expectancy Theory of Motivation to the Energy Conservation Activities of Private Citizens." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

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APPLICATION OF EXPECTANCY THEORY OF MOTIVATION TO THE ENERGY CONSERVATION ACTIVITIES OF PRIVATE CITIZENS

A Dissertation

Presented for the

Doctor of Philosophy

The University of Tennessee, Knoxville

Carl W. Ericsson

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ABSTRACT

The purpose of this study was to investigate the motivation of private citizens to perform energy conservation activities through the use of the expectancy theory of motivation. A series of interviews were performed in the homes of community residents obtained by both a randomized metropolitan census sample and a non-randomly selected church-affiliated sample. The total number of respondents was 190. A pilot study was made to collect outcomes from energy conservation activities that were relevant to home owners.

The structured interview guide allowed the collection of expectancy theory attitude items, performance measures and other dependent variables. The results showed that motivation alone could not account for performance differences, but when combined with both an effort measure and the respondent's perception of their control over their activities, performance was significantly predicted. Analysis of interviews done before and during a severe winter indicated that people tended to take energy conservation much more seriously when the weather was bad and energy costs were higher.

It was posited that the general public needs to be informed that certain outcomes or rewards which may be of value to them can be achieved if they are willing to perform conservation activities. Further research is needed to identify the type of outcome desirable to the public and the public's perception of their ability to contribute to solving the national energy dilemma. Future efforts to investigate motivation to conserve or concentrate on energy usage should not use

the whole expectancy model but rather specific components of the theory which appear to be most promising. Possible areas of interest are the measures of actual performance, effort, and the outcome desires of the home owner.

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CHAPTER I

INTRODUCTION

The purpose of the present study was to review the development of and empirical research on expectancy theory[1] of work motivation and to apply it to the motivation of private citizens in the community to reduce their energy consumption. Historically, expectancy theory has evolved from the drive theories of psychology, and has undergone extensive evolution and empirical verification. It has been widely used to analyze motivation to work in organizations and in the prediction of effort, performance, satisfaction and other related factors. Because of its extensive development, expectancy theory was chosen to evaluate the motivations of people in selecting and performing activities that reduce energy consumption and to predict further energy conserving actions.

Review of Energy Crisis Issues

Prior to the Arab oil embargo, our values reflected the national belief that increased success in life meant increased consumption of energy (Udall, Conconi and Osterhout, 1974). Energy was so plentiful it could be used lavishly. However, in only a few years, energy was transformed from a cheap to very valuable natural resource due to restricted supply (Freeman, 1974). Because of the nation's previous beliefs and values concerning energy, home builders were least concerned

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[1]The theory has been called instrumentality theory, expectancy theory, and valence-instrumentality-expectancy theory, or VIE for short. Even with present research there is no unanimous use of a single title. In the present study, to avoid confusion, the title expectancy theory will be used throughout.

with conservation. Their construction practices took advantage of cheap energy. Today, however, due to the energy crisis, our efforts must be directed toward finding the most feasible methods of facilitating change toward more conservation-oriented life styles and values. One possible strategy for facilitating change is to direct attention to the consumers of energy. An understanding of their motivations, attitudes, and actions toward conservation of energy consuming products may guide the development of educational programs to involve consumer conservation.

The rationale behind a consumer-oriented perspective has been stated by Berg (1974): "If the potential for energy conservation through efficient utilization at the point of consumption is recognized and developed, programs of conservation can be instituted with far less stringent effect on industry and society than if conservation were to be attempted through curtailment (of energy) alone (p. 467)."

However, before we can develop effective, specific techniques to change people's conservation activities, we should first understand the public's attitudes, motivations and needs to do so. For example, while we may know that money is a reinforcer we do not know what other reinforcements may be operating. What is needed is a broad theory of motivation which can provide information to point out fruitful avenues of future investigation. At present, little is known as to what motivates people either to conserve or to squander energy resources.

The first step in examining motivation to conserve energy in the present study was to select a psychological theory of motivation as an investigative framework. The theories of motivation examined were: equity, need hierarchy, intrinsic motivation, goal setting, and expectancy theories.

A number of studies have examined the validity of the equity theory of motivation (Goodman and Friedman, 1971; Pritchard, Dunnette, and Jorgenson, 1972; Tornow, 1971). Briefly, the theory states that an individual will have a feeling of inequity if their ratio of inputs to outcomes on a task or job is out of proportion with the ratio of another person (Goodman and Friedman, 1971). Historically, equity theory has been limited almost exclusively to the motivation of financial incentives on performance (Campbell and Pritchard, 1976). As the area of energy conservation should at present be investigated from a broader perspective than just financial incentives, equity theory was considered rather limiting and thereby not selected.

A considerable volume of research has also been conducted on Maslow's (1954) need hierarchy theory of motivation (Hall and Nougaim, 1968; Lawler and Suttle, 1972; Wahba and Bridewell, 1973; Waters and Roach, 1973; Wolf, 1970). In general, the theory states that people are motivated to satisfy specific needs starting with those at the low end of the hierarchy, such as, security and safety. As each need becomes satisfied the motivation to satisfy that need decreases. The motivation to satisfy a higher need then becomes stronger. In a review of the theory, Wahba and Bridwell (1973) found "no consistent support for Maslow's need classification as a whole." In conclusion, they felt that the current need hierarchy theory was "almost a nontestable theory." Therefore, it was felt that the need hierarchy theory was too limited in perspective to be used to investigate the whole area of energy conservation.

A relatively recent area of investigation is on the theory of intrinsic motivation (e.g., Deci, 1972; Pritchard and Peters, 1974). The theory's main hypotheses are that an individual will be intrinsically motivated to do the job well and will be satisfied thereby with higher order needs. Thus, tasks should be designed to be interesting and allow for creativity. The limited research available indicates that intrinsic motivation has some degree of validity when considered in an industrial setting. However, at present not enough research has been done to identify the "job" of performing energy conservation activities in the home to justify the application of the theory of intrinsic motivation to the less structured area of individual energy conservation.

The study of goal setting in industry has received some degree of attention (Cummings, Schwab and Rosen, 1971; Hamner and Harnett, 1974; Locke, 1968; Pritchard and Curtis, 1973; Ronan, Latham and Kinne, 1973). Locke's (1968) general hypothesis was that giving or allowing people to set higher, specific goals will result in a higher level of performance than with lower goals or more vague goals. In the application to energy conservation, goal setting theory would be useful in studying an individual's goal of future energy conservation activities. In the present study it was used for this purpose.

The motivational framework considered optimal for the present investigation was expectancy theory. An extensive amount of empirical research has, in general, been supportive of the theory. In addition, its components are readily applicable to many attitudes and activities of individuals involved in energy conservation. The components of the theory are geared to work related activities but not necessarily to

activities culminating in a manufactured product. Expectancy theory may be just as applicable in a home setting where the results are not measurable in product units but in activities around the home and in interactions with the residents and others. The conceptual essence of the theory can be applied to the measurement of motivation to conserve energy and to the prediction of activity levels related to increasing energy efficiency of the home.

The remainder of this introduction will cover the following topics. First, expectancy theory will be explained and the literature pertaining to it will be reviewed up to the present state of the theory. Second, a model will be presented which either accounts for or at least acknowledges most previous challenges to it. Finally, after expectancy theory has been reviewed in detail, the psychological literature on energy conservation will be presented.

Expectancy Theory of Motivation

Expectancy theory is basically a theory of choice in that the individual chooses from among a number of alternate behavioral actions that one which will maximize or optimize the rewards or outcomes to the individual which are are expected to come as a consequence of such action. An assumption is that "individuals have cognitive expectancies concerning the outcomes that are likely to occur as the result of what they do and that individuals have preferences among outcomes (Campbell, Dunnette, Lawler, and Weick, 1970, p. 343)." The relative preference in outcomes are reflected in differences in valences of feelings of anticipated satisfaction that are expected from the attainment of each

of the outcomes. These outcome valences and the individual's feelings of the likelihood of their occurrence are combined to indicate a choice of performance level that the individual elects to achieve. This method of combining was best explained by Dachler and Mobley (1973):

> It attempts to explain the process of work motivation in terms of employee cognitions. The model is based on the view that an employee's level of performance can be thought of as a choice he makes. For any given employee, the choice involves selecting from among different potential performance levels that level of performance which, on the basis of various beliefs and feelings, is thought to be most useful for that employee. Motivation is reflected in the effort a person exerts to reach that performance level which he has 'chosen' to be the most useful among the various potential performance levels at which he could work (p. 398).

The proposition then is that whenever an individual performs at a special level, it is because he or she has cognitively determined the likelihood of achieving the outcomes that are most desirable and has decided either consciously or unconsciously that this level of performance has the maximum chance of resulting in these desired outcomes. The individual at every moment is attempting to optimize the chances of obtaining the most desirable rewards. This theory is ipsative, in that each individual chooses among several possible alternatives and the theory attempts to model this decision process. It does not indicate the relationships among rewards and later performance outputs across many people.

The theory is not restricted just to individual decisions about levels of performance. It has been used to predict "job effort and performance, job satisfaction, organizational practices, occupational choice, the importance of pay and pay effectiveness and leadership

behavior and leadership effectiveness . . . occupational preference, morale, need achievement, group cohesiveness, and motivation for effective performance (Wahba and House, 1974, p. 122)."

Historical Development of Expectancy Theory

The basic foundation of expectancy theory can be seen as stemming from Tolman's (1949) small break from the traditional stimulus-response viewpoint of behavior. Tolman argued that "organisms do not always learn specific responses, like, for example, a left or right turn in a maze, but rather the significance or the meaning of the cues at a juncture in the maze, an expectation, in other words, of what lies beyond those cues (Cofer and Appley, 1964, p. 505)." He recognized that cognitive processes resulted in expectations about future events.

Tolman also believed in the concept of behavior space. This entailed the individual, the environment around him and the objects within it which were perceived by the individual. These objects were considered to have positive and negative valence (Cofer and Appley, 1964, p. 509). The events which the individual experiences within this behavior space were connected to the expectations of future objects which had some valence to the individual.

As a number of reviews of expectancy theory research have been published (Heneman and Schwab, 1972; Lawler and Suttle, 1973; Mitchell, 1974; Mitchell and Biglan, 1971; Wahba and House, 1974) during the course of the theory's rapid development, no attempt will be made to exhaustively present all studies published. Instead, major conclusions of the reviews will be presented.

The first comprehensive review was made by Mitchell and Biglan (1971). They surveyed instrumentality theories currently in use in all areas of psychology. Their conclusions about expectancy theory in three areas will be presented here.

Verbal Conditioning

As reviewed by Mitchell and Biglan (1971), Dulany (1961, 1962, 1968) proposed a theory of propositional control which used instrumentality theory as a foundation. Two verbal conditioning experiments provided support for Dulany's theory (Dulany (1964), Dulany, Schwartz, and Walker (1965)). However, the instrumentality relationship between one's perceived consequences and the value of these consequences and either overt behavior or behavioral intentions was not found. It was found, instead, that perceived expectations carried more weight in the prediction of behavior intention. Mitchell and Biglan concluded "that in many situations normative or social factors are more important for the subjects' intentions and behavior than are the subjects' perceived instrumentalities (p. 437)."

Attitudes

Mitchell and Biglan (1971) also reviewed a number of early studies which applied instrumentality theory to the area of attitude research (Ajzen and Fishbein, 1969; Fishbein, 1963, 1965, 1967a, 1967b, 1972; Fishbein and Coombs, 1974; Jaccard and Davidson, 1972; Peak, 1955; Rosenberg, 1956). They stated that Fishbein (1967b) adapted Dulany's (1964) theory into the area of attitudes and behavior.

In reviewing the five studies investigating Fishbein's model (Ajzen and Fishbein, 1969, Fishbein, 1963, 1965, 1967a, 1967b) Mitchell

and Biglan (1971) concluded that attitude could be defined "as the probability of the attitude object leading to various outcomes or values and the evaluation of these outcomes (p. 444)." They concluded that Fishbein's theory had received moderate support. In this area of research Mitchell and Biglan felt the instrumentality variable did account for a considerable amount of variance in predicting behavior and behavioral intention.

