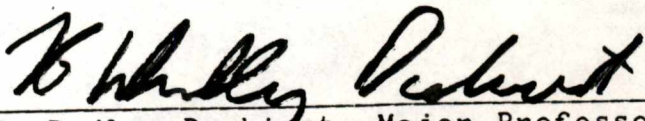
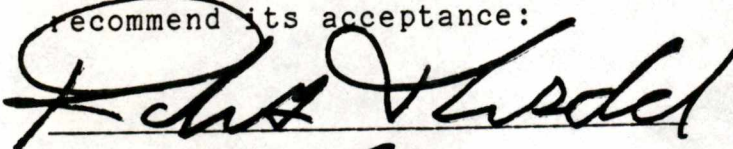
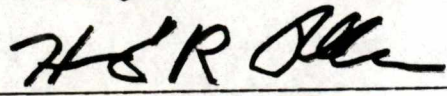


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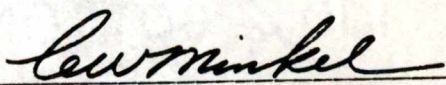
I am submitting herewith a dissertation written by David Elliot Lewis entitled "The Development and Validation of an Expectancy-Based Scale for the Measurement of the Motivation to be Creative." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Industrial and Organizational Psychology.


H. Dudley Dewhirst, Major Professor

We have read this dissertation and
recommend its acceptance:


Accepted for the Council:


The Graduate School

THE DEVELOPMENT AND VALIDATION OF AN
EXPECTANCY-BASED SCALE
FOR THE MEASUREMENT OF
THE MOTIVATION TO BE CREATIVE

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

David Elliot Lewis

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ABSTRACT

The influence of motivation on creative performance has been recognized. Its source and amount of influence, however, have not been well explored or understood. This dissertation proposed to fill this need by developing a better theoretical and empirical understanding of the role of motivation in creative activity.

The theoretical issue was addressed by applying an expectancy-based theory of motivation to explain motivation for creative action. It was hypothesized that the motivation to be creative, and consequently creative performance, was a function of one's self confidence in their creative ability (Expected Creativity) and one's expectation of their creative action leading to rewarding outcomes (Expected Reward).

The empirical issue was addressed by building and validating an expectancy-based measure of the motivation to be creative. Specifically, an 81 item Creative Motivation Scale (CM Scale) was developed to measure the constructs of Expected Creativity and Expected Reward. It was validated against a creative ability criterion and a past creative accomplishment criterion using a sample of 428 undergraduates; 176 of whom were randomly held out for the purpose of cross validation.

The results showed that the CM Scale significantly validated and cross-validated against the two criteria. Additionally, item analysis was used to construct a shorter general CM Scale and eight specialized CM Scales to predict performance in specific domains of creative achievement. These scales showed moderately higher validity and cross-validity than the original CM Scale.

Although, both the Expected Creativity and Reward subscales were found valid, the former consistently showed higher validity than the latter. This was interpreted in light of the inherent difficulty of measuring the Expected Reward construct. A computer-based interactive administration was proposed to remedy this problem.

The results have implications for the usefulness of an expectancy-based creative motivation factor for understanding and predicting creative performance. They also have implications for those who attempt to increase creativity in themselves and others.

TABLE OF CONTENTS

SECTION	PAGE
INTRODUCTION	1
I. A REVIEW OF THE THEORETICAL LITERATURE	4
The Impact of Definition	4
How Creative is Creative?	5
Divergent Versus Convergent Thinking	8
Unidimensional Versus Multidimensional Definitions	10
Creativity and Intelligence	12
Sex and Race Differences	17
The Creative Process	17
The Role of the Subconscious in Creativity	18
Fast Versus Slow Creativity	21
The Mechanism of Incubation	22
The Role of Creativity in Problem Solving	24
II. A REVIEW OF THE MEASUREMENT LITERATURE	28
The Torrance Tests of Creative Thinking (TTCT)	29
TTCT Reliability	31
TTCT Criterion and Content Validity Issues	32
TTCT Validation with High School Students	33
TTCT Validation with Adults	34
TTCT Long Term Predictive Validity	35
The Remote Associates Test	36
Ratings of Creative Performance by Others	38
Biographical Creative Achievement Inventories	42
Personality and Attitude Measures of Creativity	48
III. THE MOTIVATION TO BE CREATIVE	52
The Importance of Motivation for Creativity	52
Speculation on the Source of Creative Motivation	54
Applying Expectancy Theory to Explain Creative Motivation	55
Support for the Effect of Expected Creativity on Creative Motivation	58
Support for the Effect of Expected Reward on Creative Motivation	62
The Importance of Perceiving the Creativity-Reward Contingency	67
The Bottom Line	68
The Hypothesis of this Dissertation	70

SECTION	PAGE
IV. METHODS	71
Sample	71
The Creative Motivation Scale (CM Scale)	71
The Creative Accomplishments Inventory (CAI)	74
The Torrance Tests for Creative Thinking (TTCT)	77
Procedure	80
V. RESULTS	81
Overview	81
Scoring Procedures	81
Internal Consistency	85
Validity	88
Item Analysis	95
Refinement of the CM Scale into the New CM Scale	110
Development of Achievement-Domain Specific CM Scales	112
Factor Analysis of the New CM Scale	116
VI. DISCUSSION	131
Test of the Major Hypothesis	131
Verbal Versus Visual Validity Differences	134
The New CM Scales	134
Implications and Applications	135
Areas in Need of Further Investigation	140
Conclusion	144
LIST OF REFERENCES	145
APPENDIXES	154
A. THE CREATIVE MOTIVATION SCALE (CMS)	155
B. THE CREATIVE ACHIEVEMENT INVENTORY (CAI)	165
VITA	176

LIST OF TABLES

TABLE	PAGE
1. The internal consistency reliability of the Creative Motivation Scale and its two subscales . .	86
2. The interrelationship of the Expected Creativity and Expected Reward subscales with each other and with the Creative Motivation Scale	87
3. Validity of the Creative Motivation Scale and its Expected Creativity and Expected Reward Subscales .	89
4. Cross validation of the CM Scale validity coefficients for the TTCT and CAI criteria	90
5. Validity of the CM Scale and its two subscales for each of the three parts of the TTCT Criterion .	93
6. Cross validation of the CM Scale validity coefficients for each of the three parts of the TTCT Criterion	94
7. Validity of the CM Scale and its two subscales for each of the eight domains of the Creative Achievement Inventory criterion	96
8. Cross validation of the CM Scale validity coefficients for the eight domains of the Creative Achievement Inventory	97
9. Expected Creativity item reliabilities and validities	98
10. Expected Reward item reliabilities and validities	101
11. Item validities of the conceptually purest Expected Creativity Items	106
12. Item validities of the conceptually purest Expected Reward Items.	108
13. The 28 Items included in the New CM Scale	111
14. The validity of both the new and original CM Scales for the primary and holdout samples . . .	113
15. The CM Scale items contained in each of the domain-specific Creative Motivation Scales . . .	114

TABLE	PAGE
16. Eight new specialized Creative Motivation Scales	117
17. The cross validation of the domain specific creative motivation scales	118
18. Factor loadings of the New CM Scale with the items grouped by factor	120
19. Intercorrelations between the five factor scores	126
20. Validation of the New CM Scale's factor structure against the TTCT criterion and the CAI criterion	127
21. Cross validation of the New CM Scale's factor structure against the TTCT criterion and the CAI criterion	128
22. The confirmation of the New CM Scale's factor structure by its correlation with its matching Factor Scales	129
23. The cross-validated confirmation of the New CM Scale's factor structure	130

INTRODUCTION

The study of creativity has generated some disagreement over how creativity should be defined, operationalized, measured and developed. One notable exception is the general agreement on the importance of motivation as a determinant of creative performance. Although the importance of motivation is recognized, its source and operation are not well understood. Specifically, there does not exist a good theoretical framework to explain what variables influence this motivation and then, in turn, explain how this motivation operates to affect creative performance. Additionally, there does not exist a good empirical investigation of the role this motivation plays in creative performance, especially with respect to the extent that variance in creative ability and accomplishments can be accounted for by a motivational factor.

This dissertation proposed to fill some of these theoretical and empirical gaps. The theoretical problem was addressed by applying an expectancy-based theory of motivation to explain creative motivation. The empirical problem was addressed by building and validating an expectancy-based measure of creative motivation. The validation helped reveal the degree that creative

performance could be accounted for by a motivational factor.

The results showed that both past creative accomplishments and current creative ability were significantly predicted by an expectancy-based measure of creative motivation.

This successful prediction had at least two major implications. The first was increased accuracy in the measurement of creative capacity. The second was support for a process by which organizations can increase creativity in problem solving by developing their members' creative expectations.

This dissertation is organized into six chapters. The first chapter reviews the literature on the various definitions and explanations of the creative process. The second chapter reviews the literature on the different methods used in measuring creative abilities, personality and performance. The third chapter outlines the application of an expectancy-based theory for the explanation and measurement of creative motivation. Then, it reviews literature that provides some indirect support for this application. The fourth chapter outlines the procedure used for developing an expectancy-based measure of creative motivation and details the methodology used to validate and refine it. The fifth chapter presents the

results of the analysis. The analysis involved three stages. The first stage assessed the reliability, validity and cross validity of the expectancy-based creative motivation scale. The second stage employed item analysis to develop a set of shorter and more valid scales. Specifically, one general and eight specialized creative motivation scales were constructed, validated, and cross validated. The third stage explored the factor structure of the new general scale. Lastly, the sixth chapter discusses these results and their implications.

I. A REVIEW OF THE THEORETICAL LITERATURE

The Impact of Definition

To date, there is no generally accepted definition of creativity. Taylor (1959), after his review of over one hundred definitions, stated that the multitude of definitions acts as a semantic fog which envelopes the concept.

Creativity has been viewed from four different orientations. According to Torrance (1974) these are:

1. Characteristics of a expression, idea or product.
2. The cognitive process that produces this outcome (which can be verbal/semantic and/or visual/spatial).
3. The characteristics of the individual using this process.
4. The environmental variables that affect the individual's ability to produce these creative outcomes.

These different approaches taken toward the understanding of creativity can be likened to the proverbial blindmen trying to describe the creativity elephant, each from a perspective that precludes a full view of the beast.

The definitions of creativity, like the different approaches, tend to fall into product, process, person or environmental orientations. The choice of theoretical orientation is important since how creativity is defined, determines how it is operationalized, measured, trained, and selected for. Often, theorists who define creativity from one of these four orientations ignore the potential influence from the other orientations.

One of the more typical or modal definitions of creativity is exemplified by Burgett (1983) who defines

creativity as the ability to fashion continually fresh responses to problems presented by the available body of knowledge (p. 239).

How Creative is Creative?

The issue that causes the greatest disagreement is how original an idea needs to be and how important the problem it addresses needs to be before the idea can be called creative. Burgett believes "that every conscious human action, from the most mundane to the most cerebral is potentially creative" (1983, p. 239). He goes on to say

Being creative is a process that evolves from an infant's efforts at satisfying its needs to feats and states of being which are beyond imagination (p.247).

Carl Rogers' definition of creativity requires only that an individual produce ideas that are novel in comparison to his or her own prior ideas (1959). Guilford's (1967) definition, however, requires more since it demands that an idea be statistically infrequent with respect to all of the ideas produced by similar persons working on similar problems. Rogers does not demand that an idea be useful to be called creative. In direct contrast, Guilford insists that an idea must be useful for something to be called creative.

Rather than argue over what cutoffs or minimum standards should be used to judge creativity, it may be more fruitful to distinguish between different levels of creativity.

Schubert and Biondi (1976) state that creativity should be differentiated into two functional types. The first type produces new responses to every-day challenges. These ideas may or may not be tangible. The second type produces new and tangible solutions to significant problems. These solutions, products or ideas have applicability beyond the current problem they solve. They also claim that it is a mistake to investigate only one of these types while ignoring the impact of the other. In a similar line of reasoning, Nichols (1972) maintains that while creative ability may be a normally distributed trait

in the population, the accomplishments of eminently creative individuals differ in a qualitative way from the accomplishments of less creative individuals.

Part of the difference between eminent and normal creativity has been attributed to differences in task commitment. Eminent creators are distinguished by their active striving and intensity of involvement (Maddi, 1965), and by their intrinsic motivation and self initiation (Taylor & Ellison, 1967; Chambers, 1964; Barron, 1963).

In fact, greater task involvement can provide the motivation necessary to achieve a high level of creativity. Barron (1969) states that "hard work and dedicated practice are all most invariable precursors of originality and distinctive achievement" (p. 3).

Greater involvement also leads to greater knowledge about the problem. The importance of problem knowledge is pointed out by Ghiselin (1955) who maintains that the reshaping or extension of human achievement in any field requires a high level of mastery in that field.

Eminent creators also, may be differentiated by the standards they strive toward. Mackinnon (1965), has found that creative architects tend to strive for self generated standards of excellence while less creative architects strive toward conformity to professionally defined

standards. Nichols insists that as a consequence of these differences, different criteria should be used to measure creativity in eminent and normal populations. For normal individuals, evidence of originality is a minimum requirement to call their output creative. For eminent creators, the transformational effects of their work on the perceptions and actions of others is a minimum requirement.

Just as eminent creativity can be distinguished from every day creativity, Driver (1979) maintains that creativity should be distinguished from innovation. Innovation uses an established formula or methodology for combining ideas. Consequently, innovation adapts solutions to new situations or improves upon existing solutions. Creativity, on the other hand, uses a completely novel approach for combining ideas. Consequently, creativity generates entirely new solutions. For example, the first gasoline engine was creative. Adapting it to diesel fuel, however, was innovative. Picasso's first blue period painting was creative. The hundreds of blue period paintings that followed from others, however, were often innovative.

Divergent Versus Convergent Thinking

At the core of many definitions of creativity, is the concept of divergent thinking or ideational productivity.

This is the ability to produce ideas that are original and different from each other (Guilford, 1967; Nichols, 1972).

