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ABSTRACT

This report reviews versions of testing expectancy theory predictions of individual choice behavior. The ipsative, normative and return on effort approaches are addressed as are the issues of conceptual, methodical and empirical problems associated with each approach. In order to test the hypotheses as to which approach would yield stronger expentancy theory predictions of work effort, 160 graduate and undergraduate students were administered a questionnaire regarding intentions and attitudes about studying on an anonymous and voluntary basis. It was found (1) that ipsative expectancy theory predictions of work effort were considerably better than normative correlations; (2) using a normative paradigm, return on effort zero-order correlations were superior to normative maximum benefit correlations; (3) using an ipsative paradigm, return on effort correlations were consistently superior to maximum benefit correlations. (YJR)

IPSATIVE, NORMATIVE AND RETURN ON EFFORT VERSIONS OF EXPECTANCY THEORY

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The conventional approach to testing expectancy theory predictions of work behavior has been to correlate individuals' expectancy-valence scores with measures of individual work motivation and job performance. Although this (normative) across-individual paradigm has rather convenient statistical properties and has been extensively employed, there are, nonetheless, serious conceptual, methodological, and empirical difficulties associated with its use.

Conceptual, Methodological and Empirical Issues

There is wide agreement that expectancy theory is a model of individual choice behavior (Dachler and Mobley, 1973; Wahba and House, 1974; Mitchell, 1974; Vroom, 1964). It is generally theorized that individuals choose the acts they engage in (the direction of behavior), as well as the vigor with which they act (the amplitude of behavior), and the duration of their actions (the persistence of behavior) on the basis of expectancy-valence type considerations (Campbell, Dunnette, Lawler and Weick, 1970). More specifically, the greater a person's expectancies that a particular type of behavior will lead to various outcomes, and the more positively valent these various anticipated outcomes, the greater the motivational force to choose that particular type of behavior.

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Formulated as a model of individual choice behavior, expectancy theory clearly requires an ipsative, within-subject paradigm for testing its predictions. After all, as Atkinson (1964) wryly noted: the last person to arrive at the dinner table is not necessarily the least hungry; rather this person may simply be more motivated to do other things than eat. Yet, although expectancy theory researchers have consistently cited a within-subject choice theory, "not a single investigation has predicted job effort in this manner" [Mitchell, 1974, p. 1068, Mitchell's italics]. Instead, researchers have tested the premise that people who are above the norm in expectancy-valence scores will also be above average in effort expenditure or job performance. In short, there has been a conceptual mismatch between expectancy theory as it is expounded and the data used to test it.

Methodological problems associated with the use of grouped data to examine relationships at the individual level of analysis have been noted previously (e.g., Sidman, 1960). Nevertheless, a specific illustration in the context of expectancy theory research may be useful (see Figure 1). For Persons A and B there is a positive relationship between the relative motivational force (measured by expectancy-valence scores) of two alternative acts, and the level of effort expenditure associated with each of these acts. It is evident, therefore, that ipsative expectancy theory predictions of work effort are confirmed using the hypothetical data. In contrast, the conventional across-individual paradigm yields a negative relationship between individuals' expectancy-valence scores for specific acts and the level of effort expenditure. Moreover, if instead of comparing expectancy-valence scores for specific acts, respondents furnished such data for a generalized act (e.g., "working hard"), use of the conventional normative paradigm would still fail to confirm expectancy theory predictions in the case at hand.

Another methodological difficulty associated with normative expectancy theory research is the problem of inter-individual differences. Variations in ability or response set tendencies, to name just two possible contaminants, may confound results. The ipsative paradigm, though, automatically standardizes the data for each subject, thereby controlling for other things which may not be equal.

Unfortunately, there is one major obstacle to the conduct of ipsative expectancy theory research: this paradigm requires that comparisons be made across behavioral choices (acts, exertion levels, or duration times) for one person, rather than across people for one type of behavior (such as working hard). Clearly, the latter type of data are much more easily obtainable. As Mitchell (1974) noted,

> If one chooses a within-subject analysis, he must be prepared to measure the degree to which different levels of effort lead to different levels of different outcome dimensions. Three levels of effort with five outcomes with five levels of each demands 75 subject responses and still only generates three ΣEVs for each subject. The research work becomes cumbersome very quickly. [p. 1070].