Industrial Psychology

In the area of industrial psychology, Mitchell and Biglan (1971) commented that researchers were less concerned about internal construct restrictions than research in other areas of psychology. They felt the advantage of the theory was its systematic framework which facilitated the study of many variables simultaneously affecting behavior. It was the start of a framework from which to build a network of constructs.

As Mitchell and Biglan noted, Vroom's (1964) model was regarded by most as the initial expectancy theory model to be applied to work motivation in organizations. Vroom made two propositions and supported them with a considerable amount of literature and discussion as to their applicability. His first proposition, known as the force model, was that:

> The valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentalities for the attainment of these other outcomes (Vroom, 1964, p. 17).

Vroom's (1964) second proposition, known as the force model, was that:

> The force on a person to perform an act is a monotonically increasing function of the algebraic sum of the products of the valences of all outcomes and the strength of his expectancies

> that the act will be followed by the attainment of these outcomes (p. 18).

These two models of valence and force by Vroom indicated that an individual had feelings of anticipated satisfaction about a number of outcomes or rewards, had feelings of the likelihood that achieving one outcome will lead to the satisfaction of other outcomes, and had feelings of the expectation that performing certain actions, either job related or not, would result in the attainment of this outcome. The individual then combined these attitudes cognitively which resulted in a level of force within the individual to perform some act.

Several problems about expectancy theory in general were pointed out by Mitchell and Biglan (1971). First, interactions between components were as yet untested. Second, a more psychologically meaningful weighting system other than multiple regression was needed to weight model components. They suggested the possibility of subjects weighting the variables themselves. Third, some consideration must be made for the degree of control the individuals have over behaviors the model is trying to predict. Fourth, the fact that the component values change over time must be considered. The results of Graen's (1969) study, in which instrumentality was found to be affected by experience, must be considered for all components. Five, subjects should generate their own outcomes rather than being given a set of predetermined outcomes. Finally, components must be evaluated as to their cultural and sex specificity.

A second review was made by Heneman and Schwab (1972) of research done primarily in industrial psychology. They concluded that "generally valence, instrumentality, and role perceptions were significantly related

to performance, while ability was not. Little support was obtained for hypothesized interactions among these variables." They then made several suggestions for future researchers. They believed that the model of force needed to be measured according to its theoretical definition. All three variables of force, ability and role perception needed to be included in a model and tested. Also, "the contribution of the interactions in explaining performance variance, beyond additive effects" needed to be properly computed. They also called for the development of theoretically and psychometrically sound measures of instrumentality, expectancy, ability and role perceptions for the purpose of further construct validation.

In a review of three other reviews (Heneman and Schwab, 1972; House and Wahba (1972), Mitchell and Giblan, 1971), Wahba and House (1974) showed the need for research on several logical and methodological issues. In general, they also found support for the theory.

However, in a cautious note they stated that:

> It is also evident from the reviews that the magnitude of the support for the theory is inconsistent from study to study. It is discomforting to note that the levels of concurrent or predictive validity coefficients range from .72 for predictions of job satisfaction to as low as .11 for predictions of job performance, in the majority of studies, the coefficients generally are about .30 (p. 122).

Finally, Mitchell (1974) surveyed recent research on expectancy theory in the prediction of job satisfaction, occupational preference and effort. His general conclusions were that no within-subject analyses have been done as required by the theory, that the force model had been modified extensively but never tested in the original form, and lastly,

that the valence model had so far remained unchanged and had been thoroughly tested.

In addition, Mitchell made a number of methodological comments that need to be considered. As to outcomes, Vroom's (1964) theory stated that subjects generate their own, especially where the experimenter has little control over them. However, Mitchell felt practical problems will exist in subject generated outcomes as they will be influenced by instructions given, examples used, etc. Negative outcomes which are important in the theory may have to be generated, where necessary by the experimenter, if the subject fails to do so. No problems were seen in the measurement of expectancy. But, with instrumentality the theory considered it a +1 to -1, outcome to outcome relationship, while most researchers have treated it as a probability. As for valence, researchers need to include negative outcomes.

A number of empirical issues were also enumerated by Mitchell. Within-subject analysis definitely needs to be done. As expectancy theory scores are tested, much like a subjective expected utility, the assumptions made by decision theorists need to be considered. The need for the inclusion of a factor to account for the degree of control the individual has in choosing the level of effort and then acting must be explored. Another point worthy of attention is the overemphasis on the expectancy that effort leads to performance. Many other factors which are related to performance should be considered. Finally, the causal relationship between the model components needs to be researched.

In conclusion, Mitchell (1974) states that:

> Because of these multiple problems, future directions for research are unclear. Changing and modifying the theory seems premature. That is, before we reject Vroom's original

> formulation, we should correctly test it. A summary perspective suggests that we are left with the task of developing mathematically sound scales, establishing their reliability and validity, and testing their particular combinations in the prescribed manner. . . . However, the stage of rather crude development is past and it is time to move to a more thorough and systematic analysis (p. 1075)."

Dachler and Mobley (1973) presented the next major renovation of expectancy theory. They rephrased many of the relationships and terms in the process of greatly clarifying the model. They also pointed to a number of conceptual and methodological issues needing clarification. As to valence they stated that it should be defined as anticipated satisfaction and not as experienced satisfaction (value), or as the importance of an outcome. They questioned whether we could assume that all outcomes have relevance for the subjects and that we must consider specific levels of each outcome and not just outcomes in general. Finally, they pointed out that many researchers have failed to consider negative valences.

They stated instrumentality should be considered a conditional subjective probability where the chances of attaining the outcome vary across levels of performance. They also noted that instrumentality is ipsative in nature in that it involves the relationship between a level of performance and the corresponding outcomes and does not refer to other levels of performance.

Dachler and Mobley (1973) proposed the inclusion of task goals, as have Graen (1969) and Campbell, Dunnette, Lawler and Weick (1970). In addition, they included several other factors. The end result was a model incorporating most of the modifications suggested in expectancy literature up to the year 1972. A flow chart of this model is given in

Figure 1. In describing this model briefly, first components and operations of the model will be described. Outcomes were generated by interviews with relevant individuals in the organization being studied and in previous research. Negative as well as positive outcomes were included. Finally, valence was measured as outcome desirability (anticipated satisfaction).

Initially, the individual estimates the performance-outcome probability, that is, their perceived chances of attaining an outcome by performing at a specific level, for one outcome and for one level of performance. The individual then estimates the outcome desirability (Vroom's valence) of the same outcome. These two variables are then combined multiplicatively. Then this process is repeated across all outcomes relevant to the individual and the products are summed. The resulting value represents the expected utility of this specific level of performance. The whole procedure is then repeated for each other level of performance.

Next, for each performance level the expectancy of this level is multiplied by the level's utility computed previously. The level with the largest value is the "level of performance with maximum expected utility." This level is the end product of the force model and is the variable for comparison with independent measures of task goals, effort and performance. With this modification the model is now clearly ipsative in nature. While Vroom initially specified that the individual chooses from among a number of choices the one which maximizes his gain, no research studies have used this approach. Instead, most studies have measured each individual's expectancy and valence, combined

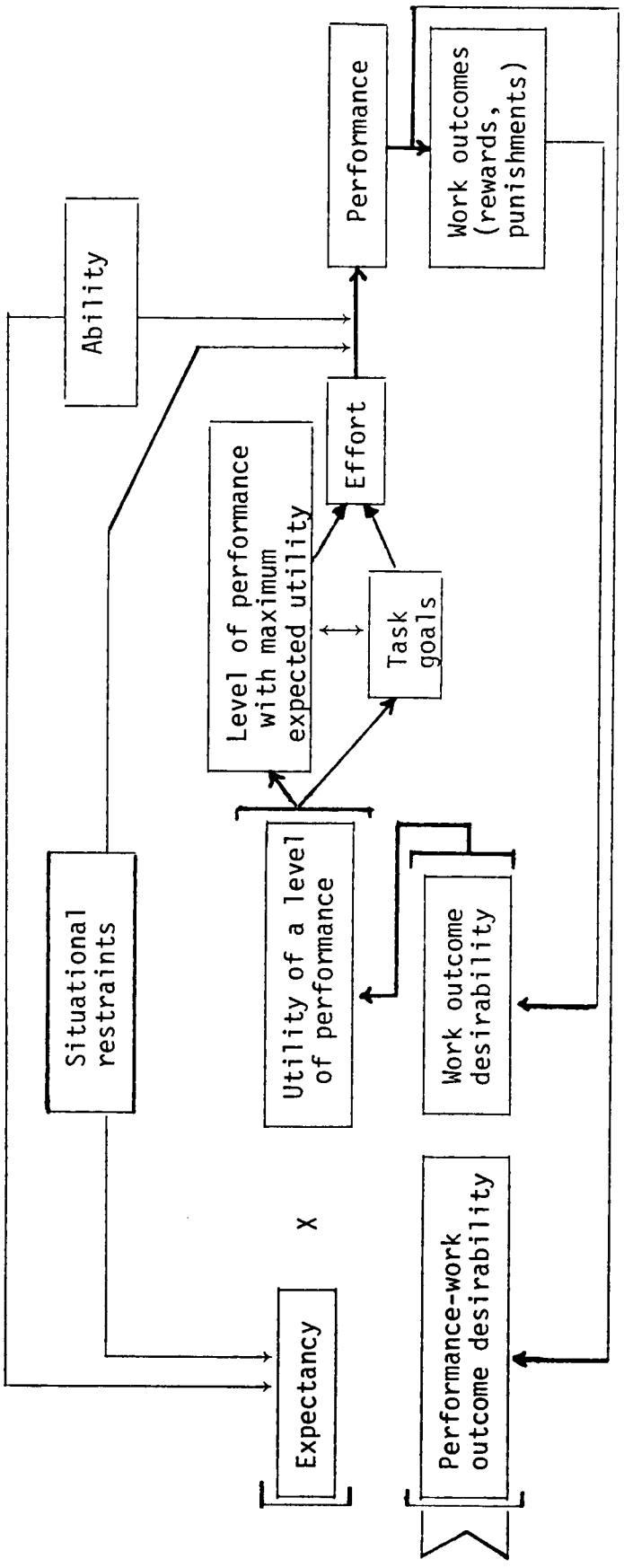


Figure 1. Dachler and Mobley's (1973, p. 399) Diagram of the Expectancy Theory Model.

this to produce a product and then correlated this value across all subjects, with a measure of effort, performance, or some other independent variable. As presented by Dachler and Mobley (1973) the individual chooses one level of performance (i.e. level of force in Vroom's terms) which maximizes the product of expectancy and valence. This single performance level is then compared with an independent measure of either the individual's performance or performance goal.

Task goal was also incorporated in the model as formulated by Graen (1969) and Campbell, Dunnette, Lawler and Weick (1970). However, Dachler and Mobley (1973) have specified that the task goal be a level of performance that the individual will attempt to perform at in the future. This allows the prediction of task goals from the index of motivation produced by the model.

Next, the relationship between effort and job performance is influenced by several factors. First, the individual's abilities will influence this relationship, while his self perception of his abilities may effect his expectancies toward performing at different activity levels. Situational restraints, such as material, equipment and coworker hindrances may also influence the transformation of the individual's efforts into performance. Finally, previous performance and previous work outcomes achieved will feedback on both performance-outcome probabilities and on outcome desirability.

Dachler and Mobley (1973) also specified two boundary conditions. The first was ambiguity which they defined as the "lack of specified organizational contingencies between alternative behaviors and consequences, and organizational structures and climates." The second was

perceptual blocks which they defined as "personal or organizational conditions which make it difficult for employees to accurately perceive what the actual situation is like." In general, these two researchers have provided the most comprehensive and thorough statement of expectancy theory to date.

Recent Studies

A number of studies of expectancy theory have been published since these reviews, many of which have attempted to answer some of the questions pointed out by previous reviewers.

Attitudes

Since Mitchell and Biglan's (1971) review, several other studies have investigated the application of Fishbein's attitudinal theory in applied areas. To further understand family planning behaviors, Fishbein (1972) applied his basic attitudinal model. Jaccard and Davidson (1972) then tested this application of the model. Based on a sample of 73 female students they found a significant relationship ($r = .84$, $p < .01$) between the attitude model and use of birth control pills and between the attitude and the intention to use the pill ($r = .79$, $p < .01$).