Divergent thinking can be viewed as the other side of convergent thinking. Trachtman (1975) describes the difference by statings:

Where the intellectual mind converges on a problem, clothed in mental blinders to prevent it from being distracted, the creative mind tends to diverge, maintaining an awareness of a great variety of irrelevant issues in the expectation that novel connections will be perceived which will offer the possibility of unexpected solutions or even of a fundamentally different statement of the entire problem (p.37).

This distinction between divergent and convergent thinking has been described in different terms by different theorists. For instance, Bruner (1960) made a similar distinction by refering to analytic versus intuitive thinking.

Analytic thinking is a sequential, step-by-step mode of thought. The steps are explicit and easily communicated. The individual is aware of what information is used and employs deductive and logical reasoning.

Alternatively, intuitive thinking is not sequential, but parallel. It involves branching and cycling back. The steps are often implicit and not easily understood or communicated. The individual employs inductive reasoning.

Pollio (1980) has found that these two modes of thinking have at different times been described as:

	CONVERGENT THINKING	DIVERGENT THINKING
Bruner	ANALYTIC	INTUITIVE
Polanyi	EXPLICIT KNOWLEDGE	TACIT KNOWLEDGE
Freud	SECONDARY PROCESS	PRIMARY PROCESS
DeBono	VERTICAL THINKING	LATERAL THINKING
Many sources	LEFT BRAIN	RIGHT BRAIN
Many sources	LITERAL	METAPHORICAL

It is important to note that how ever necessary divergent thinking may be to creative thinking, it is not a sufficient condition. Both divergent and convergent processes are involved.

Unidimensional Versus Multidimensional Definitions

Another area of disagreement is the number of dimensions included in the definition of creativity. Amabile (1983) prefers an unidimensional and global view of creativity. Specifically, she states that an idea or product is creative if the appropriate observers say it is creative. Appropriate observers are those individuals with sufficient knowledge of the subject matter or problem area that the idea addresses.

McMullan and Stocking (1981), however, criticize unidimensional definitions claiming they lead to unreliable measurement of creativity, especially when

measured by means of idea or product ratings. This is because many raters hold a personal definition which is often multidimensional. For instance, when asked to rate an idea for overall creativity, raters may base their evaluation on not only the idea's uniqueness, but on the importance of the problem area addressed, and/or the idea's attractiveness, elaboration or refinement. Furthermore, the weightings assigned to each of these different dimensions will vary across raters. This causes lower inter-rater agreement.

In further opposition to the unidimensional view, Guilford (1959) insists that creativity is inherently multidimensional. Guilford, and later Torrance (1974), stated that divergent thinking ability is composed of four primary skills. These are:

- 1 IDEATIONAL FLUENCY which is the ability to produce a large quantity of ideas in response to a problem or challenge.
- 2 ORIGINALITY which is the ability to produce unique ideas with respect to the ideas of others working on the same problem.
- 3 FLEXIBILITY which is the ability to produce a great variety of different types or categories of ideas.

According to Guilford, flexibility requires freedom from the impulse to use previously learned solutions.

- 4 ELABORATION which is the ability to embellish and refine ideas.

These dimensions have been borne out by factor analytic studies (Wilson, Guilford, Christensen, & Lewis, 1954; Guilford, & Hoepfner, 1966).

Partly on the basis of these studies, Guilford would add to these four core abilities the abilities of:

- o Sensitivity to potential or current problems.
- o Ability to redefine the problem or view it from another perspective.
- o Ability to abstract and analyze the problem's components and their interrelationship.

Torrance would add

- o Ability to visualize the problem.

Creativity and Intelligence

One of the more controversial issues in defining the components of creativity is the role of general intelligence. Wallach (1970; 1971) addressed this in his extensive literature review on the relationship between intelligence and divergent thinking and concluded that there is an ideational fluency factor (a component of

divergent thinking) that is distinct from measured intelligence. Additionally, Hargreaves and Bolton (1972) intercorrelated two intelligence tests and four convergent thinking tests with eight divergent thinking tests. They found that divergent thinking came out as a distinct and separate factor from intelligence and convergent thinking. This was evidenced in part because the divergent measures correlated more highly among themselves than with the other measures. This latter finding has been supported by the work of Wallach (1970) and Hocevar (1980).

Torrance (1974) reviewed 88 studies that correlated I.Q. with (visual/spatial) creative ability plus 114 studies that correlated I.Q. with verbal creative ability. He found that the median correlation was $r=.06$ for figural creative ability and $r=.21$ for verbal creative ability. This suggests the existence of a definite, but small relationship between measured intelligence and verbal creativity.

Dellas and Gaier (1970), in their review of the literature on creativity and intelligence, cite several studies that show that when the time limit is taken out of creative ability tests (i.e. TTCT), the association between test performance and measured intelligence is greatly reduced.

Barron (1963) has observed that more intelligent individuals are more likely to become involved in activities requiring greater creativity. Therefore, there will always be a small, but real correlation between I.Q. and creativity over the total range of these abilities. However, beyond an I.Q. of 120, the correlation becomes negligible. This may in part be due to restriction of range in the scores of creativity and intelligence at this upper end of ability.

The small but significant correlation between divergent thinking and intelligence measures may in part be due to common method variance. This is suggested by the finding that when the two constructs are measured with very different methods, their intercorrelation is greatly reduced (Boerma & Obryan, 1968; Nichols, 1971).

In an alternative perspective, Guilford (1959) integrates creativity and intelligence with his structure of intellect model. This model views divergent thinking as one of many factors composing the structure of one's intellect. Some of the other factors include convergent thinking, evaluative thinking, and memory and perceptual operations. From this perspective, typical intelligence or creativity tests alone, fail to measure the complete set of important intellectual abilities.

In addition to these cognitive skills, many insist that various dispositional or personality attributes are also necessary for creative thinking. Guilford (1967) would include in this list:

- o Tolerance of ambiguity and uncertainty
- o Love of creation for its own sake.
- o Desire for new challenges and problems.

Gowen (1972) would include:

- o Curiosity and sensation seeking.
- o Independence of thought.
- o Being easily excited and intrigued by novel ideas.

Torrance would include:

- o Resistance to premature closure on the solution search (which is facilitated by tolerance of ambiguity and uncertainty)
- o Emotional awareness.
- o Sense of humor.
- o Ability to visualize problem.

Davis (1975) would include:

- o Risk taking and adventureness.
- o Breath of interests.
- o Perseverance.
- o Self confidence.
- o Aesthetic interests

Clark (1979) would include:

- o Ability to withstand any adverse effects from being labeled eccentric or nonconformist.
- o Having a rich and elaborate fantasy life.

Debono would include:

- o Disposition toward exploring an idea's potential for improvement rather than its shortcomings.

Amabile (1983) proposed that creative performance depends on three different factors. These are:

- o DOMAIN RELEVANT SKILLS which in turn depends on
 - Knowledge about the domain of the problem (its causes, effects and context).
 - Training and experience which provide the skills relevant to understanding and working with the problem.
 - Innate skills such as general intelligence.
- o CREATIVITY RELEVANT SKILLS which depends on
 - Knowledge of idea generation heuristics and techniques.
 - Cognitive styles and habits such as presence of perceptual blocks and resistance to premature closure.
 - Personality characteristics such as tolerance of ambiguity, independence of judgment, and low stress.

- o TASK MOTIVATION which depends on
 - Individual task preferences.
 - Socially imposed constraints.

Sex and Race Differences

Neither sex nor race appear to account for much variance in creativity. Specifically, Kogan's (1974) literature review on sex differences on creative ability found no systematic effect for gender. As for racial differences, Torrance (1976) also provided evidence indicating that creative thinking ability as measured by the Torrance Tests of Creative Thinking (TTCT) lacks the racial and social-economic biases of intelligence tests.

The Creative Process

There has been considerable debate over the actual process that is involved in creating an original idea.

Wallas (1926) divided the process into four phases which are:

- 1 PREPARATION: the investigation and analysis of the problem.
- 2 INCUBATION: the subconscious search for a solution.
- 3 ILLUMINATION: the moment when the incubated solution breaks through the threshold of conscious awareness.

- 4 VERIFICATION: the proof, refinement, utilization and communication of the idea.

Many theorists recognize the role of at least some form of preparation such as problem recognition, analysis or efforts at expanding aesthetic sensitivity.

Mednick conceptualized this phase as the building up of an associative hierarchy or network of concepts explaining and surrounding the problem. The more complete the hierarchy in terms of the number of elements and the inter-connections between them, the better prepared the problem solver is to be creative.

Kris (1952), explains this by suggesting that the extent of these associations determines the accessibility of subconscious material that serves as the basis of creativity.

The Role of the Subconscious in Creativity

The role of the subconscious in producing ideas as indicated by Wallas's concept of incubation, has also provoked some disagreement. Wallas (1926) as well as the French mathematician Hadamard (1945), maintain that extensive preparation initiates, sustains and directs a subconscious search for solutions.

On the other hand, Gruber (1974) maintained that creative accomplishments are the result of conscious and

purposeful actions with no unique role played by subconscious processes. These conclusions were largely based on his analysis of the thinking of Charles Darwin.

Gruber insists that as a consequence of all attention being focused toward solving a problem, one's waking thoughts will intrude into, and shape the course of their dreams. What is dreamed, however, is the effect of waking thoughts, not the reverse.

Similarly, Gestalt theorists like Max Werthiemer (1945) subsumed creative thinking under a conscious process called productive thinking. Productive thinking involves identification of the problem's elements, relating them to each other, relating them back to their whole, and then consciously clustering these elements into useful groups.

Alex Osborn and Sidney Parnes developed a method for training creativity based on a conscious model. Their model stated that new ideas can be produced by consciously modifying old ideas or integrating them with other ideas. Specifically, ideas can be "manipulated" by applying the following manipulative verbs: MAGNIFY, MINIFY, SUBSTITUTE some aspect, REVERSE some dimension, REROUTE or work around the problem, COMBINE with certain other ideas, and ADAPT a solution from a different problem to work in your situation. (Parnes, Noller, & Biondi, 1953).

In the middle ground between the conscious and subconscious perspectives are those of Freud, of William J.J. Gordon, and of Guilford.

Freud (1963) viewed creativity as occurring when the ego sufficiently loosened its control to permit a regression into primary-process thinking (subconscious) which resulted in a free mixing of ideas. However, ego-controlled secondary-process thinking (conscious) was still necessary to take the resulting ideas and develop them into viable solutions.

William J.J. Gordon (1961) stated that creative thinking was effectively accomplished by means of analogies and metaphores. These served to link the conscious and subconscious processes through a translation-retranslation process. Specifically, through the formation of analogies, a familiar and verbally described problem is translated into an unfamiliar and nonverbal image. This image is able to penetrate beneath the surface of consciousness. Then, at this subconscious level, a solution is sought for the analogous problem which, when found, is brought back into consciousness and retranslated into familiar verbal terms. Gordon proposed four types of analogies which could accomplish this. They are:

- 1 Fantasy analogy (wishful thinking, which often occurs at the beginning to help gain unusual perspectives)
- 2 Direct analogy (such as between a biological and mechanical system)
- 3 Symbolic analogy (metaphor)
- 4 Personal analogy (problem solvers personifies themselves as the problem and then role play it)

Fast Versus Slow Creativity

The roles of the conscious versus the subconscious have been dichotomized to a degree by Driver's (1979) distinction between fast versus slow creativity.

Slow creativity, or incubation, is operationalized as a rest period during which there is no conscious work on the problem but after which there is visible progress toward the solution. Sometimes this progress is of a highly original nature. This period can last from a few minutes to a few months. Guilford (1979) notes that during incubation, the problem solver can sometimes have spontaneous glimpses of the normally subconscious idea processing.

Alternatively, fast creativity is operationalized as the conscious brainstorming of many solutions over a short period of time. Fast creativity may not be as useful for problems that have been highly resistant to resolution or

demand a highly original approach. However, fast creativity does not require as much effort and persistence as slow creativity.

Whether fast or slow creativity is more valuable depends on the problem. Many problems can be effectively solved with fast creativity. If fast creativity fails to produce an effective solution, however, then slow creativity can be put into effect.

The Mechanism of Incubation

Even though many acknowledge the importance of what Driver (1979) calls slow creativity (incubation), there is still disagreement over the actual mechanism operating to produce the ideas. Guilford contended that during incubation, the subconscious is freed from implicit assumptions and socialized perceptual-constraints.

The actual subconscious process that produces a creative solution may be as follows. A motivated and conscious attempt to find a solution to a problem that has resisted resolution by familiar methods activates a subconscious search for solutions. Once this has begun, conscious attention can shift away from the problem. During this covert search, the subconscious breaks ideas into their elements and then rapidly and ceaselessly groups and regroups, sequences and resequences them. This mixing of idea fragments contains a certain amount of

randomness. The mixing continues until a certain configuration of idea elements is "recognized" as useful to the problem (or aesthetically appealing for artistic problems). This recognition begins in the subconscious and causes the potential solution's dimly perceived outline to be amplified in vividness. This amplification facilitates its still subconscious evaluation and recognition. The process of recognition and amplification become reciprocally enhancing. That is, the more "right" it appears, the more attention is focused on it. This cycle spirals upward until it breaks through the threshold of conscious awareness. The breaking through of an idea is experienced by the individual as sudden creative insight.

In an alternative explanation of incubation, Buss and Mansfield (1980) claim that the rest period associated with incubation allows unproductive but dominating mental sets to weaken in influence and thus lose their constraining effects. This allows the rested problem solver to renew their effort with a fresh and more productive viewpoint.

In yet another explanation of incubation, Olten (1979) claims that during brainstorming a massed practice effect or stimulus overload occurs. This fatigues the individual's cognitive abilities and thus reduces their

creativity. Therefore, a rest period is needed to recover from this debilitating fatigue.

None of these three explanations of incubation is inherently mutually exclusive with the others. Therefore, each may account for some of the reality of the phenomenon.