Empirical results to date using the across-individual paradigm have not been particularly encouraging. A recent survey of sixteen populations found a median correlation between expectancy-valence scores and concurrent job performance of r = .21 (Kopelman, 1974). Although positive results have usually been obtained, correlations have not been sizble and writers have increasingly expressed skepticism and disappointment. For instance, House, Shapiro and Wahba (1974) wrote: "Generally, the conclusions of this review are rather disappointing...It appears that support for the various parts of the theory are usually rather low." [p.502].

One explanation for the disappointing results to date is that the across-individual design introduces a number of complicating factors that need be controlled for, such as: differences in ability, differences in task difficulty, differences in level of rewards received, differences in initial level of the criterion, and differences in organizational reward practices. Indeed, recent evidence suggests that these factors (and time lags) serve as boundary conditions for normative expectancy theory predictions (Kopelman, 1974).

It may not be entirely due to chance that in the three instances in which ipsative expectancy theory predictions were performed (involving predictions of occupational preferences and leadership behaviors), ipsative predictions were as good or better than normative ones (Mitchell, 1974). Along these lines, Locke (1969) repeatedly found that correlations between discrepancy scores and satisfaction items were slightly better using a within-subject design as compared to an across-subject design.

In view of the aforementioned conceptual, methodological, and empirical considerations, the following proposition is advanced for testing:

> Hypothesis I-- Ipsative expectancy theory predictions of work effort will be stronger than normative expectancy theory predictions.

Return on Effort (ROE)

Both the normative model of differences in grouped data and the ipsative model of individual choice behavior share an important commonality: both models assume that individuals choose their behaviors on the basis of total motivational force (net of costs) so as to maximize total expected benefits. Yet this conception runs

counter to the decision algorithms found in a variety of other contexts--e.g., the least energy principle in Physics (Blumberg, 1974), the notions of marginal gain and comparative advantage in Economics, the idea of return on investment (ROI) in Finance. All of the latter decision rules are incremental maximization algorithms. Applying an incremental decision algorithm to human work behavior suggests that people will (or should) choose those acts with the highest incremental return on invested effort (ROE), and not necessarily choose those acts with the greatest total benefit.

An example may clarify this distinction. Consider the case of Person A and Person B, both trying to decide whether to work especially hard or only a minimal amount. Assume that the motivational force of working hard is 100 for Person A and 80 for Person B; assume, further, that the motivational force of working only a minimal amount is 60 for Person A, 20 for Person B. Using the maximization of total benefits algorithm, expectancy theory would predict that Person A would be more motivated to work hard than Person B. An incremental analysis, however, suggests that Person B would obtain a higher return on his effort expenditure than Person A (60 versus 40 motivational force units); hence, Person B would presumably be more motivated to work hard. Similarly, but in ipsative terms, a student might choose to study especially hard for a course with lower total benefits, because the marginal return on effort is greater.

Unfortunately, no prior expectancy theory research has examined predictions using an incremental decision rule; perhaps the closest that past research has come to a marginal analysis is to obtain instrumentalities for high and low performance (Georgopoulos, Mahoney and Jones, 1957). Therefore in the absence of pertinent prior research, the following

proposition is rather tentatively advanced:

> Hypothesis II-- Expectancy theory predictions of work effort will be stronger using a return on effort formulation than using the (conventional) maximum benefit model. This will apply to both normative (Hypothesis IIA) and ipsative (Hypothesis IIB) paradigms.

METHOD

The sample consisted of 160 graduate and undergraduate students taking Management courses at Baruch College in 1974. All respondents were either employed full-time (n = 101) or part-time (n = 59); the median age was 24; 77% were male; 74% reported supporting one or more dependents.

The questionnaire, entitled, "Survey of intentions and attitudes about studying", was administered during the third week of the school term and was completed on an anonymous and voluntary basis. Respondents listed courses in alphabetical order, the exact number of courses taken varying by respondent: exactly 1 course (n = 16); 2 courses (n = 51); 3 courses (n = 23); 4 courses (n = 32); 5 or more courses (n = 38). Respondents taking 6 courses completed all 161 questionnaire items, a task requiring about 30 minutes.[2]

Expectancies were operationalized for two levels of effort, studying "especially hard" and studying "a minimal amount", by asking the question,"If you were to study especially hard [a minimal amount] for course # 1 [2,3...6], what would your chances be of ...?" The six outcomes used were: getting a good grade (an A or B); avoiding a bad grade (a D or F); obtaining useful knowledge; enjoying taking the course; getting a promotion at work; obtaining a better job in another organization.[3] A 7-point scale was used with the end scores labeled "excellent"

and "poor".