In a similar study, Fishbein and Coombs (1974) applied the Fishbein model to voting behavior. Using data from a panel study of the 1964 presidential campaign they found that the model was supported. They concluded that voting intentions were based on attitudes toward the two candidates which were from "the voter's evaluation of characteristics and issues, and his beliefs about the candidates with respect to these characteristics and issues."

Industrial Psychology

In a recent study of expectancy theory in industrial psychology, Kesselman, Hagen and Wherry (1974) factor analyzed measures of satisfaction, performance, effort and expectancy and found four factors. The first was a general factor indicating that all measures belonged together. The second was the expectancy that certain behaviors will lead to certain rewards. The third was the expectancy that work behaviors will lead to generally satisfying rewards. The fourth was the expectancy that satisfaction will modify expectancies.

In a test of the valence component, Parker and Dyer (1975) measured valence under two different contexts. First, they had subjects estimate their valence for a set of outcomes assuming they decided to stay in an organization and then again assuming they decided to leave the organization. They found significant differences with a majority of the pairs of valence ratings of the same outcomes across the two context settings. As Pritchard and DeLeo (1973) had done earlier, Parker and Dyer then argued for a strength of need of an outcome definition in the valence construct based on the idea that the different role contexts elicited different levels of anticipated need arousal or satisfaction among the individuals.

In a recent study of component interactions in a field study of workers under an incentive payment plan, Sheridan, Slocum and Min (1975) found that instrumentality and valence were not independent, which goes against a basic assumption of the theory. They found that highly valent outcomes had negative instrumentalities with performance and argued that this negative relationship was either due to the workers'

perceptual function or that these variables actually were negatively related in the organization and that the workers' perceptions were veridical with reality.

In a test of the predictions of the force model in a study of Japanese salesmen, Matsui and Terai (1975) found the force model to be predictive of both effort ($\underline{r}$ = .22, $\underline{p}$ < .01) and performance ($\underline{r}$ = .24, $\underline{p}$ < .01). In a finding contrary to the usual results, Sheridan, Slocum and Min (1975) found that ability did not contribute much to the predictive validity of the basic force model. Predictions of performance were significant using the force model alone ($\underline{r}$ = .23, $\underline{p}$ <.01) and with ability included ($\underline{r}$ = .28, $\underline{p}$ <.01). A possible reason for this finding was that while their ability measure was of psychological functions of verbal comprehension, quantitative reasoning, and spatial reasoning, the original Vroom (1964) theory called for the individual's "perception" of his abilities. Sheridan and his associates argued that this use of the individual's perception of his abilities has been largely ignored by expectancy theory researchers.

In a criticism of the methodology of the theory, DeLeo and Pritchard (1974) argued that low predictive validity coefficients, found consistently in most research on expectancy theory, were the likely results of low instrument reliabilities. The possible cause could be the relatively simple measures used to measure complex expectancy theory constructs. They made measurements of valence as importance and as attractiveness of an outcome, while instrumentality and expectancy were measured as both a correlation and a probability. These measures were then given to subjects in two sessions on two consecutive days.

The result was median test-retest reliabilities of valence as a measure of importance of $r_{XX'} = .60$, and as a measure of attractiveness of $r_{XX'} = .61$, with instrumentality as a probability measure of $r_{XX'} = .47$, and as a correlation of $r_{XX'} = .56$. As expectancy measures were not given twice, reliability was measured by Cronbach's coefficient alpha and equalled .64.

An estimate of convergent validity was made by correlating the two measures of each construct. The correlations for valence, instrumentality, and expectancy were .58, .46, and .10, respectively. The authors argued that if a model resulted in a composite score, its reliability could only be as good as its best element, in which case, the square of this reliability, which their example was .41, would indicate the maximum validity coefficient to be expected. Thus, the low observed correlations may be due more to the unreliability in the measuring instruments, than to low "true relationships" among the constructs.

Additional research has also been made into the application of expectancy theory to the understanding of additional factors. Arvey and Mussio (1974) compared the perceptions of advantaged and disadvantaged clerical employees that doing well will lead to rewards (expectancy) and on importance of rewards. Concerning outcome valence, they found that making use of abilities was more important for the advantaged than the disadvantaged employees. In contrast, high salary was considered more important for the disadvantaged group than for the advantaged. As to expectancies, the disadvantaged group had lower expectancies on eight of ten outcomes than the advantaged group with use of own judgement and advancement being significantly different between the two groups.

Petty and Sheil (1975) used expectancy theory in the prediction and explanation of turnover in ROTC students. The model was effective in predicting whether or not the student would stay in or get out of the program. Comparison of the need structure of the two groups showed little difference. Expected level of satisfaction with outcomes was considered the main contributor to model prediction with valence adding little.

Finally, in a test of the moderating effects of employee expectancies on a leadership style and employee performance relationship, Arvey and Neel (1974) hypothesized that "job motivation and performance will be enhanced when employee's supervisors behave in considerate fashions and when these behaviors are dependent on effective subordinate job performance." This was supported when the motivational model was found to be related to performance ratings, and a combination of an expectancy score (expectancy X valence) and a leadership style (consideration) score was found to be related significantly ($p < .01$) to two performance appraisal dimensions and closely related ($p < .10$) to three more dimensions.

In summary, the recent studies have both provided support for, and found new problems with expectancy theory. The theory was found to be predictive of family planning, voting behavior, turnover, performance and effort in another culture, and of performance when combined with leadership style, and to indicate differences between specific socio-economic groups on their desire for certain outcomes and expectations of performance. However, it was also found that valence and instrumentality were not independent as assumed by the model. Instrument

unreliability was also pointed out to be a possible cause of the low validity coefficients found in the literature. An addition to the valence component of determining the strength of need for an outcome, may also be needed.

Current State of Expectancy Theory

The starting point in describing the current state of expectancy theory was Dachler and Mobley's (1973) model (Figure 1, p. 15). For purpose of the present study, the figure showing the model has been reorganized to better reflect the model components, its output variables, dependent variables to be predicted and variables which previous research has indicated may influence the relationships (Figure 2).

Starting with Dachler and Mobley's computed utility model (i.e. Vroom's (1964) valence model) the evidence is generally supportive. Only the relationship between performance-outcome probabilities (i.e. instrumentality) and outcome desirability (i.e. valence) remains largely uncertain. At present there is also little hope of clearly specifying this relationship due to measurement weaknesses. Dachler and Mobley, as well as most previous theorists, have cautiously specified a multiplicative relationship, knowing that psychometrically it is not proper (Schmidt, 1973), but intuitively makes the most sense. The output variable of the computed utility model is level of performance with maximum computed utility (LPMCU), defined as the performance level with the largest computed utility score. LPMCU has been predictive of job satisfaction, attitudes toward businesses, and turnover.

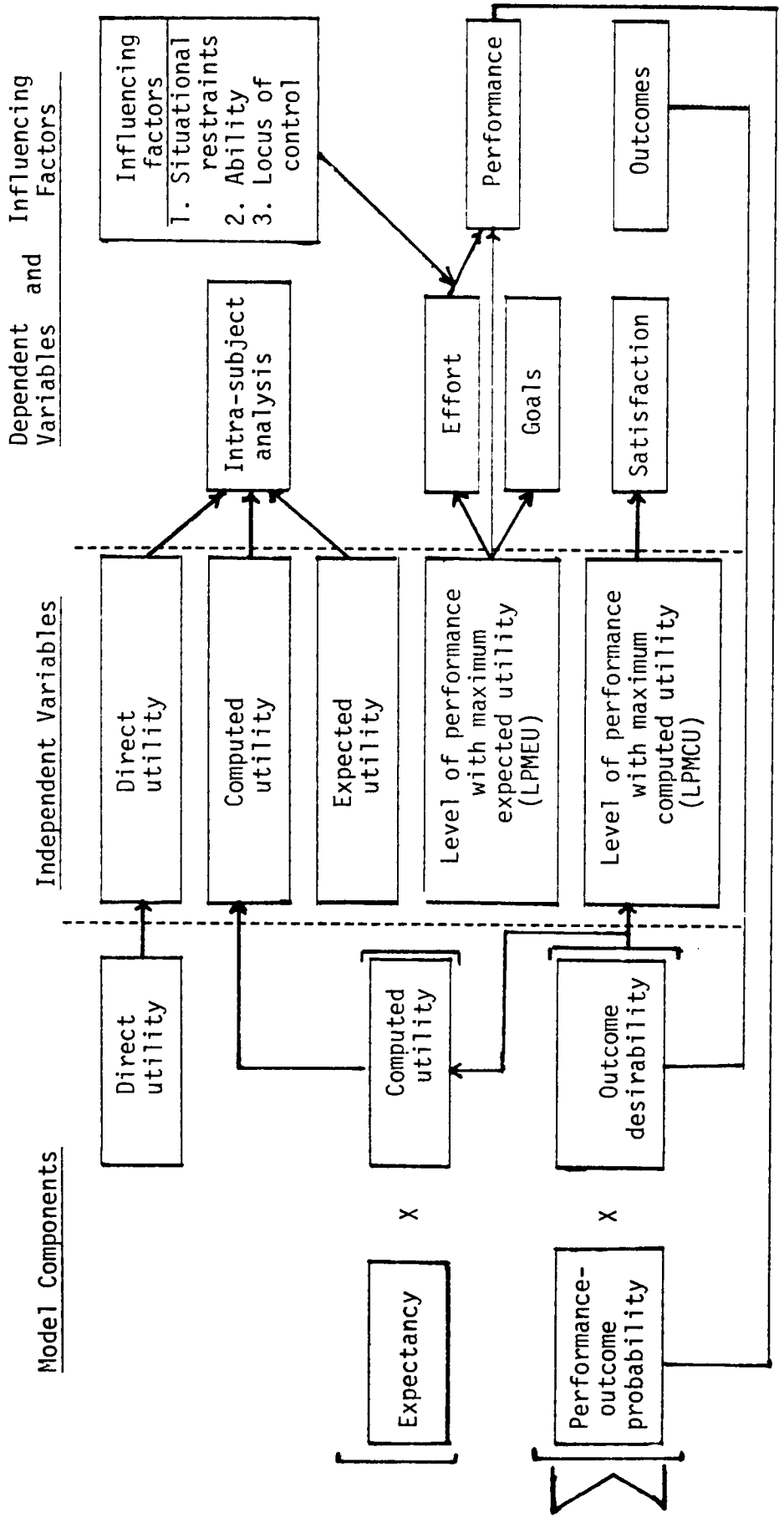


Figure 2. Current Model of Expectancy Theory.

At the second level, Dachler and Mobley's expected utility model produces two output variables. First, is the expected utility score for each level of performance. Second, is the level of performance with maximum expected utility (LPMEU) which is the performance level with the largest expected utility score. The empirical support for the expected utility model is based primarily on the consistency of predictions by the level of performance with maximum expected utility index (LPMEU) of a variety of actors while little construct validation work has been done. Future construct validation studies are needed on this part of the model, as with all other parts of the model. Again, the expected utility index, as with the computed utility index (LPMCU) lacks a well defined and empirically supported relationship among the expectancy and utility components.

The LPMEU index has also been found to be predictive of a number of variables. In the Dachler and Mobley model only task goals, effort, and performance were indicated. However, research has shown that the model is also predictive of occupational choice, turnover, and other factors. The term "work" has also been removed from outcomes as this is an unnecessary restriction. The current model has not altered the Dachler and Mobley model, only expanded its range to cover other variables with empirical support.

In addition to the empirical evidence linking ability to the effort-performance relationship, research on locus of control, and situational restraints should be added to expectancy theory at this point. Conceptually, locus of control is the individual's perception of their ability to convert their efforts to performance considering

social constraints (Rotter, 1966). This concept can include the suggestion by Mitchell and Knudsen (1973) that the expectations of others be considered. Little research has been done on the effect of situational constraints in the model. One other relationship that has received empirical support is the feedback loop between performance and performance-outcome probabilities. Graen (1969) has shown how an individual's performance-outcome probability can change depending on the past experience of the individual with the performance-outcome contingencies of the environment.