The Role of Creativity in Problem Solving

Different conceptions of creativity also vary with respect to the boundaries of creativity within the problem solving process. Torrance takes one of the broadest perspectives by viewing creativity as the entire scientific problem solving process. Specifically, he states that creativity is:

The process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypothesis about the deficiencies, testing and retesting these hypothesis and possibly modifying and retesting them; and finally communicating the result (1974, p.8).

However, such broad definitions can be criticized since they fail to capture the essence of creativity. If the definition is limited to the generation of novel ideas, then the value of creativity is not fully realized until it is integrated into the larger problem solving

process. It is in applying creativity to problem solving that it really gains tangible utility. Mettal (1977) adds that creativity in problem solving is crucial for effectively utilizing resources and information to obtain goals.

Osborn and Parnes place creativity into a model of problem solving that is similar to, but more general than Torrance's. Their model involves the six sequential steps of:

- 1 Objective finding (Goal setting)
- 2 Fact finding (Problem analysis)
- 3 Problem finding (Problem clarification and definition)
- 4 Idea finding (Applying creativity to generate alternative solutions)
- 5 Solution finding (Selecting the best alternative)
- 6 Acceptance finding (Planning for implementation of this alternative)

This process can be expanded further to include prior strategic planning and post evaluation of effectiveness. Specifically, the sequence could be:

- 1 Goal setting and goal prioritization.
- 2 Determination of an overall set of strategies and tactics to achieve these goals.
- 3 Identification of those problems likely to hinder strategy and tactic implementation and thus goal attainment.
- 4 Assessment of each potential problem's importance and urgency to justify a problem solving effort.
- 5 Analysis of a chosen problem's causes, consequences and its requirements for effective resolution.
- 6 Creative production of potential solutions.
- 7 Development of ideas into solutions and then selection of the one most likely to solve the problem (whether development or selection comes first depends on the cost of development and the amount of information needed to make an accurate choice.
- 8 Debugging and refinement of the selected solution to develop it for implementation.
- 9 Putting the solution into effect.
- 10 Assessment of the solution's effectiveness.

Therefore, it would appear that creativity is a necessary but insufficient condition for effective problem solving. It follows then that not all problem solving efforts will equally benefit from creativity. The value of

creativity in problem solving depends on the importance of the problem and how resistant it is to cost-effective conventional solutions.

II. A REVIEW OF THE MEASUREMENT LITERATURE

The decision regarding just which aspects of creativity should be measured all depends on how creativity is defined. Unfortunately, as discussed in Chapter One, there is no general agreement on this definition. There appears, in fact, as many definitions as there are theorists to define it. In applied settings, however, the issue of definition becomes less important than the issue of predictive validity. That is, if a creative ability measure can predict organizationally relevant variables, whether it be number of submitted suggestions or team work, it is useful.

To date, the development of an agreed upon, reliable and valid measure of creativity has been a challenge that has not been fully met. Investigators have approached the measurement of creative ability in four distinct ways. These are:

- 1 Standardized creative ability tests.
- 2 Ratings of creative performance or products produced on-the-job or in-the-classroom.
- 3 Self-report biographical inventories of past creative accomplishments.
- 4 Self-report personality and attitude inventories.

The Torrance Tests of Creative Thinking (TTCT)

One of the most popular and best validated of the standardized creative ability tests is the Torrance Tests of Creative Thinking (TTCT). Its popularity is in part due to its ease of administration to large groups and its standardized scoring manual.

This test measures Guilford's four factors of creativity that were discussed in Chapter One. In review, these were Fluency, Originality, Flexibility and Elaboration. In practice however, the elaboration score isn't often calculated since it has shown relatively low inter-rater reliability. These four dimensions can be calculated for both verbal (semantic) creativity and figural (visual-spatial) creativity by administering some or all of five different verbal measures and three different figural measures. The verbal measures include:

- 1 The Ask and Guess measure which presents the respondent with a picture of people involved in an ambiguous activity and then asks them to (1) list diagnostic questions designed to obtain more information, (2) list possible causes of the portrayed activity, and (3) list possible consequences stemming from it. This is designed to measure curiosity, the ability to develop hypotheses, and to think in terms of possibilities.

- 2 The Product Improvement measure describes a common household object and then asks the respondent to brainstorm ways of improving it to make it more desirable and useful.
- 3 The Unusual Uses measure requires the respondent to brainstorm a list of unusual uses for a common object like a cardboard box or a tin can.
- 4 The Unusual Questions measure is a variation of the asking questions part of the Ask & Guess measure. It requires the respondent to ask interesting and curiosity arousing questions about the household object used in the Unusual Uses measure.
- 5 The Just Suppose measure is a variation of the Guess Consequences measure. This variation is designed to elicit a greater amount of fantasy. The respondent is presented with an improbable situation and asked to predict the possible outcomes from it; i.e. "Just suppose a great fog were to fall over the earth and all we could see of people would be their feet. What would happen? How would this change life on earth?" (Torrance, 1974). The figural measures include:
- 6 The Picture construction measure which displays a tear drop or pear shaped silhouette. Respondents are asked to draw a picture using this shape as an integral part.

- 7 The Incomplete Figures measure presents 10 incomplete figures, each consisting of a few squiggly lines. The respondent is instructed to add embellishment. This is based on a Gestalt theory suggesting that figural incompleteness will induce a tension to complete the figure in the simplest way possible. To make an original response, the respondent must delay gratification of their desire for closure.
- 8 The Repeated Figures measure is similar to the Incomplete Figures measure. The respondent is given 30 sets of parallel lines or circles and is required to elaborate upon each. This assesses the ability to make multiple figural associations to a single stimulus.

TTCT Reliability

Torrance (1974) indicates that when estimating most creative ability measures' test-retest reliability, it is important to consider that there is an inherent instability of expressed creative ability over time. This is because creativity can be developed by life and educational experiences and its expression can be influenced by changing incentive conditions that affect creative motivation. Torrance maintains that the TTCT is sensitive to the influence of these variables along with other variables such as organizational climate, test

instructions, physical test-taking conditions, fatigue, and competition.

Torrance reviewed several studies of the test-retest reliability of TTCT scores. These showed correlations for a two week period of $r=.88$, for an eight month period of $r=.77$ and for a three year period of $r=.59$.

The TTCT has shown high inter-rater reliability of scoring. This may, in part, be due to the thorough and standardized scoring manual. This manual includes lists of common responses produced for each measure which facilitates the estimation of each idea's originality and flexibility. Torrance reviewed inter-rater reliability studies for trained scorers. The coefficients ranged from $r=.92$ to $r=.99$. For trained versus untrained scorers, the correlations ranged from $r=.88$ to $r=.96$. Additionally, there were no significant differences between the mean scores calculated by trained versus untrained raters.

TTCT Criterion and Content Validity Issues

There are inherent problems in trying to estimate the criterion and content validity of creative ability tests. With respect to criterion validity, Torrance maintains that it is inappropriate to try to find an overall validity coefficient for tests of creative thinking ability. This is because there is no established and agreed upon criterion of creative ability to validate a

test against. He goes on to state that it would be much more useful to employ a variety of different criteria of creative ability which would, in fact, measure a variety of different types of creative abilities.

With respect to content validity, Torrance (1974) claims that creativity can be expressed in an almost infinite variety of ways. Therefore, it would be impossible to develop a battery of tests comprehensive enough to representatively sample this entire universe of creative abilities and expressions.

TTCT Validation with High School Students

TTCT studies with high school students have shown a significant relationship between TTCT performance and other personality/cognitive attributes conceptually related to creativity.

Dauw (1966) compared high versus low scorers in a group of 712 high-school students. He found high scorers reporting significantly more adventurousness, curiosity, independence in thinking, willingness to take risks, sense of humor, and unconventionality in their career aspirations.

Torrance and Dauw (1965) compared 115 gifted high school seniors with a group of unselected job applicants. They found that the gifted students had significantly higher TTCT scores, as well as greater resistance to

social pressure, experimental orientation, intuitive thinking, a low preference for rules and tradition and a low need for structure.

The TTCT has shown convergent validity with a peer nomination criterion in a study by Yamamoto (1964) of 459 high school students. He found significant correlations between TTCT scores and peer nominations of creativity. Torrance has reviewed other studies that have supported this finding (1974).

TTCT Validation with Adults

Similar support has been obtained from studies with adult populations. Weiser compared those scoring in the upper and lower 27% on the TTCT from a pool of 282 undergraduates. The upper group showed no significant differences in academic ability but did report significantly higher adventureness, courage, effort, determination, humor, individualism and versatility (cited by Torrance, 1974).

Haven (1965) found a significant correlation between TTCT scores and a checklist of past creative achievements for 120 male undergraduates.

Torrance and Hansen (1965) studied the classroom behavior of 14 college business instructors. They found a significant relationship between performance on the TTCT

and the creativeness of the questions they asked their students.

The TTCT has shown convergent validity with sales volume used as a criterion. Wallace (1961), found a significant difference in sales volume between high and low TTCT scorers among 61 department store saleswomen.

Another form of construct validity is obtained by showing that the TTCT is sensitive to treatments designed to increase creative ability. Torrance reviewed 106 studies that used the TTCT to assess the effects of creative growth experiences. These experiences ranged from exercises in creative writing to participation in creativity training workshops. The review reported that 71% of the studies showed that the experiences produced a significant increase in TTCT performance.

TTCT Long Term Predictive Validity

Torrance, Tan and Allman (1970) followed up on 114 students who took the TTCT when they were junior education majors. They found that TTCT scores significantly predicted ($r=.62$) creative teaching behavior eight years later.

Cropley (1971;1972) administered the TTCT to 111 seventh graders. He found that their scores significantly predicted creative achievement in art, drama, literature and music measured five years later.

Torrance (1969a) administered the TTCT to 46 12th graders. He found that their scores significantly predicted ($r=.51$) the quality and quantity of their creative achievements five years later.

In one of the most impressive studies to date, Torrance (1981) conducted a 12 year longitudinal study that followed 162 high school students. He found that the TTCT highly predicted later creative achievement (i.e. the number of publicly recognized accomplishments, the quality of the highest creative achievement and the creativeness of future career aspirations).

The Remote Associates Test

Another approach toward development of a standardized measure of creative ability is Mednick's Remote Associates Test (RAT). This test presents the respondent with sets of three words and then asks for a fourth word that has something in common with the first three. For instance, if the words RAILROAD, GIRL, and CLASS are presented, the respondent is expected to come up with the remote associate WORKING since it can be associated with all three.

Mednick's test has been criticized by Jackson and Messick (1965) because the items have only one recognized response. This greatly reduces the capacity of the test to measure originality. In fact, many apparently creative

responses are scored wrong. For instance, The correct remote associate for CHERRY, TIME and SMELL is BLOSSOM. However some individuals have come up with the word BOMB, which although creative, is scored wrong.

Mednick's test also correlates uncomfortably high with measures of intelligence ($r=.61$) as compared to the TTCT which only shows a small median correlation with intelligence ($r=.21$ for the verbal test and $r=.06$ for the figural test, Torrance, 1974). The RAT may also have low convergent validity. Ward (1975) found low correlations between the RAT and Wallach and Kogan's creativity test (which is similar to the TTCT), but high correlations between the RAT and intelligence measures. This has led many to conclude that the RAT is more a measure of convergent thinking than divergent thinking (Dellas & Gaier, 1970).

Standardized tests have been criticized in general for having low ecological validity. This means that the tests do not adequately represent the actual situation under which creativity occurs. Creative thinking supposedly occurs under conditions of higher task motivation, a longer time span and with greater knowledge of the problem.

This criticism, however, may be more applicable for the use of standardized ability tests as a measure of

"slow creativity" than of "fast creativity" which requires considerably less time, effort, and problem knowledge.

Ratings of Creative Performance by Others

Since more creative individuals should generate more creative ideas and products, identifying creative ability by performance has been common in creativity measurement. The evaluative criteria used in these ratings range from a simple global criterion to complex multidimensional criteria.

The raters of creative ideas and products have included teachers, peers and supervisors. Since a large percentage of creativity research occurs in educational settings, teacher ratings have frequently been used as a criterion. Teacher ratings have taken the form of nominations of the most and least creative based on classwork and projects (Yammamoto, 1963). Teacher ratings have also taken the form of checklist measures of creative personality traits based on behavioral observation (Torrance, 1974).

Another source of raters is peers. Unfortunately, peer nominations have been mostly used with children (Hocevar, 1981). One exception is Specher (1964), who used peer ratings to assess creativity in engineers. Some of the characteristics assessed included preference for

unusual and challenging problems, fluency of ideas, development of worthwhile ideas, and foresight.

Lastly, supervisors have been used as a source of raters. Taylor, Smith and Ghiselin (1963) used immediate supervisors to assess scientists in a government research lab on multiple traits. These included desire for facts, independence, flexibility and overall creativity.

The criteria used to rate the creativity of ideas and products has been as diverse as the definitions of creativity. In dealing with the problem, Besemer and Treffinger (1981) reviewed over a hundred articles containing different proposed criteria. They combined, summarized, and grouped these criteria into three general categories. These are:

* UNIQUE

- Original (remoteness, uniqueness, or unusualness)
- Germinal (ability of the idea to serve as a heuristic or to stimulate other ideas plus its generalizability across different problems and even disciplines.)
- Transformational (such a radical departure from tradition that it alters perceptions and interpretations of reality or behavior within the culture.)

* RESOLUTION OF PROBLEM

- Logical (has technical feasibility)
- Suitable (has social feasibility; is likely to be accepted)
- Adequate (successfully eliminates the problem)
- useful (fills a need physically, psychologically, socially, economically, or politically.)

* ELABORATION AND SYNTHESIS

- Craftmanship (debugged and developed.)
- Expressive (can be readily communicated or understood.)
- Attractive (commands attention, is beautiful, entertaining or surprising.)
- Organic (shows completeness and unity, balance and proportion in its organization.)
- Elegance (is refined, understated, and economical in its expression of information.)
- Complex (is elaborate and detailed.)