Valences for the first four outcomes were operationalized for both levels of effort by asking, "If you were to study especially hard [a minimal amount] for course # 1 [2,3...6], how pleasurable would it be to...?" Valences for the last two outcomes did not specify a level of study effort, and simply asked, "How desirable to you would it be to...?" All valence items used a 7-point scale with end scores labeled "very desirable" and "not desirable".

Work effort was measured by the initial question respondents were asked, namely: "On the average this semester, how many hours per week do you plan to study for each course?" Mean number of hours respondents planned to study per course declined with the number of courses taken, from 4.06 hours with one course to 2.24 hours (per course) with 5 courses. As a rough indication of (alternate measure) reliability, correlations were performed between planned study hours for each course and responses to the question, "How time consuming is it to prepare for course # ...?" The median correlation for courses #1 through #5 was r = .36.

Return on effort (ROE) was operationalized by subtracting the motivational force score for studying a minimal amount (ΣEVsma) from the motivational force score for studying especially hard (ΣEVseh). Because deficiency scores are subject to artifactual contamination (e.g., Wall and Payne, 1973), return on effort correlations were performed a) on a zero-order basis; and b) after partialling out the subtracted term (ΣEvsma).

RESULTS AND DISCUSSION

Normative, across-individual correlations between motivational force scores and planned study hours are presented in Table 1. As predicted by expectancy theory, there was a positive relationship between the motivational force of studying especially hard (ΣEVseh) and the number of planned study hours: 4 out of 5 correlations were positive, 3 significant at $p < .05$, the mean normative correlation being $r = .18$. Not surprisingly, there was a negative relationship between the motivational force of studying a minimal amount (ΣEVsma) and the number of planned study hours: 4 out of 5 correlations were negative, 2 significant at $p < .01$, the mean normative correlation being $r = -.13$.

Normative correlations using the incremental return on effort formulation (ROE) are also presented in Table 1. In 4 out of 5 cases ROE correlations were stronger than than those obtained using the conventional maximum total utility predictor (ΣEVseh); 2 of these differences were significant-- course # 1, $Z = 2.58$ ($p < .01$) and course # 3, $Z = 2.82$ ($p < .01$)--using the Hotelling formula for the significance of differences between correlated correlations (c.f. Guilford, 1965). However after partialling out the subtracted term (ΣEVsma), normative ROE correlations were approximately equal to normative correlations using the maximum benefit algorithm (ΣEVseh)--indicating no support for Hypothesis IIA.

Ipsative correlations between motivational force scores and planned study hours were computed for all respondents taking 3 or more courses. A comparison of ipsative and normative correlations (Table 2) indicates that the former were generally superior. Among respondents

taking exactly 3 courses, median ipsative correlations using the 3 motivational force predictors-- study especially hard (ΣEVseh), study a minimal amount (ΣEVsma), and return on effort (ROE)--were r = .68, r = -.66, and r = .75, respectively. In comparison, mean normative correlations for the same respondents using the same 3 motivational force predictors were r = .37, r = -.15, and r = .42. Results were even more supportive (of Hypothesis I) among respondents taking exactly 4 courses: median ipsative correlations using the 3 motivational force predictors were r = .42, r = -.15, and r = .54 compared to mean normative correlations of r = .05, r = -.19, and r = .20. Even though normative correlations for respondents taking exactly 4 courses were not significant, median ipsative correlations were sizable. However, for respondents taking exactly 5 courses, median ipsative correlations were only slightly better than normative correlations. All in all, the present data tend to support Hypothesis I; but the superiority of ipsative as compared to normative correlations appears to attenuate as the number of behavioral choices increases--principally because ipsative correlations diminish in magnitude.

Lastly, Hypothesis IIB predicted that ipsative correlations using a marginal decision rule (ROE) would be better than ipsative correlations using a maximum expected benefits algorithm (ΣEVseh). Results were as hypothesized. Among respondents taking 3, 4, and 5 courses, ipsative ROE correlations were, respectively, r = .75, r = .54, and r = .35; for the same respondents, ipsative maximum expected benefits (ΣEVseh) correlations were r = .68, r = .42, and r = .27. Although normative ROE correlations were probably spuriously elevated due to a scaling artifact, the same cannot be said about ipsative ROE correlations.