Further research is needed in the following areas: 1) Feedback loops from ability, situational restraints, and locus of control to the individual's expectancy that a level of effort will lead to a level of performance; 2) feedback loop from rewards and punishments of outcomes to the desirability of these same outcomes. Although this loop has intuitive appeal, it still must be shown that changes in the degree or frequency of obtaining an outcome will produce a corresponding change in the desirability. Such a relationship can be depicted in a manner similar to the economic principle of diminishing marginal utility, where the addition of another unit produces a smaller percentage increase in the utility of that unit than the increase obtained from the last unit received; 3) the relationship between task goals and the amount of effort expended. Goal setting literature may be compatible here where the higher one's goals are set, the harder one will strive to achieve them (Locke, 1968).

In conclusion, Figure 2 represents the current state of the expectancy theory model. It incorporates the research available and

also points out relationships needed in the model as suggested by previous researchers and those as yet not fully or at least not adequately tested. The model shown in Figure 2 (p. 23) is the one used in the present study. The dependent variables selected for special consideration in the present study were: satisfaction, goals, effort, performance and the influence of the locus of control variable on the effort-performance relationship.

The model values used as the independent variables in the study were computed as follows. First, the performance-outcome probability component was computed by summing the responses across the activities comprising each level of performance. Second, the computed utility component was produced for each level of performance by multiplying performance-outcome probability scores with outcome desirability responses for each activity corresponding to each level of performance. Third, the expected utility component was computed for each level of performance by multiplying the expectancy response with the computed utility score for each performance level. Fourth, the level of performance with maximum computed utility (LPMCU) was identified as the performance level with the largest computed utility score (i.e., LPMCU equalled two if the second level was largest). Fifth, the level of performance with maximum expected utility (LPMEU) was identified as the performance level with the largest expected utility value in the same manner used to compute LPMCU.

Energy Conservation Research

Only a limited number of studies were found which dealt with energy conservation. Those found will be briefly reviewed. In an

attempt to "examine the effects of the magnitude of noxiousness of a potential energy crisis and its probability of occurrence on intentions to reduce energy consumption," Hass, Bagley and Rogers (1975) performed a laboratory study incorporating two levels of noxiousness and two levels of probability. They viewed the use of "fear appeals" through expectancy theory components where noxiousness was considered a negative valence of the energy crisis outcome, while, the probability term was similar, although not identical to, the expectancy that a given consequence will be followed by an action. They found that the magnitude of noxiousness was the only variable significantly related to the individual's behavioral intention to conserve energy. The authors also reasoned that behavioral intentions are better predictors of later energy conserving activities than just conservation attitudes.

Only one other study was found to be pertaining directly to energy conservation. Stamm (1970) developed a scale for the measurement of orientations toward the conservation concept of scarcity. He hypothesized that peoples' attitudes toward alleviating scarcity can be grouped as either: a) avoiding scarcity by switching to alternate resources when scarcity reaches a significant level, and b) desiring to avoid scarcity by preserving existing resources. The scale consisted of seven items which were scored one way for the use of alternatives orientation and scored another way for the reversal of current trends orientation. In a random sample of community residents, Stamm found that the more individuals participated in outdoor recreation activities, the more likely they were to score high on both scales. Also, the degree to which individuals felt there was a scarcity problem and whether or not

there was a need to find a solution was significantly related to the degree of outdoor recreation activities they participated in. Scarcity awareness was related to environmental participation or interaction.

Environmental Conservation Research

Other than the few studies in energy conservation, most of the conservation research has been on environmental and ecological issues. Within this domain the majority of studies have been related to changing the public's attitudes towards conservation. Several scales have been developed to measure individual's attitudes toward conservation areas. In addition to Stamm's (1970) attitude toward scarcity scale, previously stated, Watkins (1974) has developed a water concern scale. The purpose of the scale was to determine attitudes toward water resources in surrounding communities as an economic commodity rather than just a geographical part of the area used primarily for recreation. Maloney and Ward (1973) also developed a scale for the measurement of ecological attitudes and knowledge. This scale was then shortened and further psychometric data provided by Maloney, Ward and Braught (1975). A scale designed to assess concerns for environmental degradation, environmental action and overpopulation was developed by Lounsbury and Tornatzky (1977). In a series of three studies they developed a 26 item scale which they cluster analyzed. They found that "global attitudinal concern for environmental degradation and for environmental action were typically found to be better predictors of general levels of behavioral involvement in action than of single activities."

Investigations have also been made of attitudes towards environmental issues. Stamm and Bowes (1972a) used Stamm's (1970) scarcity scale in an investigation for public support of the Army Corps of Engineers flood control projects. They found that those supporting the Corps' actions were high on the "use of resource alternates" scale, while those opposed were high on the "reversal of trends" of usage scale.

In a study of the relationship between environmental knowledge and environmental attitudes, Cohen (1973) compared two groups of high school students, those with high- and those with low-environmental knowledge. He found that the two groups did differ in their environmental attitudes and that the high knowledge group was more willing to express their views. He also felt that the difference in willingness to express their attitudes was considered most important. An examination of different methods of diffusing environmental action practices was completed by Lounsbury (1976). He found that the use of a printed form alone, such as, as a newspaper, was ineffective. Although, if an agency is committed to this approach he suggests that this printed material be followed up with some form of personal contact, such as a phone call.

Finally, in a section of the Stamm and Bowes (1972b) study which dealt with the adequacy of communication between community members and a federal agency, they evaluated the social impact of a flood control project. They found a large difference between residents' and agency's views overall. Residents who viewed a change as a benefit tended to perceive the agency's view as similar to theirs, while those who viewed

change as disadvantageous were less likely to think they shared the same view. The one-sided understanding between residents and the agency was due to the agency advertising project benefits only. Public doubt was reflected more in feelings of uncertainty and lack of information than in feelings of conflict of interest. It was also interesting to note that they found potential project disadvantages only surfaced as the result of public outcry or opposition group actions rather than as a conscious effort of the federal agency to provide the public with an unbiased view.

To summarize the research on energy and environmental conservation, considerable work has been done in the development of scales for the measurement of attitudes toward issues such as environmental degradation, the scarcity of resources, and water usage. Attempts have also been made to understand the relationships between knowledge of issues and attitudes toward them, and of communication between a governmental agency and the public. However, no attempt has been made to understand the motivation of the community residents. More work is needed in the understanding of individual motivation, of gains and losses, of needs and expectations that the individual has which will influence directly the individual's conservation involvement. Thus, expectancy theory was used to investigate the motivation to conserve and to predict household conservation performance, the effort put into these activities and the relative satisfaction received from them. In addition, it was important to study the influence of the locus of control factor in the predictions of the model. It may well be that people who perceive little chance of influencing their conservation activities and those of the

family and nation would not try, while those who perceive the ability to do something would be motivated to do so.

Purpose

The purpose of this study was to apply the current model of expectancy theory to the motivation of private citizens to conserve energy consumption. Considering the current model components shown in Figure 2 (p. 23), the hypotheses are as follows.

Hypotheses

1. The level of performance with maximum expected utility (LPMEU) is expected to be predictive of measures of conservation effort and performance.

2. The LPMEU index is expected to predict an individual's goals toward future conservation activities.

3. The level of performance with maximum computed utility (LPMCU) index should be predictive of a measure of satisfaction with the present amount of conservation activities.

4. It is hypothesized that one's efforts to perform conservation activities will contribute to the prediction of conservation performance by the LPMEU index.

5. The hypothesis that the locus of control (LOC) variable will contribute to the prediction of performance from expectancy theory components will be investigated by: a) testing LOC's value as a moderator variable in the relationship between effort and performance, by) by combining LOC with effort and the LPMEU index in a multiple

regression equation to predict performance, and c) by using a multiple regression combination of locus of control and effort to predict the LPMEU index.

CHAPTER II

METHOD

Subjects

Census Sample

One hundred and thirty-four residents of a southeastern city were interviewed in their homes using a structured interview guide (Appendix A). They were randomly selected from census data. Since they were more likely to have complete responsibility for paying their own utility bills than renters, it was decided to restrict to sampling to a subpopulation of home owners. The investigator felt that analysis of citizens who had more impact on energy usage and conservation practices than the population in general, would be the most worthwhile to study. Accordingly, citizens with homes of above average property values would probably have higher levels of energy consumption than those with homes below average value. Those with above average incomes would also tend to have higher disposable incomes which could be used to make energy conserving improvements in their homes.

Selection of possible respondents was performed by using only those census tracts with above average incomes for the city (greater than $8,200) and census blocks with above average property values for the city (greater than $14,300). Initial contact was by introductory letter explaining the study, and was followed in approximately one week by a telephone call to provide more information and set up an interview date.

Census Selection Procedures

In first selecting respondents, the census tract book was used to identify tracts with average incomes above the area average. Second, census blocks within tracts were identified by the census tract book which had above average home values. Third, a small random sample of blocks (i.e., up to five blocks) was selected from each tract. Next, dealing with each block a single street forming one of the block boundaries was randomly selected. Finally, using the city directory to identify the names, addresses, and telephone numbers of those living on this street for at least one year, a systematic random sample of up to three houses per street was selected. To summarize, the following criteria for selection was used: a) single family dwellings, b) not indicated by the city directory as having recently changed addresses or new telephone numbers, c) above average census tracts and blocks.

Mormon Sample

Independently, an association of the Latter Day Saints (Mormons) religion had expressed an interest in the energy conservation study. The researcher decided to include this sample in the present study as he believed it would provide responses which were more positive towards energy conservation (Appendix F). The positive orientation would result from the Mormon's belief in conservation as part of the frugal orientation of their religion.

Measures

The structured interview guide used during the interview sessions contained demographic, attitudinal and expectancy theory items

(Appendix A). Examples of expectancy theory items used in the current study are:

Performance-outcome probability. "How confident are you that you would save money by doing this activity." This was repeated for each outcome (underlined) on each activity page. Responses were from "not very confident" to "very confident" on a five point scale.

Outcome desirability. "Considering all that we have talked about so far, how desirable or undesirable is it for you to receive or do the following, independent of any specific activity." Responses were to each outcome on a five point scale from "very undesirable" to "very desirable."

Expectancy. "Has this activity been done, or is it being done in your home? If no, how confident are you that you could do this activity if you wanted to do it, regardless of how desirable or undesirable this activity is to you?" Responses to each activity were on a five point scale from "not very confident" to "very confident."

Utility of a level of performance (direct measure). "How desirable is the actual doing of this activity to you, regardless of how confident you are that you could do it at all or are now doing it?" Responses to each activity were on a five point scale from "very undesirable" to "very desirable."

Goals. "If no, do you plan to do this activity in the near future?" Responses to each activity were "yes" or "no." These were combined across activities associated with each performance level.

Effort. "What is the overall level of effort you have put into energy conservation activities over the past year?" Responses were on a five point scale from "no effort" to "considerable effort."

Satisfaction. "How satisfied are you with the amount of energy conservation activity done in your household?" Responses were on a five point scale from "very dissatisfied" to "very satisfied."

Performance. "Check the following energy conservation activities which have been done in your home. Make a second check next to those activities which you were primarily responsible for doing. Check as many as apply." This was followed by a list of 28 activities. This list was collected by reviewing conservation literature (Citizen's Advisory Committee on Environmental Quality, 1973; Knoxville Utilities Board (unknown); State Energy Office (1975); Tennessee Valley Authority (1975) and through discussions with several conservation researchers.

Locus of control. Used Rotter's (1966) Internal-External control scale, short form, which required responses on a four point scale to eleven items (Appendix B).

Defining Performance Levels

Dachler and Mobley's (1973) model required the measurement of several variables for each of a number of performance levels. As no measure identifying different levels of performance in energy conservation around the home existed in the literature, one was constructed. A sample of 104 Home Economics students were given the list of conservation activities previously compiled and instructed to rate each one on a seven point Likert-type scale as to how difficult they felt the item was to do (Appendix C). While Home Economics students were not, in general, home owners, it was felt that their knowledge about activities around the house would make them good judges of the

difficulty to do these tasks. A total of nine activity items were then selected to represent a range of difficulties. This range was divided into four levels. The activities selected for the same level of performance had similar mean ratings and small standard deviations. Table 1 gives the level of performance, lists corresponding conservation activities selected and their means and standard deviations.