To date, however, this list has yet to be cited or used elsewhere in the literature. As intuitively appealing as the use of product ratings are, there are many problems of interpretation that arise when they are employed. For instance, when using ratings by supervisors

of creative performance on-the-job, especially in R&D management, the following problems are likely to arise:

- o Inadequate or nonrepresentative opportunities to observe creative performance.
- o The long delay between the creative insight and production of a tangible result.
- o The synergistic interactions of many individuals during the formulative stages of a creative project.
- o The numerous external resources and influences which aid or hinder a creative project.

Additionally, even if these problems could be controlled for, there is another source of error in the form of rater bias. This can occur whenever performance ratings are used. These problems can include:

- o Halo or generalization across different creativity dimensions.
- o Differential dimensional weightings across raters when only global ratings are called for (causing low interrater reliability).
- o Stereotypes or implicit personality theories.
- o Leniency or friendship bias.
- o Severity bias.

- o Central tendency or restriction in range of the ratings across. ratees.
- o Unique and atypical definitions of creativity held by raters.

Biographical Creative Achievement Inventories

Biographical inventories of past creative accomplishment have the advantage of possessing high potential ecological validity. This is because they measure creativity as it occurred under "real world" conditions. Hogevar (1981) maintains that because of high content validity, biographical inventories are the most defensible way to identify creative talent.

The biographical achievement inventories have taken open and closed-ended forms. The latter is formatted like a behavioral checklist. The former is formatted with open-ended questions accompanied by a list of creative achievement examples to help recall.

One of the best validated inventories is a closed-ended scale developed by Holland and Nichols (1964). Their inventory lists achievements that generally require commitment and often involve some form of public recognition. Their instrument measures creative accomplishments in high school and college in such domains as:

- * Leadership in campus or off-campus organizations.
- * Organization or participation in campaigns and political causes.
- * Recognition for public speaking, debate, or dramatic performance.
- * Initiation of business enterprises.
- * Exhibition or publication of art, original music, or creative writing.
- * Construction of scientific equipment or patentable inventions.
- * Publication or design of scientific research.

This type of inventory has been used in a variety of studies (Holland & Austin, 1962; Holland & Baird, 1968; Holland & Nichols, 1964; Holland & Richards, 1965; Richards, Holland, & Lutz, 1967) which have shown it to possess relatively high internal consistency and test-retest reliability.

There is also indirect evidence for the inventory's freedom from response bias. This exists in the form of a $r=.96$ correlation between student reported grade point average (G.P.A.) and transcript verified G.P.A. (Nichols & Holland, 1963). It is assumed that students are less sensitive about not having accomplished a scientific or artistic project than they are about their grades.

Therefore, the high accuracy in which they report their grades suggests that they are not biasing their responses on extra-curricular achievement.

Nichols and Holland report that although there are high correlations of achievements within each domain, that is, many accomplishments within a given field such as art or music, there are lower correlations between different domains, such as between art and music. One exception appears to be a small relationship for males between the domains of leadership, dramatics and writing.

However, Hocevar (1976) contends that there are sizable correlations between the domains. Specifically he found intercorrelations between creative achievements in the areas of fine arts, performing arts, crafts, literature, music, math and science. These coefficients ranged from $r=.17$ to $r=.68$ for males and $r=.35$ to $r=.76$ for females. Hocevar interpreted this to suggest a general predisposition to distribute one's creative efforts across different areas. Milgram and Milgram (1976) also found low, but significant correlations between achievement in different domains. They also found a positive relationship between the quantity and quality of achievements within a domain.

Regardless of whether there are correlations across different creative domains, the evidence is fairly strong

in suggesting that the correlations between extra-curricular creative achievement and academic achievement are low (MacKinnon, 1960; Nichols & Holland, 1964; Hoyt, 1965; Thorndike & Hagen, 1959).

One of the most rigorous studies on this question was done by Richards and Holland (1965). Their investigation looked at over twelve thousand college freshmen who were taking part in the American College Testing (ACT) program. All of the students were measured for academic achievement with the ACT and were measured for non-academic achievement with the Holland and Nichols inventory. The results of this study showed that the median correlation between the two was $r=.04$. Additionally, the results showed that the highest correlation was $r=.23$, and also that over 26% of the correlations were negative.

In open-ended format creative achievement inventories, Bull (1978) has developed a measure of past creative accomplishments called the Statement of Past Creative Activities (SPCA) scale. This scale requires respondents to list past creative activities along with details and descriptions of any public exhibition of their creative products. The respondent's recall is prompted with a list covering eight different and major domains of creative achievement. These eight domains include:

- | | |
|--------------|--------------------------------|
| (1) ARTISTIC | (5) PERFORMING ARTS: TECHNICAL |
| (2) LITERARY | (6) PERFORMING ARTS: ON STAGE |
| (3) CRAFTS | (7) INVENTIONS |
| (4) DESIGN | (8) MANAGERIAL AND TEACHING |

The test scorer then rates each reported accomplishment as either (2) A major creative accomplishment, (1) A minor creative accomplishment, or (0) not creative.

The SPCA scale has shown validity coefficients ranging from $r=.30$ to $r=.40$ with other self report creativity scales. One of these include the HOW DO YOU THINK SCALE (Davis, 1975) which uses a 105 items to measure self-perceived curiosity, risk taking, openness to new experience, sensation and adventure seeking, energy level, self confidence, aesthetic interests, hobbies and creative activities, and originality.

The SPCA has also shown convergent validity with the Sounds and Images test (Torrance & Khatena, 1970; Torrance, Khatena, & Cunningham, 1973). This measure rates the originality of reported images and associations stimulated by listening to a recording of abstract sounds.

Creative achievement inventories have also been validated against TTCT creative ability criteria. In a study by Torrance (1969), creative achievement was

measured by a scale similar to the Holland and Nichols inventory along with additional measures. These other measures included suggestions to improve one's work situation and changes in philosophy of life. Torrance found significant correlations ($r=.39$ to $.44$) between the fluency, originality and flexibility scales of the TTCT and the quality and quantity of adult creative achievement over the following seven years. Also, an index of fluency, flexibility, originality and elaboration produced a multiple correlation of $r=.50$ with the quality of the highest creative achievement and $r=.46$ with the quantity of creative achievements. Measured intelligence, which was high for the entire group, did not significantly differ for high and low creative achievers. These findings were supported by Kaltsounis (1976) who found a $r=.55$ biserial correlation between high and low TTCT scores and having received awards for creative accomplishments in a sample of 196 undergraduates.

Similarly, Wallach and Wing (1969) administered the Wallach and Kogan (1965) creativity ability test to 336 college students. They found significant correlations between creative ability and creative accomplishments in leadership, art, social service and literature. However, they did not find a relationship in the areas of drama and music.

Milgram and Milgram (1976) found similar results with the exception of drama and music for 145 Israeli high-school students. They showed $r=.81$ to $.96$ correlations between the Wallach and Kogan tests and creative achievement in the areas of music, science, leadership, fine arts, writing, community service, drama, sports and dance. Their effects held up even after school grades (assumed to reflect both intelligence and achievement motivation) were partialled out.

Personality and Attitude Measures of Creativity

Many investigators have measured creativity in terms of personality factors and cognitive predispositions. One of the more popular measurement instruments of dispositional attributes associated with creativity has been the Gough Adjective Checklist (ACL) (Gough & Heilbrun, 1965). This is a self rating personality inventory that contains a list of descriptive adjectives.

Schaefer (1969) used the ACL to investigate differences in self-perceived attributes between high and low creative individuals. Specifically, he divided 800 adolescents into high and low creatives based on teacher assessment of their creativity in artistic, literary or scientific projects and based on their performance on Guilford's Alternative Uses and Consequences Tests

(similar to the TTCT). Schaefer found that high creatives significantly more often viewed themselves as:

- + Creative (Imaginative, artistic, ingenious and original)
- + Independent (Unconventional and individualistic)
- + Uninhibited (Spontaneous and impulsive)
- + Iconoclastic (Assertive, outspoken and rebellious)
- + Complicated (Complex, reflective cynical and idealistic)
- + Asocial (aloof)

In contrast, the low creatives significantly more often viewed themselves as dependable, cooperative, contented, conventional, and quiet. These results are substantiated with similar findings with creative adults (Crutchfield, 1963; MacKinnon, 1962).

Some investigators have attempted to measure creative predispositions by assessing attitudes toward creative activities. This is based on the assumption that the expression of positive attitudes toward creative activities will be indicative of a belief that these activities are rewarding which in turn would make it more likely that such creative activities are performed.

One of the more popular instruments used to measure such creative interests has been the Guilford-Zimmerman Interest Inventory (Guilford & Zimmerman, 1963). This inventory asks respondents to rate their interest in a wide variety of activities (creative and noncreative). Taft and Gilchrist (1970) used this inventory to find that more creative subjects are differentiated by their greater interest in activities like thinking up plots for novels, inventing new gadgets, and formulating new theories to replace commonly accepted ones.

Others have approached the study of creative personality by studying creative individuals that have been publicly recognized. Dellas and Gaier (1970), reviewed the literature on the personality characteristics of recognized creative architects, artists, writers, mathematicians, psychologists, and industrial and academic research scientists. The personality measures ranged from the California Personality Inventory and Cattell's 16PF to the Rorschach. Despite heterogenous methodologies and subject populations, the results showed that there were some striking similarities among the highly creative individuals. These individuals tended to consistently appear as more independent in thought, attitudes and social behavior. They had less concern for social norms and were more introverted. They were more open to novel

experiences and had wide ranging interests. They showed higher dominance, self-acceptance, intuitiveness and flexibility. They also leaned slightly more toward the femininity side of the femininity-masculinity dimension (Dellas and Gaier, 1970).

Dellas and Gaier also note that these findings with eminent creatives are congruent with the findings for creative children and adolescents. However, these younger creatives have less sharply defined personality structures.

III. THE MOTIVATION TO BE CREATIVE

The Importance of Motivation for Creativity

Of all aspects of creativity, the nature and source of the motivation to be creative has been the least well explored, both conceptually and empirically. The importance of motivation for the creative process, however, has been observed by many. Bain humorously noted that

The number of trials necessary to arrive at a new construction is commonly so great that without something of a fascination for the subject one grows weary of the task (cited by Campbell, 1960, p. 385).

Nichols (1972) would agree and add that task involvement is needed to learn problem relevant skills and information as well as to focus attention on task requirements. Furthermore, Tractman points out:

It is only the fundamental belief in the point and purpose of the creative act which provides the spirit, the passion and the psychic and intellectual energy necessary for great creative efforts (1975, p. 50).

The importance of motivation for creativity may exist not only in its facilitation of task involvement, but also in its direct contribution to the creative process. This

speculation is elucidated by Spearman (1930) who contended that the trait of perseveration contributes greatly to creativity by preventing premature closure. Prolonging the solution search is important because it provides the opportunity for incubation to occur. In agreement, Guilford (1979) insists that the conscious desire to solve a problem is crucial since it is the driving force that propels the processes of incubation.

There is some available research suggesting a relationship between creativity and motivation. Khatena (1970) found a positive association between effort and creativity. He showed that the originality of ideas produced during brainstorming increases as creative activity continues.

Guilford (1979) has reviewed research with similar findings. He concludes that during a typical brainstorming session, the initial ideas generated are those most familiar to the participants. The brainstormers, in effect, are purging themselves of what they already know. After their "supply" of known solutions has been exhausted, they can begin generating original ideas. The more time and effort expended, the more original ideas produced.

Additionally, there is evidence for a relationship between self reported motivation and creative ability.

Wallace (1964) studied the creative ability of 223 salesmen. He found a significant difference between their estimated self motivation and their Fluency and Originality scores on the TTCT. In sum, possessing more motivation to create may result in more persistent efforts at creating which, in turn, may produce more creative ideas.

Speculation on the Source of Creative Motivation

Unfortunately, although the importance of creative motivation is recognized, its origin and operation are not well understood.

From a psychodynamic viewpoint, Freud (1963) viewed creative motivation as stemming from the desire to attain a pleasant emotional state. This state results from the energy discharged during the primary process thinking believed a part of creative thought.

Translating this psychodynamic view into cognitive and behavioral terms, this could be saying that creative thinking behavior may elicit an unconditioned-emotional response that is positively reinforcing. This viewpoint suggests that creative thinking is internally rewarding.

Although such internal reward contingencies are difficult to objectively substantiate, there is evidence that the availability of external reward can increase creativity. Glover and Sautter (1977) found that when

reward (points toward a course grade) is made contingent on creative performance, creativity (as measured by the TTCT) is increased.

In contrast to the positive reinforcement process, others propose a negative reinforcement process as the principle source of creative motivation. That is, one is motivated to create to avoid an aversive outcome rather than obtain a positive outcome. For instance, Torrance (1979) viewed the motivation to be creative as stemming from the need to reduce cognitive tension. This tension results from being confronted with a problem that cannot be solved in a conventional or habitual way.

Similarly, Sinda (1976) believes that tension reduction is the principle motive underlying creativity. This tension arises out of the wish to control that which limits fulfillment of one's desires and ambitions. Additionally, this tension can arise from the unfulfilled wish to share muted feelings and thoughts.

Since positive and negative reinforcement are not mutually exclusive processes, both can operate concurrently to drive creative ideation.

Applying Expectancy Theory to Explain Creative Motivation

This dissertation proposes that the motivation to be creative can be better understood, as well as predicted, by applying an expectancy-based theory of motivation.

This theory was inspired by Vroom's (1964) Valence, Instrumentality, Expectancy (VIE) theory.

Specifically, this current expectancy theory proposes that the motivation to be creative is a function of the anticipation that effort expended toward producing creative ideas will lead to reward. Creativity is defined in terms of the quantity, the variety and the originality of the ideas produced in response to a stated problem (based on Guilford's definition).

This anticipation of effort leading to reward is divided into two components. The first component is called Expected Creativity which is similar to Vroom's concept of Expectancy. This is the expectation of effort leading to creative performance. The second component is called Expected Reward which is similar to Vroom's concept of Instrumentality. This is the expectation of creative performance leading to a reward. A reward is defined as the obtainment of a desired outcome or the prevention of an undesired outcome. In behavioral terms, this is suggesting that both positive and negative reinforcement processes are in operation.