CONCLUSIONS

In summary, data presented herein suggest three main conclusions. First, ipsative expectancy theory predictions of work effort were considerably better than normative correlations, although the difference narrowed as the number of behavioral alternatives increased (Hypothesis I). Second, using a normative paradigm, return on effort (ROE) zero-order correlations were superior to normative maximum benefit correlations, but this finding virtually disappeared using partial correlation analysis (Hypothesis IIA). Third, using an ipsative paradigm, return on effort (ROE) correlations were consistently superior to maximum benefit correlations, a finding not attributable to a scoring artifact (Hypothesis IIB).

All told, the present results are encouraging for expectancy theory research. As Mitchell (1974) wrote: "...before we reject Vroom's original formulation, we should correctly test it." [p. 1075]. While the present study, far from being the "correct test", has several deficiencies (e.g., use of students as subjects; use of a self-report criterion), it does represent a first, and moderately successful, test of work effort predictions using an ipsative design. In addition, finding support for the return on effort formulation suggests a possible future convergence of expectancy theory with various other incremental decision algorithms.

FOOTNOTES

1. The author appreciates the assistance of Mr. Edward Abramowitz, Research Assitant at Baruch College, in helping perform the data analysis for this paper.

2. Because only 5 respondents reported taking 6 or more courses, data analyzed herein pertain only to courses #1 through #5.

3. Expectancies for the last two outcomes were obtained using slightly different wording. Respondents were asked, "If you were to study especially hard [a minimal amount] for course # 1 [2,3...6] , how useful might this be in the long run for...?" Additionally, a slightly different outcome list was used for respondents who were not employed, but because only 29 respondents were not employed these data were not analyzed.

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TABLE 1

Normative Expectancy Theory Predictions of Work Effort:
Correlations between Study Hours Criterion and
Four Motivational Force Predictors

Courses	Motivational Force Predictors: Study Especially Hard (ΣEVseh)	Study a Minimal Amount (ΣEVsma)	Return on Effort (ROE) = (ΣEVseh - ΣEVsma)	Return on Effort, ΣEVsma Partialed out
Course # 1 (n = 159)	.21**	-.23**	.38**	.28**
Course #2 (n = 143)	.19*	-.06	.21**	.16*
Course #3 (n = 92	.23*	-.28**	.41**	.25**
Course #4 (n = 69)	-.02	-.01	-.01	-.07
Course # 5 (n = 38)	.26	.03	.22	.18
Mean Correlation	.18	-.13	.27	.16

**p < .01.

*p < .05.

TABLE 2

A Comparison of Ipsative and Normative Expectancy Theory Predictions of Work Effort

	Normative Correlations			Ipsative Correlations[a]		
	SEH	SMA	ROE	SEH	SMA	ROE
Exactly 3 Courses (n = 23)						
Course #1	.39*	-.27	.46*			
Course #2	.44*	.22	.26			
Course #3	.28	-.37*	.52**			
Mean Correlation	.37*	-.15	.42*	.68	-.66	.75
Exactly 4 Courses (n = 32)						
Course #1	.23	-.30*	.42**			
Course #2	.10	-.25	.26			
Course #3	-.10	-.17	.06			
Course #4	-.01	-.03	.02			
Mean Correlation	.05	-.19	.20	.42	-.15	.54
Exactly 5 Courses (n = 33)						
Course #1	.50**	.00	.41*			
Course #2	.28	.10	.16			
Course #3	.51**	-.20	.53**			
Course #4	-.06	.01	-.06			
Course #5	.28	.18	.16			
Mean Correlation	.31	.02	.25	.27	-.35	.35

[a]Median within-subject product-moment correlations

Note: SEH = Motivational force predictor for study especially hard (ΣEVseh).
SMA = Motivational force predictor for study a minimal amount (ΣEVsma).
ROE = Motivational force predictor for (ΣEVseh - ΣEVsma)--i.e. return on effort.

**p < .01.

*p < .05.

FIGURE 1

A Comparison of Ipsative and Normative Expectancy Theory Predictions of Effort Expenditure: A Hypothetical Case