Pilot Study

Twelve household residents were selected for participation in a pilot study of the interview guide. The purpose of these interviews was to generate possible positive and negative outcomes to the conservation questions using the method also used by Dachler and Mobley (1973). The pilot study also tested the wording of the questions and determined the overall length of the interview.

From the pilot study a total of 51 outcomes (24 positive and 27 negative) were generated by the household residents. Redundant, vague, and irrelevant outcomes were culled and several outcomes were combined by the investigator to reduce the list to 31 outcomes. Finally, for practical considerations of the interview's length (since each question on each outcome would be asked nine times), the investigator selected eight to include in the actual interview form for the primary study. They were: a) save money, b) lose some leisure time, c) increase the safety of your home, d) spend some money on home repairs and investments, e) have greater personal comfort in your home, f) have family, friends, and neighbors feel negatively towards you, g) increase the value of your home, h) invest some initial effort and time to do an activity.

TABLE 1

PERFORMANCE LEVELS, ACTIVITIES, MEANS AND STANDARD DEVIATIONS

Performance Level	Activity	Mean	SD
1	Wash only full dishwasher and clothes washer loads	1.55	.85
	Clean lint trap in clothes dryer after every load.	1.67	1.15
	Turn on yard or outside lights only when you expect people to be outside after dark	1.86	1.74
2	Use light bulbs of a lower wattage where ever possible (garage, hall, closets)	2.29	1.55
	Use storm windows and/or storm doors year round	2.31	1.79
3	Window and wall air conditioning units are covered during winter to prevent air leaks	3.74	1.97
	Put in or make sure attic has at least 6 inches and floor has at least 2 inches of insulation	4.03	1.96
4	Lower the temperature in the hot water heater to approximately 140 degrees	4.48	2.20
	Insulate hot water pipes	4.90	2.15

Procedures

Training Interviewers

Undergraduate students (3 male, 2 female) who desired to work on the project in exchange for course credit in field research methods were trained by the researcher. They read a text on field interviewing (Adams, 1958). Role playing and training sessions were conducted until the interviewers were familiar with the interview form and procedures.

Contacting Respondents

A standard letter of introduction (Appendix D) was then sent to each respondent. It was followed one week later by a telephone call providing them with additional information on the study and asking them to participate in the study. If they agreed interview dates were set up at the respondent's home.

Interviewing Procedures

The interviewers called the respondents just before the appointment date to ensure that the appointment was still to be kept. The interviewer then traveled to the respondent's residence. Upon arrival the interviewer introduced himself/herself and provided a brief introduction, again explaining the purpose of the study. The respondents were asked to sign a consent form allowing the information gathered in the interview to be used for research purposes (Appendix A). The interviewer then proceeded with the structured interview format. Probing and brief explanations were used by the interviewer to obtain the responses. If

more than one household member was present, the interviewer asked the questions to each in turn and handed out parts of the form to each and obtained a separate completed interview guide for each.

When the form was completed the interviewer closed the interview session by discussing the study again, answering any questions the respondent may have had, thanking the respondent for participating and then leaving the respondent's residence. Several days after the interview, a letter of appreciation was sent to the respondent (Appendix E).

CHAPTER III

RESULTS

Analysis of Expectancy Model Components

By definition, the expectancy model scores produced were based on responses to three components: performance-outcome probability, outcome desirability and expectancy. Table 2 gives the response distributions of performance-outcome probabilities for each outcome averaged across performance levels. Distributions for two outcomes were highly skewed which indicates that a majority of people felt that same way. As indicated by these outcomes, the respondents in general felt confident that if they performed conservation activities they would not have family, friends and neighbors feel negatively towards them, while saving money by doing these activities. On the other outcomes a majority consensus did not exist. In contrast, looking at the performance-outcome probability responses across the four performance levels did not reveal any noticeable differences (see Table 3).

The second component was one's feeling of how desirable an outcome is independent of performing any conservation activity. As shown in Table 4, the majority of respondents considered the positive outcomes as desirable and the negative outcomes as undesirable. The only exception was the outcome of losing some leisure time, which half of the respondents were neutral toward, with 44% feeling it was undesirable. This result may reflect the reluctance of most people to admit during an interview on conservation efforts that one does not desire giving up some leisure time to put in these activities.

TABLE 2

RESPONSE DISTRIBUTIONS OF PERFORMANCE-OUTCOME PROBABILITIES SUMMED ACROSS PERFORMANCE LEVELS

Outcomes	Number of responses[a]	Response Distribution (% of Total) 1 Not very confident	2	3 Not sure	4	5 Very confident
Save money	1188	4	3	8	21	64
Lose some leisure time	1190	45	15	13	14	13
Safety of the home	1190	31	10	21	16	22
Home repairs and investments	1190	37	10	19	14	20
Personal comfort	1190	26	10	16	20	28
Family, friends and neighbors	1190	76	9	11	2	2
Home value	1189	43	9	17	11	20
Initial time and effort spent	1189	19	9	10	28	34

[a]Responses summed across nine performance activities (see Table 1, p. 15).

TABLE 3

RESPONSE DISTRIBUTION OF PERFORMANCE-OUTCOME PROBABILITY AVERAGED ACROSS OUTCOMES FOR EACH PERFORMANCE LEVEL

Performance Levels	Number of responses[a]	Response Distribution (% of Total) 1 Not very confident	2	3 Not Sure	4	5 Very confident
1	3176	42	10	15	12	21
2	2111	33	9	12	17	29
3	2107	25	7	12	20	36
4	2111	36	11	17	15	21

[a]Responses summed across eight outcomes and two or three activities for each performance level (see Table 1, p. 15).

TABLE 4

RESPONSE DISTRIBUTIONS OF DESIRABILITY FOR EACH OUTCOME

Outcomes	Number of responses[a]	Response Distribution (% of Total) 1 Very undesirable	2	3 Neutral	4	5 Very desirable
Save money	132	5	1	2	14	78
Lose some leisure time	133	22	20	50	6	3
Safety of the home	133	5	0	4	14	77
Home repairs and investments	133	8	10	23	3	28
Personal comfort	130	2	1	6	23	69
Family, friends and neighbors	133	58	12	22	3	5
Home value	132	3	0	3	17	78
Initial time and effort spent	132	3	4	27	37	29

[a]Number of respondents which answered the respective item.

By combining the performance-outcome probability and outcome desirability responses and then summing them across the outcomes the LPMCU score was produced for each of four performance levels. Table 5 gives the distributions of LPMCU scores. The third component of the expectancy model was the respondents expectations that they could perform at specified levels of conservation performance. Table 6 gives the distribution of these expectancy responses. Most of the respondents were very confident that they could perform well at each and every one of the performance levels. However, there was a slight decrease in "very confident" responses when comparing across the performance levels from level one to level four (from 94% to 68%). Confidence intervals (95% level) also showed that most people were generally confident that they could achieve any of the performance levels. This expectancy score was then combined with the previous LPMCU score to produce the level of performance with maximum expected utility (LPMEU) score (Table 6).

Using the census sample, a test was also made to determine if including the nine activities used to compute the LPMCU and LPMEU scores in the overall performance measure would inflate the relationships. As with the overall performance score, it was found that only effort was significantly related to both a performance measure consisting of just the nine special activities and one computed by subtracting the responses on these nine activities from the total performance score ($\underline{r} = .19$, $\underline{r} = .17$, $\underline{p} < .01$; respectively). No other variables were related to these two other performance measures.

A comparison was also made between LPMEU and a performance score consisting of the number of performance activities which the respondent

TABLE 5

DISTRIBUTION OF LPMEU AND LPMCU INDEXES
ACROSS PERFORMANCE LEVELS

Indexes	Distribution (% of Total) Performance Levels			
	1	2	3	4
LPMEU	30	5	9	56
LPMCU	18	1	5	76

TABLE 6

RESPONSE DISTRIBUTION OF EXPECTANCY SCORES AND EXPECTANCY CONFIDENCE INTERVALS AVERAGED ACROSS OUTCOMES FOR EACH PERFORMANCE LEVEL

Performance Levels	Number of responses[a]	Response Distribution (% of Total) 1 Not very confident	2	3 Not sure	4	5 Very confident
1	264	1	1	1	3	94
2	264	2	1	5	4	88
3	264	5	1	8	9	77
4	396	7	1	11	13	68

	Confidence Intervals		
	Low	Mean	High
1	3.62	4.9	6.10
2	3.61	4.9	6.15
3	2.26	4.4	6.59
4	2.10	4.4	6.73

[a]Responses summed across eight outcomes and two activities for performance levels 1, 2, and 3 and three activities for level 4. N = 132.

indicated he was primarily responsible for doing and found not related. This performance measure was also not related to effort and the respondents' future goals of conservation activities.

Unit of Analysis

Analysis of the census sample was by examination of individual and household responses. Each resident (N = 134) produced a set of individual scores. Household scores (N = 51) were obtained by averaging the scores of those respondents who were husband and wife and were living in the same house.

In general, husband and wife agreed with each other on the dependent variables of effort, performance and satisfaction. On performance, the husband's and wife's scores were significantly related ($\underline{r}$ = .24, $\underline{p}$ < .05), while the husband's and wife's scores were also related to the household performance score as expected ($\underline{r}$ = .84, $\underline{r}$ = .73, $\underline{p}$ < .001; respectively). Greater agreement occurred between them on both the satisfaction and effort variables. Individual husband and wife satisfaction scores were in agreement ($\underline{r}$ = .60, $\underline{p}$ < .001) and both were equally correlated with the combined household satisfaction score ($\underline{r}$ = .98, $\underline{p}$ < .001; for both). On effort, the husband and wife generally agreed with the household score ($\underline{r}$ = .89, $\underline{r}$ = .84, $\underline{p}$ < .001; respectively).

In contrast, on the LPMEU and goal scores husband and wife did not agree. The husband's LPMEU score was not related to the wife's LPMEU score, nor was the wife's score related to the household LPMEU score. The husband's LPMEU score, however, was significantly related

to the household score (r = .98, p < .001). The household LPMEU and LPMCU scores were significantly related, but in the negative direction, with each other (r = -.42, p < .01). Possibly because of this contrast, the husband's and wife's goal scores were only moderately related to the combined household goal score (r = .54, r = .49, p < .001; respectively).

Tests of the Hypotheses

As shown in Table 7, the level of performance with maximum expected utility (LPMEU) was not significantly correlated to either effort or performance for the individual score but it was related to effort (r = .72, p < .001) for the household score (Hypothesis 1). LPMEU was significantly correlated to one's goals of conservation activities of the future (r = .18, p < .05) for individual scores but not for the household score (Hypothesis 2). As predicted, the motivational variable which does not include the expectancy component — that is the level of performance with maximum computed utility (LPMCU) — was significantly correlated with one's satisfaction with the amount of present conservation activities for both individual and household scores (r = .47, r = .79, p < .001; respectively) (Hypothesis 3). Effort was found to be significantly related to performance (r = .29, p < .01). Also, performance on energy conservation activities was predicted by a multiple regression equation containing LPMEU and effort using both individual and household scores (R = .20, R = .22, p < .05; respectively) (Hypothesis 4). A multiple regression equation of effort and the LOC measure using both individual and household scores (R = .20,

TABLE 7

CORRELATIONS BETWEEN EXPECTANCY MODEL VARIABLES AND ENERGY CONSERVATION VARIABLES FOR THE CENSUS SAMPLE, INDIVIDUAL RESPONSES (UPPER TRIANGLE, N = 134) AND THE HOUSEHOLD RESPONSES (LOWER TRIANGLE, N = 56)

Measures		(1)	(2)	(3)	(4)	(5)	(6)	(7)
LPMEU	(1)		.67***	.00	.02	.18*	-.07	.05
LPMCU	(2)	.80***		-.07	-.11	.07	.03	-.12
Performance	(3)	-.02	-.44***		.29**	-.08	.47***	.01
Effort	(4)	.72***	.83***	-.45***		-.08	.47***	-.11
Goals	(5)	.12	.06	-.11	-.12		-.07	-.10
Satisfaction	(6)	.71***	.79***	-.48***	.43***	-.05		.06
LOC	(7)	.12	-.08	-.05	-.04	.07	.01	

*$p < .05$.