More specifically, Expected Creativity and Expected Reward involve personally estimated probabilities. Thus, Expected Creativity is the individually estimated probability that effort expended toward the generation of

creative ideas will actually yield such ideas. Expected Reward is the individually estimated probability that these generated ideas will result in obtaining desired outcome(s) or preventing undesired outcome(s).

Expected Creativity is, in part, formed by one's personal history of creativity attempted/performed ratios. Expected Reward is in part formed by one's history of creativity performed/rewarded ratios. Additionally, the degree that an outcome is desired is in part formed by one's history of reward received/satisfaction felt ratios. These estimations are also in part formed by current situational cues that signal a change in performance opportunities or reward contingencies.

Expected Creativity can also be viewed as self-confidence in one's ability to produce creative ideas and solutions. Expected Reward can also be viewed as a combination of the perceived supportiveness of one's environment towards creativity (extrinsic outcome) and of the pleasant anticipation of experiencing an internal satisfaction for being creative (intrinsic outcome).

In short, possessing higher Expected Creativity and/or higher Expected Reward estimations should produce more motivation to be creative. Greater motivation will in turn result in a greater number of attempts to generate creative ideas. These attempts serve as practice which

increases creative skill. Additionally, the self perception of increasing skill will further boost Expected Creativity. Therefore, with sufficient reward contingencies and initial creative self confidence, the development of the motivation to be creative can become upwardly spiralling. Likewise, with situational constraints and sanctions against creative performance, creative motivation can become downwardly spiralling.

Unfortunately, to date, neither this expectancy theory nor the similar VIE theory has been applied to the study of creativity. However, the empirical creativity literature does offer some indirect evidence suggesting the operation of Expected Creativity and Expected Rewards in creative motivation.

Support for the Effect of Expected Creativity on Creative Motivation

There is indirect evidence supporting the hypothesis that possessing higher expectations of effort resulting in creative performance will produce more creative motivation. Expected Creativity is measured by creative self confidence and motivation is measured by performance on creative ability tests and creative accomplishments.

Coopersmith's (1967) study found that creative self-concept significantly correlated with the fluency,

originality, and elaboration dimensions of the TTCT. Creative self-concept was measured by items that assessed one's creative self-perception. Examples of such items are: like:

- * - I come up with innovative solutions to every day problems.
- * - When in a group discussion, I suggest unique ideas or new solutions.

Interestingly, general self-concept was not found to be significantly correlated with any of the TTCT scores. In another study, Wright, Fox and Noppe (1975) administered the TTCT, the Tennessee Self-Concept scale and a Creative Self Concept scale to 80 junior and senior education majors. Their study found no significant relationship between creative ability and general self esteem. The study did find, however, a positive and significant relationship between creative ability and self rated creativity.

In further support of the above findings, Richards, Cline, and Needham (1964) found that self ratings of originality correlated with the following measures of divergent thinking in a sample of 119 students:

$r=.36$ with Guilford's Word Association Test.

$r=.27$ with Guilford's Immediate Consequences Test.

$r=.23$ with Guilford's Unusual Uses Test.

$r=.20$ with teacher ratings of originality.

Similar to this study, Harrington found a significant correlation between creative ability (alternate uses test) and self-ratings of creative ability for 50 graduate students. This effect held up even when measures of achievement motivation and verbal aptitude were partialled out.

The relationship between self ratings and creativity has also been found when creative accomplishments have been used as a criterion for creativity. Self ratings of creative ability were found to significantly differentiate white collar employees involved in research activities from those who were not. Additionally, responses to the question "Do you think of yourself as creative?" significantly differentiated inventors and noninventors in a group of 450 university faculty members (Bergum, 1975). These results have been substantiated in a similar study by Albaum (1976). Skager, Klein, and Schultz (1967) found that success of students in a college art program was significantly predicted by self ratings of artistic ability.

One potential confound in the use of self ratings is the tendency of some respondents to bias their self presentation positively. The relationship between self ratings of creativity and bias toward presenting a more socially desirable image was studied by Cook (cited by Hurt, Joseph, & Cook, 1977). He correlated responses on a 20 item self-rating scale that measured willingness to accept innovations with Crowne and Marlow's social desirability scale for 498 undergraduates. The results showed only a $r=.12$ relationship between the two. Thus social-desirability bias only accounted for 1.4% of the total variance in self rated willingness to accept innovations.

Schaefer (1973) provided evidence on the long term stability of creative self image. He divided 800 high school students into high and low creativity groups based on teacher nomination and performance on Guilford's Alternative Uses and Consequences Tests. The two groups were found to differ significantly in self rated creativity using the adjective check list. His five year follow up study located 60% of the original sample. This study found that the differences in self rated creativity held up for students with artistic and literary talent but did not hold up for those with mathematical or scientific talent.

Support for the Effect of Expected Reward on Creative Motivation

There is indirect evidence for the hypothesis that having greater expectations of receiving reward for creative performance will result in greater motivation to be creative.

One source of indirect evidence is the association between creative achievement in a culture and that culture's encouragement of creativity. Along these lines, a literature review by Trachtman (1975) noted that the quantity and quality of creative achievement varied significantly across countries and historical periods. He said

In the arts, in science, in technology, some eras appear to gush fresh and original contributions while others seemed dry and barren (p.36).

Arieti (1979) has also noted that throughout history, incidents of great creative achievement and innovation have not appeared randomly, but in clusters. These included the classical Greek period, Italian renaissance, creation of the American constitution, and Jewish contributions since the 19th century.

Additionally, even during great periods, significant creative acts appear to be clustered. For instance, within

the Greek period, the great tragic plays appeared over a relatively short time interval and the great philosophy primarily came from the successive student-teacher relationships of Socrates, Plato and Aristotle (Arieti).

The American anthropologist Kroeber (1944), observes a total lack of creative achievement in England from 1450 to 1550, but an explosion of creativity in literature, music, science, philosophy, and politics between 1550 and 1650. A similar event was paralleled in Germany for the periods of 1550 to 1650 and 1700 to 1800, respectively.

Trachtman (1975), Arieti (1979), and Kroeber (1944) all claim that this variability can be explained by the degree that a society encourages and rewards achievements in these domains. In fact, in these previously mentioned historical periods, those who were producing creative accomplishments were often given great status or nobility in their society.

Interestingly, this was suggested over two thousand years ago by Plato who said "What is honored in a culture will be cultivated there" (cited by Torrance, 1969b, p.1). More recently, Tractman said

Clearly, every society imposes limitations and bounds on the expression of creative impulses as well as offering opportunities, support and rewards (1975, p.46).

Torrance (1969) has provided empirical evidence to suggest that the amount and type of creative accomplishments within a culture are a function of what that culture values. His study collected creative ability data from over 8000 children across 11 diverse cultures. These cultures included high and low social-economic groups. Their locations included West Berlin, Norway, Austria, America, Western Samoa, and Singapore. Torrance found a rank-order correlation of $r=.94$ across cultures between creative ability as measured by scores on the TTCT and the teacher's encouragement-discouragement of creativity. The latter was measured by the classroom teacher's scores on the ideal-pupil checklist. This is a checklist of adjectives (including creative adjectives) that allows the teacher to describe what they think an ideal student should be like.

Additionally, Torrance found a $r=.95$ between creative ability and the childrens' preference for entering creative occupations (.i.e in the arts and sciences). This preference is, in part, a function of the perceived availability of these occupational outlets and, in part, a function of their culturally determined desirability. Therefore, Torrance has shown an association between creative ability and the social and cultural preference for creative activities. This suggests that the more

creative activities are valued and rewarded, the more people will develop those abilities necessary to perform them.

If trust can serve as a surrogate measure of Expected Reward, then there is support for the effect of Expected Reward from a study by Klimoski and Karol (1976). They found that when perceived trust was manipulated in four person brainstorming groups, creative output varied as a direct function of trust.

Another form of indirect evidence in support of the motivational effects of Expected Reward comes from a study on the effects of perceived parental permissiveness. It may be that adults' expectations of creativity leading to positive outcomes traces back to childhood. Parish and Eads (1977) found that college students who reported that their mothers were more permissive in their child-rearing practices showed greater fluency in a divergent thinking measure compared to those who reported that their mothers were more restrictive. Additionally, there was no significant sex of student effect.

There is also indirect evidence regarding the motivational effects of Expected Reward from the risk taking literature. Specifically, differences between individuals in their willingness to chose a risky alternative could be interpreted as differences in the

expectation of that alternative providing a payoff. Therefore, a positive relationship between choosing risky alternatives and creative ability could be interpreted as a positive relationship between expectations of risky choices providing rewards and creative motivation, or in short, between Expected Reward and creative motivation. Note that this is based on the assumption that motivation is an important determinant of creative performance. There is evidence for this relationship between creativity and risk taking from the following studies.

Glover and Sauter (1977) administered the TTCT and the Kogan and Wallach Choice Dilemma Questionnaire (1964) to sixty six mostly black undergraduates. They found that high risk takers showed significantly more flexibility and originality.

Kaltsounis (1976) found a $r=.34$ biserial correlation between self reported willingness to take risks and high versus low performance on the TTCT for 196 undergraduates.

Pankove conducted a systematic study of the relationship between creativity and risk taking for 5th grade boys. Creativity was measured with the Wallach and Kogan creativity (1965) tests. Risk taking was measured by the subject's choice of the degree of risk under which they were willing to perform a task. The results showed a

positive relationship between creativity and risk taking (cited by Dellas and Gaier, 1970).

The Importance of Perceiving the Creativity-Reward Contingency

For rewards contingent on creativity to increase the motivation to create, this contingency must be perceived. As Rotter (1966) points out,

If a person perceives a reward as contingent upon his own behavior, then the occurrence of either a positive or negative reward will strengthen or weaken potential for that behavior to reoccur....If he sees the reward as being outside his own control or not contingent, that is, depending on chance, fate, powerful others, or unpredictable, then the preceding behavior is less likely to be strengthened or weakened (p.5).

Rotter cites numerous studies in support of this hypothesis including one by Phares. This study found that when subjects believed rewards were due to their skill, changing the amount of reward received produced a corresponding change in their expectancies for receiving future rewards. However, when they believed that rewards were due to chance, then there was no effect of received reward on expectancies. In applying this to Expected Reward, this suggests that the more a reward is attributed

to creative performance the greater its motivational effects.

The Bottom Line

In sum, there is good indirect evidence indicating that higher Expected Creativity and higher Expected Reward result in higher creative motivation (the latter as measured via performance).

To substantiate the possible role of Expected Creativity and Expected Reward in creative performance, a more direct and explicit investigation is needed. Unfortunately, this is a need that has not been previously met.

To the degree that the motivation to be creative is an important determinant of creative performance, as suggested by the previous literature, then a measure of this motivation would be a valuable predictor of creativity. Such a predictor may capture variance that is missed by ability measures used alone. If this is true, then the capacity to create would be better predicted by using both ability and motivational measures than either alone.

Additionally, if a measure of creative motivation significantly correlated with creative performance it would have important implications for those who attempt to increase creative performance in work, school or home

environments. Specifically, it would suggest that creativity should be increased by a two fold method. The first is the provision of more initial positive feedback and encouragement to increase creative self confidence. The second is the restructuring of performance-reward contingencies to increase the anticipation of reward. That is, the making available of personally meaningful rewards that are contingent on creative performance.

The implications could also be used by organizations who want to increase the amount of creativity applied in solving organizationally relevant problems. These applications can range from rank and file efforts to improve quality control, to managerial efforts at cost reduction and greater utilization of human resources, to research and development efforts aimed at new product development. More specifically, an organization can realize these applications by first using a creative expectancy-based measure as part of their selection battery (to increase the percentage of creatively motivated members), then second, train managers to be more encouraging and rewarding of creative behavior in their subordinates (to increase Expected Creativity), and third, establish a financial incentive system to reward creative ideas and efforts that benefit the organization (to increase Expected Reward). The allocation of rewards can

be determined by an idea review committee and/or subordinate, peer, and superior ratings of an employee's or work-team's creativity.

The Hypothesis of this Dissertation

It is the hypothesis of this dissertation that a statistically and practically significant portion of the variance in both creative thinking ability and past creative accomplishments can be accounted for by an expectancy based measure of creative motivation.

IV. METHODS

Sample

The participants were drawn from undergraduate courses in introductory psychology and management. This population was selected because the creative ability (TTCT) and accomplishment (CAI) measures were validated with similar populations. Therefore, it was reasonable to assume that the validity of these instruments would generalize to the present sample. The incentive for participation was the obtainment of extra-credit points that counted toward a course grade.

A total of 428 people participated. They were randomly divided into a primary sample of 252 and a holdout sample of 176. A power analysis showed that statistical power for the primary sample was 99% for an alpha of ($p < .01$). The statistical power for the holdout sample was 95% for an alpha of ($p < .01$). Thus, there was an almost certain chance of demonstrating validity if it was there for an effect size of $r = .30$ or greater (Cohen, 1969).

The Creative Motivation Scale (CM Scale)

The Creative Motivation Scale (CM Scale) was developed by creating two sets of items with the first designed to measure Expected Creativity and the second,

Expected Reward. In review, Expected Creativity refers to the personally estimated probability that effort exerted toward generating creative solutions will yield such solutions. Expected reward refers to the personally estimated probability that these solutions will be instrumental for obtaining desired outcomes or avoiding undesired outcomes. Both of these constructs and their rationale were described in Chapter Three.

The CM Scale items were designed to sample Expected Creativity and Rewards in several different domains. These included work, hobbies, common daily problems, and interpersonal relationships. The respondent was instructed to consider the extent that each statement described him or her and then respond by writing 1 through 5 on a corresponding answer form.

Each item was scaled with one of two, 5 point Likert scales. The scale anchors were:

- | | | |
|-----------------------------------|----|----------------|
| | or | |
| (1) ALL OR NEARLY ALL OF THE TIME | | (1) VERY MUCH |
| (2) MOST OF THE TIME | | (2) MUCH |
| (3) SOME OF THE TIME | | (3) SOME |
| (4) ONCE IN A WHILE | | (4) LITTLE |
| (5) HARDLY EVER OR NEVER | | (5) NOT AT ALL |

The Expected Creativity and Expected Reward items were randomly mixed together. The items, however, were

divided into two groups according to which of the above scales were most appropriate.

To construct the scale, an initial list of 160 items was created and then subjected to critical review. This review assessed each item's understandability, face validity, and rationally determined content and construct validity. The reviewing was performed by three University of Tennessee faculty members and 20 psychology graduate students. The initial review was an iterative process whereby each of the first five reviewers sequentially critiqued a version that contained improvements based on suggestions of previous reviewers. In all, the scale went through eight successive revisions. This process resulted in a much better refinement than would have occurred if all reviewers evaluated the same version. Additionally, 16 of the reviewers, who were graduate students in clinical and experimental psychology, produced a pool of 61 new items. Several of these sampled aspects of Expected Creativity and Reward that had been overlooked in the initial version. Of these items, 16 were selected for inclusion in the final scale. The process of review and rereview ultimately resulted in a scale of 81 items.

Please refer to Appendix A for a copy of the complete instrument. This inventory differs from the one administered in its inclusion of item labels indicating

positive versus negative scoring and Expected Creativity versus Expected Reward measurement. Additionally, the version administered was only titled the CM Scale.

The Creative Accomplishments Inventory (CAI)

The CAI was designed to measure the extent and diversity of creative achievements from the start of high school to the present. It was a closed-ended, self report instrument that employed a five point likert-scale. It sampled achievement in eight different domains. These were

- 1- LITERATURE
- 2- MUSIC
- 3- ART
- 4- CRAFTS
- 5- PERFORMING ARTS
- 6- MATH AND SCIENCE
- 7- LEADERSHIP AND PUBLIC SPEAKING
- 8- MISCELLANEOUS

The CAI was a slight modification of the Creative behavior inventory (CBI) which was developed by Hocevar (1979). The CBI, in turn, was a modified version of an inventory developed by Holland and Nichols (1964) to measure extra-curricular achievement during college. The nature and validity of the Holland and Nichols inventory

was discussed at length in Chapter 2 under the section titled Biographical creative achievement inventories.

To improve upon the Holland and Nichols inventory, Hocevar asked 239 undergraduates to list their three most creative accomplishments in the areas of mathematics, science, music, arts, drama and literature. This generated a pool of 198 items and an additional category of Crafts.

To refine these items, an additional 50 undergraduates were used to rate each activity for its creativity. Their inter-rater reliability was $r=.96$. Items whose mean creativity ratings fell below the 28th percentile or above the 85th percentile were eliminated. Also, any items with an excessive standard deviation (indicating lack of agreement) were eliminated. This resulted in a pool of 90 items. Remarkably, these items showed about an 85% overlap with the items in the Holland and Nichols inventory. It appears as if Hocevar's undergraduates and Holland and Nichols brainstormed substantially similar activities. This lends a kind of validity by consensus to the final pool of items.

The internal consistency reliabilities of Hocevar's inventory were estimated with Coefficient Alpha on a sample of 239 college students. These were:

$r=.81$ for fine arts

$r=.84$ for performing arts

$r=.63$ for math-science

$r=.89$ for crafts

$r=.80$ for literature

$r=.74$ for music

The present Creative Achievement Inventory (CAI) attempted to improve upon the Hocevar Creative Behavior Inventory in two ways. The first was to add another 15 items that appeared in the original Holland and Nichols inventory. The second was to shift from a four point to a five point response scale.

Additional items were added to increase the diversity of creative achievements sampled, and thus hopefully, content validity. Also, these items have shown good criterion validity as established in studies using the Holland and Nichols inventory (Holland & Austin, 1962; Holland & Baird, 1968; Holland & Nichols, 1964; Holland & Richards, 1965; Richards, Holland, & Lutz, 1967). The inclusion of these additional items also resulted in an additional category of leadership and public speaking which was present in the Holland and Nichols inventory.

A five point scale was used instead of Hocevar's four point scale because it allowed for more precise

discrimination and facilitated correlational analysis (Ladd, 1983, personal communication).

Each item had one of the three following scales associated with it.

- (1) NEVER
- (2) ONCE
- (3) TWICE
- (4) 3 TO 5 TIMES
- (5) MORE THAN 5 TIMES

- (1) NEVER
- (2) ONE YEAR
- (3) TWO YEARS
- (4) 3 TO 5 YEARS
- (5) MORE THAN 5 YEARS

- (1) NEVER
- (2) ONE ORGANIZATION
- (3) TWO ORGANIZATIONS
- (4) 3 TO 5 ORGANIZATIONS
- (5) MORE THAN 5 ORGANIZATIONS

The complete inventory is presented in Appendix B. This inventory differs from the one administered in its inclusion of achievement domain labels for each item. Additionally, the version administered was only titled the CA Inventory.

The Torrance Tests for Creative Thinking (TTCT)

Three tests from the TTCT battery were used to measure creative thinking ability. To measure verbal creativity, the Product Improvement Test and the Unusual Uses Test were selected. To measure figural creativity, the Lines Test was selected. These tests were chosen because they appeared best able to validly and reliably

measure the Fluency, Originality and Flexibility criteria of creative ability used in this dissertation.

All tests were administered on a group basis. The group sizes varied from 85 to 125 participants. Before beginning, the group was informed they were about to participate in a series of activities that was to give them the opportunity to use their imagination in thinking up ideas. They were told that there were no "right" or "wrong" answers. The objective was to think of as many interesting, unusual and clever ideas as possible and to think of ideas that no one else would. They were told that they would be timed on each activity and therefore, it was important to make good use of the time and work as fast as possible without rushing.

The Product Improvement Test booklet displayed a picture and written description of a stuffed toy elephant. The respondents were instructed to list the cleverest, most interesting and unusual ways they could think of for changing the toy so that children would have more fun playing with it. They were also told not to worry how much the change costed, but only to think about what would make it more enjoyable. The respondents were given ten minutes to generate ideas and record them on an answer sheet containing 32 numbered lines (one line per idea).

The Unusual Uses Test informed the respondents that although many people throw away empty cardboard boxes, they have thousands of interesting and unusual uses. Subjects were then instructed to list as many interesting and unusual uses for the boxes as they could think of. They were also instructed not to limit themselves to any one size of box or to the uses they have previously seen or heard about. They were given ten minutes to record their ideas on an answer sheet containing 50 numbered lines.

The Lines Test presented each participant with a sheet containing 30 sets of lines. Each set consisted of two vertical parallel lines that were one inch high. The respondents were instructed to make as many objects or pictures as they could from the pairs of lines. They were also told that the lines should be the main part of each picture and that they were free to add more lines, draw between them, over them, outside them or wherever they wanted to make their picture. Additionally, they were instructed to make as many different types of pictures as they could. They were given ten minutes working time.

The TTCT can be obtained by writing the Scholastic Testing Service, P.O. Box 1056, 480 Meyer Rd. Bensenville, IL 60106.

Procedure

The participants were greeted and informed that they were going to participate in a study for the purpose of learning about their style of thinking and the types of extra-curricular activities they had been involved in since high school. They were assured that their responses were to be held in the strictest of confidence and were totally anonymous. They also were informed that the objective of the experiment was not to evaluate them, but to evaluate, develop and refine the research instruments they were using. Lastly, they were urged to be completely honest in the facts and attitudes that they reported.

The two-hour fifteen-minute experimental session was composed of the following sections:

5 MINUTES	General orientation and introduction
3 MINUTES	Instructions for the Creative Motivation Scale
42 MINUTES	Administration of the Creative Motivation Scale
5 MINUTES	Instructions for the Torrance Tests of Creative Thinking
30 MINUTES	Administration of the Torrance Tests of Creative Thinking .
5 MINUTES	Instructions for the Creative Achievement Inventory
45 MINUTES	Administration of the Creative Achievement Inventory

V. RESULTS

Overview

The analysis of the Creative Motivation Scale (CM Scale) proceeded in three stages. The first stage assessed the reliability and validity of the Scale and its two subscales. The second stage employed item analysis to develop a set of shorter and more valid scales. Specifically, one general and eight specialized Creative Motivation Scales were constructed, validated, and cross validated. The third and final stage explored the factor structure of the new general scale.

Scoring Procedures

The Creative Motivation Scale was scored by assigning the weights, 1 through 5, to the five corresponding response categories for each item. For those items that were negatively worded, the order of their weights were reversed.

The participants' CM Scale scores were calculated by summing the weights of their selected response categories. Missing responses were replaced with that item's median response based on the total sample of 428 participants. In almost all cases, this was the number three. Missing responses in the CM Scale occurred in less than 6% of the participants. Over 90% of those participants with missing data left no more than two items blank.

Three separate CM Scale scores were calculated. The first was the total score for the full 81 item Creative Motivation Scale. The second was the score for the CM Scale's 39 item Expected Creativity subscale. The third was the score for the CM Scale's 42 item Expected Reward subscale.

Although Expected Creativity and Expected Reward are conceptually distinct factors, they are hypothesized, as Chapter 3 suggests, to be reciprocally facilitating and thus positively correlated. Therefore, the rationale for calculating separate Expected Creativity and Expected Reward subscores is only to determine if one or the other construct is more useful for predicting past creative achievement (CAI) and current creative ability (TTCT).

The Creative Achievement Inventory's (CAI) score was calculated in much the same way as the CM Scale's score. That was, by summing the weights of the selected response categories. A total score, consisting of the sum of all responses, was calculated along with separate scores for each of the eight achievement domains. Missing data, however, were handled differently. Since the modal response category was "NEVER", missing responses were interpreted to mean that the participant did not attain the listed achievement. Therefore, for those 8% of the

participants that left blanks, their blanks were replaced with the "NEVER" response weight of one.

The Torrance Tests of Creative Thinking (TTCT) was scored according to its standardized scoring manual (Torrance, 1974). This yielded separate Fluency, Originality and Flexibility scores for the Product Improvement, Unusual Users and Lines creative ability measures.

The Fluency subscore consisted of the total number of relevant responses. Less than 1% of all the responses were discarded as not relevant. Of those responses that were discarded, almost all were either not readable or did not relate to the task's problem.

The Flexibility subscore consisted of the number of different conceptually distinct categories that the responses fell into. Torrance's (1974) standardized scoring manual defined 23 such categories for the Product Improvement measure, 28 categories for the Unusual Uses measure and 68 categories for the Lines measure. These categories were derived from several thousand administrations. In all cases, all responses were able to be classified according to Torrance's existing categorization system.

The Originality subscore consisted of the sum of the originality weights assigned to each response. These

weights were zero, one, or two. A weight of zero was assigned to all responses given by more than 5% of the participants. A weight of one was assigned to those responses given by 2% to 5% of the participants. A weight of two was assigned to those responses given by less than 2% of the participants. Like the Flexibility scoring, the Originality scoring was greatly aided by Torrance's listing of the several hundred most common responses and their associated originality weights. For those responses not on his list, running tallies were kept to determine their degree of originality. Since the modal weight was zero, participants could not inflate their Originality subscore simply by listing a large number of redundant or common ideas.

Since the Fluency, Flexibility, and Originality subscores all had different means and standard deviations, they were standardized. These standardized subscores were then summed across the Unusual Uses, Product Improvement, and Lines measures to produce composite Fluency, Flexibility, and Originality scores. Additionally, an index creative ability score was calculated by summing these three composite scores. Only the standardized composites and index score were used in the remaining analyses.

Internal Consistency

The internal consistency reliability was assessed for the full CM Scale and its two subscales. Reliabilities were calculated for both the primary sample of 252 participants and a randomly selected holdout sample of 176 participants.

For the primary sample, the overall Coefficient Alpha was a reasonably high $r=.89$. The Expected Creativity and Reward subscales showed slightly lower Alpha's of $r=.86$ and $r=.84$ respectively. This decrease can, in part, be attributed to the smaller number of items involved. For the holdout sample, the magnitude and ordering of the reliability coefficients were very similar to the primary sample. Table 1 displays these reliabilities using the intra-class correlation, Coefficient Alpha.

The intercorrelation was calculated between the Expected Creativity and Reward subscales along with the correlation between these subscales and the full CM Scale. These coefficients are displayed in Table 2. The results show a relatively high relationship of $r=.84$ ($p<.001$), between the CM Scale and each of its two subscales. The intercorrelation between the subscales, however, is a lower $r=.41$ ($p<.001$). Similar findings were obtained with the the holdout sample which are displayed in the table's bottom half.

Table 1. The internal consistency reliability of the Creative Motivation Scale and its two subscales.

	Coefficient Alpha		
	Primary sample N = 252	Holdout sample N = 176	
Creative Motivation Scale	.89	.90	(81 items)
Expected Creativity Subscale	.86	.87	(39 items)
Expected Reward Subscale	.84	.84	(42 items)

Table 2. The interrelationship of the Expected Creativity and Expected Reward subscales with each other and with the Creative Motivation Scale.

	Expected Creativity Subscale		Expected Reward Scale	
	Primary sample N = 252	Holdout sample N = 176	Primary sample N = 252	Holdout sample N = 176
Creative Motivation Scale	.84 ***	.88 ***	.84 ***	.86 ***
Expected Creativity Subscale			.41 ***	.50 ***

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Validity

The overall validity of the CM scale was investigated by correlating the CM scores with the current creative ability criterion and the past creative accomplishments criterion, the TTCT and CAI respectively. These validity coefficients are presented in Table 3.

For the primary sample of 252 participants, the results show that the 81 item CM scale and its two subscales significantly correlated with both criteria. The CM Scale showed validities of $r=.29$ and $r=.40$ for the TTCT and CAI criteria, both ($p<.001$). A greater portion of this relationship is attributable to the Expected Creativity Subscale than to the Expected Reward subscale. Five of the six coefficients were highly significant at the ($p<.001$) level while the Expected Reward-CAI coefficient reached significance at ($p<.05$). The correlation between the TTCT and CAI criteria was also calculated. The result showed a relationship of $r=.36$ ($p<.001$).