**$p < .01$.

***$p < .001$.

R = .22, p < .05; respectively) was found related to conservation performance.. The regression equation containing LPMEU, LOC and effort measures using both individual and household scores (R = .21, R = .23, p < .05; respectively) was also related to performance. However, combining LPMEU, LOC and effort in a regression equation did not appreciably improve the prediction of performance by effort alone (Hypothesis 5).

To determine the possible influence of one's perception that events are the product of chance or of one's efforts on conservation activities, the LOC scores were used to moderate the effort-performance relationship for individual scores only (Hypothesis 5). The results showed that perceptions of control over events reduced the effort-performance relationship. By dividing the same total sample in half at the median LOC score (Mdn = 22) the correlation between effort and performance dropped from the significant relationship in the total sample (r = .29, p < .01) to a lower, but still significant relationship in each of the half samples (r = .20, p < .05). By adding the LOC score to the effort score in a multiple regression equation to predict LPMEU the results were not significant.

Intra-subject Analysis

As directed by Dachler and Mobley (1973) a necessary test of the expectancy model should be of the validity of the utility index. The assumption was that direct ratings of utility will be highly related to utility scores produced by the model. The method for performing an intra-subject analysis was stated in Dachler and Mobley's study. Using

the census sample (N = 134) the average correlation between the direct measure of utility and the computed utility measure in the present study was $\bar{r}$ = .23. This was similar to the average correlation between direct utility and the expected utility measure of $\bar{r}$ = .22. Both of these correlations were considerably lower than the average correlation between the computed and expected utility measures ($\bar{r}$ = .97). This indicated that while the model was consistent in the scores it produced, as reflected in the computed and expected measures, the model scores were not related to direct measures of utility.

Additive and Multiplicative Models

Previous researchers (Lawler and Suttle, 1973; Pritchard and Sanders, 1973; Schmidt, 1973) have questionned which method (multiplicative versus additive) of combining model components is best. In the additive model the LPMCU score would be produced by adding the performance-outcome probability variable with the outcome desirability variable and summing across all outcomes and across those conservation activities which correspond to each level of performance. The LPMEU score would be computed by adding the LPMCU score with the expectancy variable for each level of performance. In a comparison of the predictiveness of the additive model as compared to the multiplicative model neither model was clearly superior. LPMEU significantly predicted effort when computed by the additive model (r = .16, p < .05). While goals were significantly predicted by LPMEU using the multiplicative model (r = .18, p < .05). No other dependent variables were significantly predicted by the additive model scores. In general, the motivational scores for LPMEU and LPMCU were not very predictive of the four dependent variables, regardless of how they were computed.

CHAPTER IV

DISCUSSION

Based on the present study's results, several hypotheses were supported. LPMEU was found to be related to effort using household scores, and to goals using indivudal scores. LPMCU was related to one's satisfaction with their conservation efforts. Effort itself, and combinations of LPMEU with effort, of effort and LOC, and of LPMEU, LOC and effort were significantly related to performance. In contrast, an investigation failed to show any moderating influence by the LOC variable on the effort-performance relationship.

These results indicated that one's level of energy conservation performance is related to both the degree of motivation to conserve energy in their homes and the amount of effort they put into the tasks. The fact that motivation alone is not related to conservation performance reflects the nature of the activities required around the home to make it more energy efficient. These tasks required an individual's efforts. Whether it is something as easy as removing the lint from the clothes dryer trap or the arduous and exhausting task of laying down insulation in one's attic, no task is effortless. Personal energy or at least the purchasing of another's energy is required.

A second possible explanation for why motivation plus effort, but not motivation alone, were related to performance was that possibly the motivational variable was not tapping the real sources of conservation motivation. The variable used in the present study was computed following

the model specified by expectancy theory. A possibility exists that the basic model components could be the cause of the problem. The expectancy component may not have contributed much to variations in the total motivational score (LPMEU). It is conceivable that most people felt they could perform the activities if they put in the effort. This meant that the outcome desirability variable would provide most of the variation in the LPMEU score. A likelihood then exists that the outcomes used in the present study were not ones most desired by home owners and thereby motivating to someone to perform conservation activities. The outcomes will be discussed in more detail later.

As motivation (LPMEU) and effort were found related when households were considered, it is possible the mechanics involved in household coordination of conservation tasks are tied much more to the family's group motivation and thereby to their collective level of effort. Because of the coordination required, motivation may be more important in determining effort for households than for individuals. Further research is needed into the possible causes of this difference.

Additional information on conservation motivation can be obtained from examination of the changes in relationship between the primary variables of this study caused by the inclusion of a locus of control (LOC) variable. As the results showed when LOC was combined with the motivational variable (LPMEU), the product was related to conservation performance for both individuals and households. Quite possibly people who performed conservation activities were those who perceived specific outcomes which they desired as coming from their efforts, and felt that they could realize them because they had some degree of control over the means of achieving them. They then merely applied the necessary effort.

These results supported the suggestion by Mitchell (1974) that the degree of control the individual perceives he has in choosing the level of effort and then acting be included in the motivation model.

When the LOC measure was applied as a moderator variable between effort and performance, the lack of moderating effect may have been caused by one's perception of being able to do conservation activities not inhibiting one's efforts. The individuals probably felt they could do most of the activities if they wanted to. This result was collaborated by examination of the expectancy variable distribution which allowed a similar interpretation. Obviously, the conservation activities used in this study were not perceived as being difficult to do. A question for future researchers would be which conservation activities are considered difficult, if any, and what impact does their difficulty have on the individual's motivation.

Finally, the results showed that the utility index (LPMCU) was related to the respondents' feelings of satisfaction toward their energy conservation efforts. This indicated that for both individuals and households, their satisfaction could possibly be due to how much they desired specific outcomes and felt these outcomes would come to them if they in turn performed specific conservation actions. People seem to feel more satisfied with their energy conservation efforts if they feel these efforts will lead to desirable rewards.

A third possible explanation for the weak relationship between motivation and conservation activities is that energy conservation may be too broad of an area of investigation to be analyzed by any motivational theory. A more fruitful approach may be to examine specific

topics, such as, home owners' incentives, goal setting effectiveness, home owners' perceptions of the severity of the energy crisis and their perceptions of their possible contribution to easing our energy demands.

Another consideration is that several researchers have pointed out serious problems with expectancy theory. The concept of a general theory of motivation may be basically faulty. "The behavioral domain involved is too complex and its bits and pieces are too poorly understood to permit one algorithm to do the job (Campbell and Pritchard, 1976)." Too many components and connections may exist to be examined. The multiplication of several components and summing of their cross products requires independence between variables. In fact, growing evidence casts doubt on this assumption. In addition, the assumption in the model that the relationship between variables are linear may be too simplistic to be acceptable. The model therefore appears to be a simple "formulation that encompasses a highly complex and poorly understood set of variables and variable dynamics (Campbell and Pritchard, 1976, p. 95)." The future direction of research using expectancy theory appears to be to abandon the use of the full model and to work with specific variables or relationships of interest.

A fourth problem was the way conservation effort was measured. Self-ratings of effort are not the ideal means as the respondent also provides self-ratings of the other dependent and independent variables. At present few construct validation studies have been done to examine conservation effort.

In most expectancy theory studies measures of model components are crudely developed and no effort is made to determine if the respondents are actually interpreting and answering the questions in

the manner specified by the expectancy model. As a result of this, most reliability estimates of the components may reflect common method variance, as test-retest methods have indicated low levels of reliability (Campbell and Pritchard, 1976).

Descriptive Statistics of the Expectancy Model Components

Examination of the model components provided a good view of how people actually felt about energy conservation. Using the performance-outcome probability component it was discovered that peoples' confidence in doing an activity varied across outcomes and not across levels of performance as one at first would assume. However, upon closer examination one possible explanation emerges. What the respondents were saying was that for any type of conservation activity, from cleaning the lint filter in a dryer to putting insulation in the attic, they were confident the same outcomes would come to them. The resulting outcomes were that they would have to invest some time and effort, but would not lose leisure time in doing it, would not get the people around them upset, and would save money while not investing more money than would not be reflected in increased home values.

The knowledge of desirable outcomes can be combined with an understanding of the respondents' feelings that they could perform at any level of performance, that is, do any conservation activity. With this foundation an educational program could be designed to communicate that if people became involved in conservation, they could

achieve the activities they desired and avoid those they did not, and no conservation activity would be too difficult to do.

The need for a program to persuade people to be more conservation oriented was further supported by the evidence that LPMCU and LPMEU were basically dichotomous variables. An interpretation is that people are either motivated or not motivated. They either feel energy conservation is an issue, are concerned about it, and would most likely perform conservation actions, or they don't feel this way. Thus, a program could have as its primary focus merely raising the awareness level of the general public about the positive results of conservation actions. Advertising campaigns, commercials and governmental actions which merely point out gas and oil shortages and want us to protect our national security by conservation actions are missing the mark. They are not aimed at the issue concerning people, that is, what they personally can get out of being conservative.

Intra-subject Analysis

Correlations between the three utility measures in the present study were opposite to those reported by Dachler and Mobly (1973). Expected utility and computed utility were highly related while neither were related to the direct measure. Two factors could have caused these results.

First, many of the respondents had difficulty with the direct utility measure. They could not see how one would desire to do a conservation activity just for the sake of doing it. In other words, the respondents may not have felt any intrinsic motivation to do the activity simply because it was intrinsically satisfying. As little creativity was

required to do these activities, it just may be that they are not desirable to do in and of themselves.

A second reason could be that the expected and computed utility measures possibly shared a considerable amount of method variance as the only difference between the two was the expectancy measure. In general, more research is needed on the direct utility of home conservation activities.

Additive Versus Multiplicative Models

Although Schmidt (1973) has shown that the level of measurement in expectancy theory does not allow multiple relationships to be used, it can be argued on empirical grounds that we should continue working with the model while we also attempt to develop ratio scale measures. However, whether we multiply the measures or simply add them the results as reflected in the present study will be basically the same. Motivation (LPMEU) by itself was just not strongly related to the dependent variables, no matter how it was computed. Effort was related to one way while goals were related if computed another way. Neither method was superior and thereby neither method, at present, can be eliminated. Future research should continue to compare both approaches as to their effectiveness.

Further Predictions of Energy Conservation

By taking advantage of the bad weather which occurred in the middle of data collection, it was possible to investigate what changes occurred when energy conservation became a more salient alternate to the energy problem (Appendix G). People took energy conservation more

seriously during the bad weather and after it, than they did in the Fall. They placed greater emphasis on goals for performing conservation activities in the future. This confirmed the similar finding by Stamm (1970) that if people believed a scarcity existed (and in East Tennessee there was a scarcity of natural gas and electricity), then their degree of participation would increase. While their concerns may have diminished by Spring, people could again take energy conservation more seriously as energy becomes more of an issue in the future, as it most certainly will. The surfacing of a significant relationship between motivation and effort after the winter weather may simply have reflected the fact that respondents were motivated and thereby put out the effort to do conservation activities. The cause could have been the desire to save money, or that it became popular among family, friends and neighbors to be conservative. These outcomes would possibly have become more desirable after the severe weather.

The main hypotheses were also not supported using the Mormon sample (Appendix F). However, due to non-random selection, this sample was not representative of the general population and restrictions of range probably existed because selection was based on similarity of beliefs, interests and religion. However, consideration of the nature of the Mormon sample could provide insight into what people are like who as a group feel positively toward energy conservation. As stated earlier, a tendency to believe in conservation is consistent with the frugal orientation of the Mormon religion. This was reflected in significantly higher LPMEU and LPMCU scores in the Mormon sample as compared to the census sample. They also tended to be less satisfied with their current conservation activities. However, as the two samples were

similar in performance and the Mormons showed a lack of relationship between effort and performance, a negative relationship between performance and goals, and a positive relationship between satisfaction and future goals, possibly the Mormon sample reflected only behavioral intentions toward energy conservation, with no actual behavior being exhibited.