The generalizability of this validity to randomly selected holdout samples was investigated. These validity coefficients are presented in Table 4. For the CAI criterion, a holdout sample of 176 participants was used. For the TTCT criterion, however, a smaller subset of 60 participants was used.

Table 3. Validity of the Creative Motivation Scale and its Expected Creativity and Expected Reward Subscales.

Validity coefficients for the primary sample. N = 252 subjects.		
	Torrance Tests of Creative Thinking (TTCT) Criterion	Creative Achiev- ement Inventory (CAI) Criterion
Creative Motivation Scale	.29 ***	.40 ***
Expected Creativity Subscale	.35 ***	.42 ***
Expected Reward Subscale	.14 *	.25 ***

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 4. Cross validation of the CM Scale validity coefficients for the TTCT and CAI criteria.

Validity coefficients for the holdout samples.		
N = 176 holdout for the CAI criterion		
N = 60 holdout for the TTCT criterion		
	Torrance Tests of Creative Thinking (TTCT) Criterion	Creative Achiev- ement Inventory (CAI) Criterion
Creative Motivation Scale	.47 (60) ***	.39 (176) ***
Expected Creativity Subscale	.48 (60) ***	.40 (176) ***
Expected Reward Subscale	.38 (60) **	.28 (176) ***

Note: The numbers in parentheses refer to the sample size used in the validity coefficient.

- * $P < .05$.
 ** $P < .01$.
 *** $P < .001$.

These 60 were randomly selected from the initial 176 participants heldout. Although the TTCT sample was smaller than the CAI sample it still provided adequate statistical power to detect validity (81% power, at $\alpha=.01$ for $r=.40$).

The results in the holdout samples show support for the findings of the primary sample. The 81 item CM scale and its two subscales significantly correlated with both criteria.

As with the primary sample, the Expected Creativity subscale outperformed the Expected Reward subscale. Similarly, the same five out of six coefficients were significant at the ($p<.001$) level while the Expected Reward-CAI coefficient reached significance at ($p<.01$).

The validity of the CM scale was next investigated for the three subcriteria of the TTCT and the eight subcriteria of the CAI. For the primary sample of 252 participants, the results show that the full CM Scale and its Expected Reward subscale each significantly correlated with the three subcriteria ($p<.01$). Similarly to the previous findings, the Expected Reward subscale showed lower correlations with the criteria. The Expected Reward subscale failed to reach significance with the Fluency subcriterion and showed markedly lower correlations with the Flexibility and Originality subcriteria. The validity

of the CM scores against the Fluency, Flexibility and Originality subcriteria of the TTCT criterion are displayed in Table 5.

The generalizability of this validity to the holdout sample was investigated. These validity coefficients are presented in Table 6.

The results for the holdout sample were similar to the the primary sample. One small exception was the obtainment of significance ($p < .05$) for the Expected Reward-Fluency coefficient.

The results show significant validities for the CM Scale and its two subscale for each of the subcriteria. Additionally, the results confirm the superiority of the Expected Creativity subscale over the Expected Reward subscale, although, by a lessor margin.

The validity of the CM Scale against each of the eight domain-specific subsections of the CAI criterion was examined. The results show the the CM Scale and its two subscales significantly correlated with achievement in the eight domains in 23 out of 24 cases. Consistently, the Expected Creativity subscale showed higher validity coefficients than the Expected Reward subscale. The only nonsignificant validity was between the Expected Reward subscale and achievement in art.

Table 5. Validity of the CM Scale and its two subscales for each of the three parts of the TTCT Criterion.

	Validity coefficients for the primary sample. N = 252 subjects.		
	TTCT Fluency	TTCT Flexibility	TTCT Originality
Creative Motivation Scale	.20 **	.29 ***	.32 ***
Expected Creativity Subscale	.27 ***	.33 ***	.37 ***
Expected Reward Subscale	.07	.15 *	.17 **

Table 6. Cross validation of the CM Scale validity coefficients for each of the three parts of the TTCT Criterion.

Validity coefficients for a holdout sample. N = 60 subjects.			
	TTCT Fluency	TTCT Flexibility	TTCT Originality
Creative Motivation Scale	.40 **	.34 **	.58 ***
Expected Creativity Subscale	.42 ***	.35 **	.54 ***
Expected Reward Subscale	.30 *	.26 *	.50 ***

* $P < .05$.

** $P < .01$.

*** $P < .001$.

These coefficients from this analysis are presented in Table 7. The generalizability of these validity coefficients over to the holdout sample was then examined. These coefficients are presented in Table 8.

The results only partially confirm the findings in the primary sample. Specifically, achievement in the domains of literature, crafts, science and the miscellaneous category were all significantly predicted by the CM scale as well as predicted by its two subscales. In contrast, achievement in performing Arts showed no significant prediction of the scales. Additionally, the full CM scale along with the Expected Reward subscale did not predict achievement in Music. Also, the Expected Reward subscale did not relate to achievement in art and the Expected Creativity subscale did not relate to achievement in leadership.

Item Analysis

An analysis of the item characteristics was conducted. More specifically, an investigation was undertaken to examine the individual validity and reliability coefficients of each the CM Scale's 81 items for the primary sample. Tables 9 and 10 displays these item statistics.

Table 7. Validity of the CM Scale and its two subscales for each of the eight domains of the Creative Achievement Inventory criterion.

Validity coefficients for the primary sample. N = 252 subjects.								
	1	2	3	4	5	6	7	8
	Liter- ature	Art	Music	Perfor- ming Art	Crafts	Science	Leader- ship	Misc
Creative Motivation Scale	.41 ***	.25 ***	.20 ***	.21 ***	.34 ***	.24 ***	.19 ***	.34 ***
Expected Creativity Subscale	.41 ***	.31 ***	.21 ***	.21 ***	.34 ***	.27 ***	.19 ***	.38 ***
Expected Reward Subscale	.27 ***	.11	.13 *	.15 *	.23 ***	.13 *	.14 *	.19 **

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 8. Cross validation of the CM Scale validity coefficients for the eight domains of the Creative Achievement Inventory.

Validity coefficients for a holdout sample. N = 176 subjects.								
	1	2	3	4	5	6	7	8
	Liter- ature	Art	Music	Perfor- ming Art	Crafts Art	Science	Leader- ship	Misc
Creative Motivation Scale	.41 ***	.24 ***	.12	.12	.27 ***	.29 ***	.18 *	.42 ***
Expected Creativity Subscale	.44 ***	.30 ***	.17 *	.09	.22 **	.35 ***	.14	.39 ***
Expected Reward Subscale	.27 ***	.12	.03	.12	.24 ***	.15 *	.17 *	.33 ***

* $P < .05$.
 ** $P < .01$.
 *** $P < .001$.

Table 9. Expected Creativity item reliabilities and validities.

ITEM NUMBER	Item- total correlation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
1.	.30 ***	.18 **	.13 **	.21 ***	.17 **	.20 **
4.	.32 ***	.14 *	.14 *	.13 *	.11	.16 **
6.	.31 ***	.15 *	.13 *	.15 *	.14 *	.18 **
7.	.37 ***	.26 ***	.25 ***	.19 **	.28 ***	.28 ***
9.	.32 ***	.13 *	.13 *	.12	.13 *	.13 *
10.	.28 ***	.12	.10	.11	.11	.13 *
14.	.17 **	.05	.03	.03	.08	.04
19.	.23 ***	.26 ***	.21 ***	.22 ***	.30 ***	.12
21.	.37 ***	.14 *	.08	.14 *	.17 **	.16 **
22.	.46 ***	.20 ***	.17 **	.19 **	.21 **	.26 ***
24.	.37 ***	.24 ***	.19 **	.21 ***	.27 ***	.26 ***
29.	.31 ***	.08	.05	.06	.11	.12 *
32.	.26 ***	.16 **	.13 *	.14 *	.18 **	.09

Table 9. (Continued)

ITEM NUMBER	Item- total corre- lation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
33.	.31 ***	.03	-.01	.07	.02	.10
34.	.45 ***	.15 *	.08	.15 *	.18 **	.18 **
36.	.44 ***	.08	.05	.08	.10	.20 **
40.	.36 ***	.18 **	.09	.20 ***	.21 ***	.11
43.	.40 ***	.23 ***	.16 **	.23 ***	.25 ***	.14 *
44.	.25 ***	.09	.09	.05	.10	.06
45.	.27 ***	.12	.09	.13 *	.12	.13 *
47.	.43 ***	.14 *	.09	.12	.16 **	.22 ***
48.	.32 ***	.23 ***	.22 ***	.24 ***	.19 **	.23 ***
49.	.32 ***	.10	.07	.08	.11	.20 **
50.	.42 ***	.20 **	.17 **	.20 ***	.18 **	.21 ***
51.	.26 ***	.11	.08	.11	.11	.18 **
52.	.54 ***	.31 ***	.25 **	.28 ***	.32 ***	.43 ***
53.	.47 ***	.18 **	.16 **	.18 **	.17 **	.18 **

Table 9. (Continued)

ITEM NUMBER	Item- total correlation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
54.	.45 ***	.23 ***	.16 **	.26 ***	.22 ***	.25 ***
56.	.34 ***	.00	-.03	.02	.00	.18 **
57.	.34 ***	.09	.08	.09	.09	.31 ***
58.	.08	.14 *	.11	.15 *	.14 *	.02
59.	.48 ***	.21 ***	.17 **	.24 ***	.18 **	.14 *
61.	.20 ***	-.01	-.03	-.03	.04	.11
67.	.34 ***	.16 **	.12	.12	.21 ***	.27 ***
69.	.29 ***	.15 *	.13 *	.15 *	.14 *	.19 **
74.	.25 ***	-.02	-.02	-.05	-.01	.14 *
76.	.33 ***	-.04	-.07	.01	-.04	.01
79.	.44 ***	.19 **	.14 *	.20 ***	.18 **	.16 **
81.	.23 ***	.00	.00	-.01	.03	.07

Note: N = 252 subjects.

Table 10. Expected Reward item reliabilities and validities.

ITEM NUMBER	Item- total corre- lation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
2.	.17 **	.12	.10	.11	.11	.04
3.	.11	.07	.05	.06	.08	.08
5.	.14 *	-.07	-.07	-.10	-.03	.03
8.	.34 **	.02	.01	.01	.05	.14 *
11.	.12	-.03	-.04	.00	-.04	-.01
12.	.32 ***	.03	-.01	.04	.04	.10
13.	.31 ***	.00	-.06	.08	-.01	.01
15.	.35 ***	.09	.07	.08	.10	.13 *
16.	.34 ***	-.01	-.03	.03	-.02	.05
17.	.35 ***	-.02	-.03	-.02	.01	.16 *
18.	.21 ***	-.03	-.05	.00	-.03	.01
20.	.38 ***	.21 ***	.19 **	.20 ***	.18 **	.22 ***
23.	.24 ***	.02	-.02	.04	.05	.13 *
25.	.35 ***	.14 *	.13 *	.12	.15 *	.13 *

Table 10. (Continued)

ITEM NUMBER	Item- total corre- lation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
26.	.39 **	.06	.04	.10	.03	.16 **
27.	.35 ***	.09	.10	.05	.10	.09
28.	.41 ***	.08	.03	.11	.10	.00
30.	.35 ***	.08	.07	.05	.09	.06
31.	.43 ***	.07	.00	.12	.07	.07
35.	.26 ***	.13 *	.11	.12	.13	.11
37.	.38 ***	.10	.07	.11	.11	.07
38.	.38 ***	.06	.01	.10	.06	.15 *
39.	.16 **	-.07	-.07	-.08	-.05	-.08
41.	.18 **	-.03	-.08	-.02	.01	-.06
42.	.09	-.01	-.04	-.01	.02	.04
46.	.45 ***	.16 *	.11	.15 *	.18 **	.19 **
55.	.24 ***	-.01	-.02	.00	.00	.03
60.	.31 ***	-.02	-.06	-.02	.04	.14 *

Table 10. (Continued)

ITEM NUMBER	Item- total correlation	TTCT Index Score	TTCT Fluency Subscore	TTCT Flexible Subscore	TTCT Original Subscore	CAI Total Score
62.	.26 ***	.08	.07	.06	.10	.09
63.	.51 ***	.13 *	.10	.12	.15 *	.16 **
64.	.25 ***	-.08	-.12	-.06	-.06	.05
65.	.35 ***	.07	.05	.07	.08	.16 **
66.	.38 ***	.07	.02	.06	.11	.16 **
68.	.34 ***	-.06	-.12	-.01	-.03	.06
70.	.27 ***	.12	.12	.07	.15 *	.09
71.	.32 ***	.13 *	.09	.12	.17 **	.17 **
72.	.20 ***	-.03	-.05	-.05	.00	.09
73.	.52 ***	.23 ***	.19 **	.21 ***	.25 ***	.18 **
75.	.13 *	.05	.07	.06	.03	.12 *
77.	.12	-.14 *	-.13 *	-.12	-.15 *	-.03
78.	.35 ***	-.04	-.05	-.03	-.03	.06
80.	.47 ***	.25 ***	.20 ***	.23 ***	.28 ***	.20 ***

The former presents the statistics for the Expected Creativity items and the latter presents the statistics for the Expected Reward items. Both tables display each item's correlation with the total CM Scale score, TTCT index score, its Fluency, Flexibility and Originality subscores, and lastly, its total CAI score.

The results support the previously shown advantage of the Expected Creativity scale. Generally, the items designed to measure Expected Creativity show higher validities against both the TTCT and the CAI criteria than items designed to measure Expected Reward. In the set of 39 Expected Creativity items, 24 significantly correlated with the TTCT criterion and 28 with the CAI criterion ($p < .05$). In the set of 42 Expected Reward items, only nine significantly correlated with the TTCT criterion and 17 with the CAI criterion. ($p < .05$). For the 27 items that showed significant correlations with both criteria, 20 were items designed to measure Expected Creativity.