Problems with the Present Study

Several problems were related to the method of data collection. All measures used in this study were collected by using a structured questionnaire during an interview. Therefore, the relationships between the predictors and the criteria were possibly inflated to some extent by common method variance. The respondents completed the performance items just before they completed the motivational items. While the expectancy theory items had to be obtained by respondent report, certain criteria could be obtained by other means. However, as a lengthy interview was already demanding of an individual's time, attempts to examine someone's home for objective measures of conservation habits would have possibly created some tension between the respondent and interviewer.

A second problem occurred in the difficulty of applying expectancy theory items to energy conservation, especially for the typical home owner. The original intention was to use the Dachler and Mobley (1973) terminology for each item to ensure generalization to previous and future expectancy theory research. However, the interviewers reported that several times the respondents had difficulty understanding the items. First, as to outcome desirability, some were unable to discriminate any steps between undesirable and desirable. For most, an outcome seemed to be either one or the other. Second, a few respondents

had difficulty with the performance-outcome probability item. The respondents felt that an activity would either lead to an outcome or not. There tended to be a skewed distribution of confidence scores. For each activity-outcome pair, the respondents were, in general, either very confident or not very confident one would lead to the other. The problem underlying this may be the outcomes used in the present study. Although a pilot study was performed to generate outcomes for the major study, considerably more research should be made into just what outcomes are relevant for energy conservation practices. This can be reflected in the dichotomous responses of the outcome desirability items in the present study. The outcome of saving money, home safety, personal comfort, home value and spending initial time and effort were considered very desirable by most. The outcome of having family, friends and neighbors feel negatively towards you was undesirable. Losing some leisure time and making home repairs and investments were the only generally neutral items for most respondents. With the restricted variance of the outcome desirability item in this study, the contribution of this variable to the expectancy theory model was eroded. If, through an extensive investigation, outcomes could be found which were variable across many respondents then this item would add more to the predictiveness of the model. A possible approach to generating outcomes would be to use the steps commonly used in developing behaviorally anchored rating scales. This would include interviews with many community residents to generate outcomes, then the use of several judges to cull redundant and meaningless outcomes and to produce a list of worthwhile outcomes. These outcomes would then be given to a sample of residents

for them to rate the outcomes on their desirability. Finally, outcomes would be selected which provided maximum variance of desirability.

A third problem with the present study was the difficulty of obtaining a good measure of energy conservation performance. As noted earlier, ideally one would like to obtain some objective indicators of conservation activities. One realistic approach for future energy conservation studies to consider would be to use historical records of energy usage. These could possibly be obtained with written consent of the home owner from gas and electric utility companies. To be meaningful, the information would then have to be moderated by the house's type, size, method of construction, age, type of heating and cooling equipment used, and possibly other factors.

Another problem with the performance measure used in the present study was that it measured performance as a single factor. Performance of conservation activities may be multi-dimensional factor. To assess different performance dimensions, activities could be rated on levels of difficulty, technical competence necessary, the amount of adjustments or changes in the house (or in the life style of the residents) necessary to do an activity, to name a few. The performance measured would also have to be restricted to those activities which were the direct result of the respondent's efforts and not those which were paid for or which were performed by other household members.

Recommendations for Future Research

The finding of the present study that motivation plus effort was related to conservation performance should be tested again by recplication. Although, the census sample was probably representative of

residents in a southeastern city, one would not attempt to generalize these findings to residents in areas such as New England, New York City, California, or Colorado, due to differences in weather, energy costs, and life styles. Another restriction of the present sample is that it is purposefully selected from the upper middle socioeconomic population. It would also be of interest to determine the motivation of persons from lower socioeconomic levels.

The present study found that the respondents generally felt that none of the conservation activities were difficult to do. This meant the outcome desirability item carried most of the weight in the expectancy model. It would be of interest to determine what impact different outcomes would have on the models effectiveness.

Further research efforts should also concentrate on specific segments of the expectancy model as they relate to conservation performance. Further uses of expectancy theory should concentrate on its components to examine specific aspects of conservation. Those components shown by the present study to be worth further investigation were outcome desirability and effort.

Another strongly suggested topic of further research is the development of a measure of energy conservation performance. This could be approached by developing a multiple regression model of home energy efficiency. Each home would be considered on a variety of factors, such as, the amount of energy consumption which could be obtained from gas or electric utility companies, house characteristics, such as, square footage, type of house, method of construction, age, insulation, type of heating and cooling equipment used, and possibly the current thermostat settings reportedly used by the home owner in summer and

winter. Deviations from the regression line could then be interpreted to indicate the degree of energy efficiency or inefficiency of the home being rated. Another approach would be to define the multi-dimensional nature of conservation performance and develop an instrument to rate households or individual residents on it.

The same needs also exists for defining outcomes of conservation actions around the home. A tremendous amount of information about energy conservation motivation can be obtained by simply trying to determine what an individual has to gain from it. The "just what's in it for me" attitude of most home owners may truly reflect the fact that they don't feel the rewards are sufficient for them to do anything about conservation.

In summary, while the full expectancy model was not very predictive of energy conservation practices, analysis of its components gave insight into just why people aren't being conservative. The answer is that they have nothing personally to gain. There are no rewards for their personal efforts. While most people feel they can do the necessary activities, the outcomes they desire are just not perceived as being connected to these actions. Further research should address the question of what outcomes people want and how the outcomes can be linked to conservation practices in the home. It is also strongly suggested that future research focus on specific components of the expectancy model which seem to provide the most meaningful information, rather than try to incorporate the full model into each analysis.

CHAPTER V

SUMMARY AND CONCLUSION

The purpose of this study was to understand the motivation of private citizens to perform energy conservation activities through using the expectancy theory of motivation. Review of the literature showed the best starting point was a model proposed by Dachler and Mobley (1973) which was further updated in the present study. Using the expectancy model the present study focused on the relationships among motivation and effort, performance, future goals of energy conservation activities and one's perception of their control over their actions.

Interviews with 134 community residents randomly selected, by census statistics, and 56 non-randomly selected church-affiliated residents were conducted in the individuals' homes. Analysis was done using both individual respondent scores and a household score composed of the average score for the husbands and wives in the census sample.

The results indicated that the motivational variable (LPMEU) alone could not account for why some people work to conserve energy while others do not. However, when the respondent's effort was considered it became clear that people would perform if those outcomes they desired were perceived as coming from their efforts. Analysis of the interviews done before and after a severe winter also indicated that people tended to take energy conservation more seriously when the weather made it a salient and desirable approach.

In general, more needs to be known of the specifics of an individual's motivations to conserve energy. What are the outcomes which are of real importance and which ones aren't important? Do people feel that they can be achieved by performing conservation activities. More should be known about the communication and cooperation that exists between members of the same family concerning energy usage and how these factors influence the energy efficiency of the home.

We have just begun to study this area from a psychological perspective. Considering the national importance of energy conservation, it is imperative that some degree of understanding of psychological factors which affect conservation should be achieved before huge sums of money are spent, possibly in the wrong manner, to ameliorate the energy crisis.

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APPENDICES

APPENDIX A

CONSENT FORM

I understand that this survey is being conducted for research purposes only and that my complete anonymity is assured. I am also aware that I may refuse to answer any question which I feel violates my privacy and I am aware that I may end this survey at any time. I hereby attest that my participation in this survey is completely voluntary.

_____ _____

Date Signature of Respondent

_____

Signature of Interviewer

GENERAL INFORMATION

This survey is designed to obtain information on citizens' attitudes toward energy conservation in general, and in relation to specific activities which could be related to energy savings. Please complete this questionnaire as honestly and completely as possible. THANK YOU.

1. How satisfied are you with the amount of energy conservation activity done in your home?

1	2	3	4	5
very dissatisfied	dissatisfied	neutral	satisfied	very satisfied

2. What is the overall level of effort you have put into energy conservation activities over the past year?

1	2	3	4	5
no effort	some effort	average amount of effort	moderate amount of effort	considerable effort

ACTIVITY PAGE

(Repeated for each activity in Table 1).

Activity:_____

Circle the point on the following scales which best reflects your answers, even if, you don't own the necessary equipment or don't do the above activity.

1. Has this activity been done, or is it being done in your home? Yes ___ No ___.

   a. If no, how confident are you that you could do this activity if you wanted to do it, regardless of how desirable or undesirable this activity is to you?

1	2	3	4	5
not very confident		not sure		very confident

   b. If no, do you plan to do this activity in the near future? Yes ___ No ___.

2. How desirable is the actual doing of this activity to you, regardless of how confident you are that you could do it at all or are now doing it?

1	2	3	4	5
very undesirable	desirable	neutral	desirable	very desirable

3. Please answer the remaining questions by considering what would happen if you actually did the above activity.

   a. How confident are you that you would <u>save money</u> by doing this activity?

1	2	3	4	5
not very confident		not sure		very confident

   b. How confident are you that you would <u>lose some leisure time</u> if you did this activity?

1	2	3	4	5
not very confident		not sure		very confident

3. c. How confident are you that you would increase the safety of your home if you did this activity?

1	2	3	4	5
not very confident		not sure		very confident

d. How confident are you that you would spend money on home repairs and investments if you did this activity.

1	2	3	4	5
not very confident		not sure		very confident

e. How confident are you that you would have greater personal comfort in your home if you did this activity?

1	2	3	4	5
not very confident		not sure		very confident

f. How confident are you that you would have family, friends and neighbors feel negatively towards you if you did this activity?

1	2	3	4	5
not very confident		not sure		very confident

g. How confident are you that you would increase the value of your home if you did this activity?

1	2	3	4	5
not very confident		not sure		very confident

h. How confident are you that you would invest some initial effort and time in doing this activity?

1	2	3	4	5
not very confident		not sure		very confident

CONSERVATION ACTIVITIES

Check the following energy conservation activities which have been done in your home. Make a second check next to those activities which you were primarily responsible for doing.

	Done in your home	Your responsiblity	
1.	_____	_____	Thermostat set at 68 degrees for winter heating and 78 for summer cooling.
2.	_____	_____	Thermostat set back at night or when away from home for 8 hours or more.
3.	_____	_____	In absence of thermostats, thermometers are used to determine house temperature.
4.	_____	_____	Window and wall air conditioning units are covered during winter to prevent air leaks.
5.	_____	_____	Windows and door frames are caulked, weather stripped and tightly sealed.
6.	_____	_____	Storm windows and or storm doors are used year round.
7.	_____	_____	Draperies are opened and closed to help control room temperature.
8.	_____	_____	Fireplace damper is closed when not in use.
9.	_____	_____	Put in or made sure attic has at least 6 inches of insulation.
10.	_____	_____	Put in or made sure floor has at least 2 inches of insulation.
11.	_____	_____	Checked to make sure refrigerator and freezer door gaskets are tight.
12.	_____	_____	Checked to make sure crawl space vents under house are kept open for good ventilation.
13.	_____	_____	Unnecessary lights and appliances are turned off.
14.	_____	_____	Lowered the temperature in the hot water heater to approximately 140 degrees.

15. _____ _____ Repair leaky faucets, especially hot water faucets, as quickly as possible.

16. _____ _____ Insulate hot water pipes.

17. _____ _____ Use light bulbs of a lower wattage where ever possible (garage, hallways, closets)

18. _____ _____ Consolidate car trips.

19. _____ _____ Reduce the number of electrical appliances used.

20. _____ _____ Carpool or ride a bus or bicycle to work.

21. _____ _____ Wash only full dishwasher and clotheswasher loads.

22. _____ _____ For hand dishwashing, use tub of rinse water rather than running water.

23. _____ _____ Turn on yard or outside lights only when you expect people to be outside after dark.

24. _____ _____ Clean lint trap in dryer after every load.

25. _____ _____ Wash clothes in cold water when possible.

26. _____ _____ Set refrigerator temperature to maintain 35-40 degrees.

27. _____ _____ Defrost refrigerator when frost is 1/4 inch thick and not much thicker.

28. _____ _____ Plan shopping to reduce the number of trips.

OUTCOME DESIRABILITY ITEMS

Considering all that we have talked about so far, how desirable or undesirable is it for you to receive or do the following, independent of any specific activity.

Save money.

very undesirable — neutral — very desirable

Lose some leisure time.

very undesirable — neutral — very desirable

Increase the safety of your home.

very undesirable — neutral — very desirable

Spend money on home repairs and investments.

very undesirable — neutral — very desirable

Have greater personal comfort in your home.

very undesirable — neutral — very desirable

Have family, friends, and neighbors feel negatively towards you.

very undesirable — neutral — very desirable

Increase the value of your home.

very undesirable — neutral — very desirable

Invest some initial effort and time to do an activity.

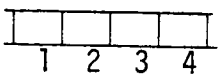
very undesirable — neutral — very desirable

APPENDIX B

LOCUS OF CONTROL QUESTIONNAIRE

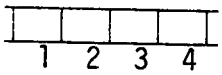
For each of the following pairs of statements place a checkmark (✓) in the box which indicates where your opinion is in relation to the two statements. For example, if you feel that your opinion is slightly close to the statement on the left, make a checkmark (✓) in the box number 2; or if you feel that your opinion is very close to the statement on the left, make a checkmark in box number 1. Similarly, check box numbers 3 if you feel that your opinion is slightly close, or number 4 if it is very close to the statement on the right.

1. Children get into trouble because their parents punish them too much.



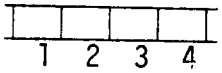
The trouble with most children nowadays is that their parents are too easy with them.

2. In the long run people get the respect they deserve in this world



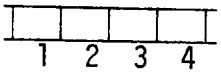
Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

3. The idea that teachers are unfair to students is nonsense.



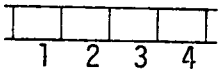
Most students don't realize the extent to which their grades are influenced by accidental happenings.

4. Becoming a success is a matter of hard work, luck has little or nothing to do with it.



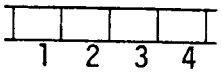
Getting a good job depends mainly on being in the right place at the right time.

5. The average citizen can have an influence in government decisions.



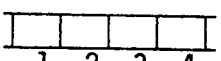
This world is run by the few people in power, and there is not much the little guy can do about it.

6. In my case getting what I want has little or nothing to do with luck.



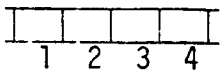
Many times we might just as well decide what to do by flipping a coin.

7. Who gets to be the boss often depends on who was was lucky enough to be in the right place first.



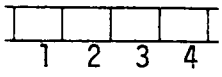
Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

8. Most people don't realize the extent to which their lives are controlled by accidental happenings.



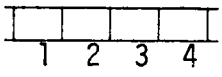
There really is not such thing as "luck."

9. In the long run the bad things that happen to us are balanced by the good ones.



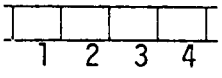
Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

10. Many times I feel that I have little influence over the things that happen to me.



It is possible for me to believe that chance or luck plays an important role in my life.

11. What happens to me is my own doing.



Sometimes I feel that I don't have enough control over the direction my life is taking.

APPENDIX C

ENERGY CONSERVATION ACTIVITIES IN THE HOME

The purpose in evaluating the following activities is to develop a measure of conservation performance in the home. Your ratings will result in the activities being placed on a scale of difficulty.

Directions: Consider each conservation activity as to the level of difficulty required to do it. Then to the left of the activity write the number of the category which you feel best describes this level of difficulty.

CATEGORIES

1	2	3	4	5	6	7
not very difficult		somewhat difficult		moderately difficult		very difficult

CONSERVATION ACTIVITIES

Category Number

_____ Thermostats set at 68 degrees for winter heating and 78 for summer cooling.

_____ Thermostat set back at night or when away from home for 8 hours or more.

_____ In absence of Thermostats, Thermometers used to determine home temperature.

_____ Window and wall air conditioning units are covered during winter to prevent air leaks.

_____ Windows and door frames are caulked, weather stripped and tightly sealed.

_____ Storm windows and or storm doors are used year round.

_____ Draperies are opened and closed to help control room temperature.

_____ Fireplace damper is closed when not in use.

_____ Put in or made sure attic has at least 6 inches of insulation.

_____ Put in or made sure floor has at least 2 inches of insulation.

_____ Checked to make sure crawl space vents under house are kept open for good ventilation.

_____ Checked to make sure refrigerator and freezer door gaskes are tight.

_____ Make sure unnecessary lights and appliances are turned off.

_____ Lowered the temperature in the hot water heater to approximately 140 degrees.

_____ Repair leaky faucets, especially hot water facuets, as quickly as possible.

_____ Insulate hot water pipes.

_____ Use light bulbs of a lower wattage where ever possible (garage, hallways, closets).

_____ Consolidate car trips.

_____ Reduce the number of electrical applicances used.

_____ Carpool or ride a bus or bicycle to work.

_____ Wash only full dishwasher and clothes washer loads.

_____ For hand dishwashing, use tube of rinse water rather than running water.

_____ Turn on yard or outside lights only when you expect people to be outside after dark.

_____ Clean lint trap in dryer after every load.

_____ Wash clothes in cold water when possible.

_____ Defrost freezer when frost is 1/4 inch thick and not much thicker.

_____ Plan shopping to reduce the number of trips.

APPENDIX D

LETTER OF REQUEST

A research team in the Department of Psychology at the University of Tennessee is involved in a project which will study the attitudes of Knoxville citizens toward energy and environmental conservation. We are attempting to obtain a representative sample of several hundred Knoxville residents. Your names have been randomly selected from the Knoxville City Directory to participate in this study.

We would like to invite you to participate in this study by allowing a UT researcher to come to your home for an interview.

We will telephone you within the next week to offer you more information, and hopefully to arrange for an interview.

THANK YOU FOR YOUR CONSIDERATION.

Sincerely,

John W. Lounsbury, Ph.D.
Project Director

APPENDIX E

LETTER TO PARTICIPANTS

Thank you for participating in our survey of opinions about environmental and energy conservation activities.

Your responses and comments will help us identify the relevant characteristics of household conservation activities which affect the degree to which a household accepts or rejects a particular activity suggestion. We hope that this information may ultimately have important implications in developing Federal and State environmental education programs or for energy conservation campaigns attempting to reduce household energy consumption.

Again, thank you very much for your time and concern.

Sincerely,

John W. Lounsbury, Ph.D.

APPENDIX F

ANALYSIS OF THE MORMON SAMPLE

Through a contact with an association of the Latter Day Saints (Mormons) religion a non-random sample of 56 Mormons were interviewed using the same structured interview guide used in the main study. As shown in Table 8, LPMEU was not significantly related to any dependent variable. LPMEU was related to LPMCU (r = .48, p < .001). Satisfaction with one's current conservation activities was significantly related to both current conservation efforts (r = .38, p < .01) and goals of future activities (r = .19, p < .05). These goals were negatively related to current levels of conservation performance (r = -.21, p < .05).

In a comparison of the Mormon sample with the census sample used in the main study, the Mormons were significantly younger ($t(183)$ = -6.92, p < .001), had more children ($t(183)$ = -6.30, p < .001), and lived in newer homes ($t(185)$ = -6.72, p < .001). Significant differences were also found in the LPMEU ($t(188)$ = -2.83, p < .01) and LPMCU scores ($t(184)$ = -2.61, p < .01), and Mormons were less satisfied with what they were doing than the general public ($t(188)$ = 3.55, p < .001). However, results based on the Mormon sample could be affected by restrictions of range as this sample was not randomly selected and consisted of respondents who were actually selected for their similarity of values and religion.

Comparison of the expectancy model variable and dependent variables using the two samples showed effort and satisfaction to be related in both census and Mormon samples (r = .47, p < .001; r = .38,

TABLE 8

CORRELATIONS BETWEEN EXPECTANCY MODEL VARIABLES FOR THE MORMON SAMPLE

Measures		(2)	(3)	(4)	(5)	(6)
LPMEU	(1)	.48***	-.11	-.02	.14	-.02
LPMCU	(2)		-.10	-.10	.07	.06
Performance	(3)			.11	-.26*	-.18
Effort	(4)				-.07	.38**
Goals	(5)					.19*
Satisfaction	(6)					

N = 56.

*$p < .05$.

**$p < .01$.

***$p < .001$.

$p < .01$; respectively). In contrast, effort and performance were related only in the census sample ($r = .29$, $p < .01$). Performance was related to goals only in the Mormon sample, and in the negative direction ($r = -.26$, $p < .05$). Performance and satisfaction were related only in the census sample ($r = .21$, $p < .05$). Finally, satisfaction with current activities was related to future goals only in the Mormon sample ($r = .19$, $p < .05$).

In summary, the Mormons, as compared to the general public, were younger, had more children and lived in newer homes. They were more motivated towards conservation and were less satisfied with what they were doing in this area.

APPENDIX G

EFFECT OF A WEATHER CHANGE ON RESPONDENTS' CONSERVATION ATTITUDES

During December, 1976 and January, 1977 the most severe winter weather in over a decade occurred in the East Tennessee region (Big Freeze, The, 1977). To capitalize on this an analysis was done comparing the census sample interviews collected during the Fall (between October and the beginning of December) with those collected in the Winter (between the third week of January and the end of May).

Results of the analysis of individual scores by Fall and Winter season are shown in Table 9. For both Fall and Winter samples the LPMEU score was not predictive of performance or effort. It was also not predictive of goals. However, effort and performance were significantly related in both Fall and Winter samples (r = .27, p < .01; r = .25, p < .05; respectively). In addition, several interesting relationships did appear in the Winter sample which were not in the Fall one. First, in the Fall sample current conservation performance was significantly related, in a negative direction, with one's goals of future conservation activities (r = .30, p < .01). This meant that those performing at a high level, in general, did not set goals as high as those performing at a lower level. However, after the Winter weather set in this relationship reversed itself. Performance was significantly related to future goals in a positive manner (r = .29, p < .01). The difference between these two correlations was significant (z = -6.96, p < .05). Possibly those performing conservation activities at a high level now

TABLE 9

CORRELATIONS BETWEEN EXPECTANCY MODEL VARIABLES AND ENERGY CONSERVATION VARIABLES FOR THE CENSUS SAMPLE, INDIVIDUAL SCORES BY FALL (UPPER TRIANGLE, N = 72) AND WINTER SEASONS (LOWER TRIANGLE, N = 62)

Measures							
[illegible]	(1)		.70***	-.02	-.09	.19	-.02
[illegible]	(2)	.65***		-.02	.18	-.01	.05
[illegible]	(3)	-.05	-.15		.27**	-.30**	.21*
[illegible]	(4)	-.03	.06	.25*		-.32**	.52***
[illegible]	(5)	.02	-.02	.29*	.01		-.23*
[illegible]tisfaction	(6)	-.17	-.07	[illegible]	.38**	[illegible]	

*p < .05.

**p < .01.

***p < .001.

set higher goals of future conservation activities than did those performing current activities at a lower level. Second, performance was also significantly related to satisfaction with one's current conservation activities in the Fall sample but not in the Winter sample (r = .21, p < .05; r = .14, ns); respectively). However, these correlations were not significantly different (z = .83, ns). Third, a significant difference (z = 6.63, p < .05) was detected between individual effort and goals for the Fall and Winter respondents. In the Fall effort was negatively related to goals, but in the Winter this relationship disappeared (r = .32, p < .01; r = .01, ns; respectively). In the Fall sample those putting in high amounts of effort set relatively easier goals than did those putting in less effort. But, this existed only before the inclement weather set in. Satisfaction with one's current conservation activities was significantly related, in the negative direction, with future goals in the Fall sample, but the relationship disappeared in the Winter sample (r = -.26, p < .05; r = < .11, ns; respectively). This difference was also significant (z = -4.31, p < .05).

VITA

Carl W. Ericsson was born in Brooklyn, New York, on October 17, 1947. He attended elementary, junior high and high school in Miami, Florida and graduated from Hialeah High School in 1965. He attended Miami Dade Junior College and received an Associate in Science degree in Aviation Technology in 1967. He then entered the University of West Florida and received a Bachelor of Science degree in Systems Science in 1970. In 1972, he entered the Graduate School of the University of Tennessee. In 1972 he also became employed in the University of Tennessee Personnel Office where he performed personnel research while doing his graduate studies. He received the Master of Science degree in Industrial/Organizational Psychology in the Fall of 1976. He received the Doctor of Philosophy degree in Industrial/Organizational Psychology in March, 1978.

He is married to the former Connie Boyd of Ft. Lauderdale, Florida and has a son, Christopher Ryan.