This validity difference can be further illustrated by examining individual items. In several instances similar behaviors were addressed by both Expected Creativity and Expected Reward items. For instance, item 34, which measured the belief that one could write interesting scenarios, had significant TTCT and CAI validities. In contrast, the similar item 33, which

measured the expectation that including attention grabbing, but unconventional expressions in letters resulted in better outcomes, had no demonstrated validity.

In another instance, item 40, which measured the belief that one could think up unconventional solutions to the complaints of others showed significant TTCT validity. In contrast, the similar item 41, which measured the expectation that when people people ask for advice, they do not want new ideas, only reaffirmation of their current thinking, showed close to zero-order validity.

The validity difference between the Expected Creativity and Reward Constructs was further substantiated by examining item validities for the most conceptually pure items. These are items that when logically and rationally examined, appeared most clearly and directly to measure the Expected Creativity and Reward constructs. The conceptually pure Expected Creativity items are listed in Table 11.

These items showed some of the highest validities in the 81 item set. The conceptually purest of the group was item 80. This question directly assessed the effort-performance linkage which embodies the Expected Creativity construct. Although this item had relatively high validity, it was lower than the total CM Scale validity.

Table 11. Item validities of the conceptually purest
Expected Creativity Items.

Expected Creativity Items	TTCT Validity	CAI Validity
53 Brainstorming long lists of ideas comes naturally to me.	.18 **	.18 **
48 I get good ideas by elaborating or building upon the ideas of others.	.23 ***	.23 ***
79 I can think up a new product or service that if marketed could sell.	.19 **	.16 **
80 It takes effort to come up with creative ideas (reversed scoring).	.25 ***	.20 ***
52 Others consider me to be a creative person.	.31 ***	.43 ***

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Surprisingly, the least conceptually direct item of this set, item 52, showed the highest validities in the entire 81 item scale. In fact, its TTCT $r=.31$ and CAI $r=.43$ validities, matched the validities of the full CM Scale, $r=.29$ and $r=.40$. respectively. The conceptually pure Expected Reward items are listed in Table 12.

In stark contrast to the Expected Creativity items, the Expected Reward items were mostly nonsignificant. One exception was item 54, which was the only one of the group that measured the intrinsic satisfaction associated with creativity.

Next, the Expected Creativity and Reward items were compared in terms of their item-total reliabilities. The two sets of items did not substantially differ in the general magnitude or frequency of items that showed significant correlations with the total CM Scale score. In fact, all but 5 of the 81 items showed significant correlations with this total score.

Differences in item validity for verbal/semantic versus visual/spatial creative ability was examined.

The verbal criterion consisted of the summed TTCT subscores for the Product Improvement and Unusual Uses tests. The visual criterion consisted of the summed TTCT subscores for the Lines tests.

Table 12. Item validities of the conceptually purest
Expected Reward Items.

Expected Reward Items	TTCT Validity	CAI Validity
5 Highly innovative thinkers are not very popular (reversed scoring)	.07	.03
13 To advance in an organization, one should avoid being too innovative in what is said or done (reversed scoring).	.00	.01
29 When I take risks by using untried and innovative solutions I am rewarded	.08	.12 *
68 In group discussion, it is better not to express very farfetched or way-out ideas (reversed scoring).	.06	.06
72 The people whose evaluation of me will affect my future opportunities (i.e. employers, teachers, etc.) value the conventional over the innovative.	.03	.09
75 People distrust the ideas of creative thinkers.	.05	.12 *
54 I enjoy the feeling of thinking up and toying with novel or way-out ideas just for the sake of it.	.23 ***	.25 ***

* $P < .05$.

** $P < .01$.

*** $P < .001$.

The results showed that the CM Scale and its two subscales each correlated higher with the verbal than the visual criterion for both samples. For the primary sample item analysis, this higher verbal validity occurred for almost all items. There were, however, a few exceptions. Several items showed markedly higher visual validity. These included item 32, measuring the tendency to doodle unusual shapes, item 64, measuring the belief that beauty in art, architecture, and clothing design depends more on conformity to accepted standards than innovation, and also item 77, measuring the tendency to feel uneasy when receiving praise for being creative.

Some differences in validity were noted when items were compared on the basis of positive versus negative wording. For Expected Creativity items, the percentage showing significant TTCT or CAI validities was 81% for positively worded and 77% for negatively worded items. For Expected Reward items, this was 92% for the positively worded and 31% for the negatively worded items. This suggests that for the Expected Creativity construct, wording direction does not have much effect. For the Expected Reward construct, however, the negatively worded items appeared to demonstrated a much lower rate of validity.

One Expected Creativity item, number 76, served as a check for the tendency to bias one's self presentation in a positive direction. This item measured the expectation that one could solve almost any problem encountered at school or work. The results revealed that the item failed to significantly correlate with the TTCT or the CAI criteria. $r=.04$ and $r=.01$, respectively. Thus, it appears that this bias was not operating at a significant level.

Refinement of the CM Scale into the New CM Scale

The 27 items with significant ($p<.05$) validity coefficients for both the TTCT criterion and the CAI criterion were selected for the development of a more valid scale. One additional item was added that was significant on the TTCT criterion and approached significance on the CAI criterion ($p<.058$).

This New 28 item Creative Motivation Scale was composed of 21 Expected Creativity items and 7 Expected Reward items. The scale numbers of these items are listed in Table 13. These numbers correspond to the item numbers of the CM Scale in Appendix A.

The reliability and validity of this New CM Scale was examined. The Coefficient Alpha for the new scale in the primary sample of 252 participants was $r=.85$ and in the holdout sample of 176 participants was $r=.86$.

Table 13. The 28 Items included in the New CM Scale.

Expected Creativity Items			Expected Reward Items
1.	22.	52.	20.
4.	24.	53.	25.
6.	34.	54.	46.
7.	43.	59.	63.
9.	47.	67.	71.
19.	48.	69.	73.
21.	50.	79.	80.

These coefficients are slightly lower than those of the original CM Scale. The correlation of the new CM Scale with the original CM scale was $r=.88$ ($p<.001$) in the primary sample and $r=.89$ in the holdout sample. The validity of the New CM Scale against the TTCT index, Fluency, Flexibility, Originality, and CAI criteria are presented in Table 14. The results show significant correlations with all criteria for both samples ($p<.01$). Additionally, nine out of the ten validity coefficients for the New CM Scale are higher than those of the original CM Scale.

Development of Achievement-Domain Specific CM Scales

An attempt was made to develop specialized CM Scales that maximized prediction in each of the domains of creative achievement. Eight domain-specific CM Scales were constructed for this purpose. Each of the scales consisted of the sum of those items that significantly correlated ($p<.05$) with achievement in that scale's domain for the primary sample. The composition of these scales is depicted in Table 15 which brackets the item numbers included in each of the eight specialized scales. These scale item numbers correspond to the item numbers of the CM Scale in Appendix A. Note that very few of the items were used in only one scale.

Table 14. The validity of both the new and original CM Scales for the primary and holdout samples.

	Primary sample	Holdout sample
Creative Achievement Inventory	.44 (.40) ***	.41 (.39) ***
TTCT index score	.42 (.29) ***	.49 (.47) ***
TTCT Fluency	.34 (.20) ***	.42 (.40) **
TTCT Flexibility	.40 (.29) ***	.37 (.34) **
TTCT Originality	.44 (.32) ***	.57 (.58) ***

Note: The coefficients in the parentheses refer to the validities for the original 81 item CM Scale.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Table 15. The CM Scale items contained in each of the domain-specific Creative Motivation Scales.

1	2	3	4	5	6	7	8
Liter- ature	Art	Music	Perfor- ming Arts	Crafts	Science	Leader- ship	Misc.
[1]	1	1	1	1	[1]	[1]	[1]
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	[4]	4	4	[4]	4	4	[4]
5	5	5	5	5	5	5	5
[6]	[6]	6	[6]	[6]	6	6	6
[7]	[7]	[7]	[7]	[7]	[7]	[7]	[7]
8	8	8	8	[8]	8	8	8
9	9	9	9	[9]	9	9	9
10	10	[10]	[10]	[10]	10	10	10
11	11	11	11	11	11	11	11
[12]	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
[15]	15	15	15	15	[15]	15	[15]
16	16	16	16	[16]	16	16	16
[17]	17	17	[17]	[17]	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	[19]	19	19	[19]
[20]	20	20	[20]	[20]	20	20	[20]
[21]	[21]	21	21	[21]	21	21	21
[22]	[22]	[22]	[22]	[22]	[22]	[22]	[22]
[23]	23	23	[23]	[23]	23	23	23
[24]	[24]	[24]	[24]	[24]	24	24	[24]
[25]	25	25	25	[25]	25	25	25
[26]	[26]	26	[26]	[26]	26	26	26
27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28
29	29	[29]	29	29	29	29	29
30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31
[32]	[32]	32	32	32	32	32	32
[33]	[33]	33	33	33	33	33	[33]
[34]	[34]	34	[34]	[34]	34	34	[34]
[35]	35	35	35	35	35	35	35
[36]	[36]	[36]	36	36	[36]	36	[36]
[37]	[37]	37	37	37	37	37	37
[38]	[38]	38	38	[38]	38	38	[38]
39	39	39	39	39	39	39	39

Table 15. (Continued)

[40]	40	40	40	40	[40]	40	[40]
41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42
[43]	[43]	43	43	43	[43]	43	[43]
44	44	44	44	44	44	44	[44]
[45]	[45]	45	45	[45]	45	45	45
[46]	46	46	46	46	46	[46]	[46]
[47]	[47]	47	47	[47]	[47]	47	[47]
48	[48]	[48]	[48]	[48]	[48]	[48]	[48]
[49]	49	[49]	[49]	49	49	[49]	[49]
[50]	[50]	50	50	[50]	[50]	50	[50]
[51]	[51]	51	51	[51]	51	51	51
[52]	[52]	[52]	[52]	[52]	[52]	[52]	[52]
[53]	[53]	53	53	[53]	[53]	53	[53]
[54]	[54]	[54]	54	[54]	[54]	54	[54]
55	55	55	55	55	55	55	55
56	[56]	[56]	56	[56]	56	56	56
[57]	[57]	[57]	[57]	[57]	57	57	[57]
58	58	58	58	58	58	58	58
59	59	59	59	59	[59]	59	[59]
50	[50]	50	50	50	50	50	[50]
[61]	61	61	61	61	[61]	61	61
62	62	62	62	62	62	62	62
[63]	63	63	63	63	[63]	63	[63]
64	64	64	64	64	64	64	64
65	65	65	65	[65]	[65]	[65]	[65]
66	[66]	66	66	[66]	66	66	[66]
[67]	[67]	[67]	[67]	[67]	67	[67]	[67]
68	68	68	[68]	68	68	68	68
[69]	[69]	69	69	[69]	69	69	[69]
70	[70]	70	70	70	70	70	[70]
[71]	71	71	71	71	[71]	[71]	[71]
72	72	72	72	72	72	72	72
[73]	[73]	73	73	[73]	[73]	73	[73]
74	74	74	74	[74]	74	74	74
75	75	75	[75]	[75]	75	75	75
76	[76]	76	76	76	76	76	76
77	[77]	77	77	77	77	77	77
78	78	78	78	78	78	78	78
[79]	79	79	79	79	[79]	79	[79]
[80]	80	80	80	[80]	[80]	80	[80]
81	81	81	81	81	81	81	81

Note: Scale items are in [].

Most items that significantly predicted achievement in one domain also did so in other domains. The validity of each of these domain-specific scales was then examined in relation to the domain specific validities of the full CM Scale and the 28 item New CM Scale. Table 16 displays these coefficients for the primary sample. All of the coefficients were significant. The results show that in all instances, the domain specific CM Scales predicted creative achievement in their domain better than either the full CM Scale or the New CM Scale. In another analysis, it was also shown that each of the domain-specific scales had higher correlations with achievement in their domain than scales from any of the seven other domains. That is, in all instances, the specialized scales had lower correlations outside of their domain than the scale designed for that domain.

The generalizability of these findings for the holdout sample was then investigated. These coefficients are displayed in Table 17. The results support the findings obtained for the primary sample.

Factor Analysis of the New CM Scale

To explore the factor structure of the New CM Scale, a Maximum-Likelihood Factor analysis with Promax Rotation was performed.

Table 16. Eight new specialized Creative Motivation Scales.

Validity coefficients for the primary sample. N = 252 subjects.								
	1	2	3	4	5	6	7	8
	Liter- ature	Art	Music	Perfor- ming Art	Crafts	Science	Leader- ship	Misc
Original CM Scale	.40 ***	.25 ***	.20 ***	.21 ***	.34 ***	.24 ***	.19 **	.34 ***
New CM Scale	.43 ***	.32 ***	.20 **	.21 ***	.36 ***	.31 ***	.20 **	.43 ***
Domain Specific CM Scales	.48 *** (35)	.37 *** (37)	.33 *** (13)	.39 *** (17)	.45 *** (36)	.39 *** (21)	.34 *** (12)	.46 *** (36)

Note: The numbers in parentheses refer to the number of items in each of the Domain specific Creative Motivation Scales.

* $P < .05$.
 ** $P < .01$.
 *** $P < .001$.

Table 17. The cross validation of the domain specific creative motivation scales.

Validity coefficients for the holdout sample. N = 176 subjects.								
	1	2	3	4	5	6	7	8
	Liter- ature	Art	Music	Perfor- ming Art	Crafts	Science	Leader- ship	Misc
Original CM Scale	.41 ***	.24 ***	.12	.12	.27 ***	.29 ***	.18 *	.42 ***
New CM Scale	.42 ***	.28 ***	.17 *	.14	.20 **	.41 ***	.14	.43 ***
Domain Specific CM Scale	.44 *** (35)	.32 *** (37)	.19 ** (13)	.15 * (17)	.27 *** (36)	.42 *** (21)	.17 * (12)	.45 *** (36)

* $P < .05$.
 ** $P < .01$.
 *** $P < .001$.

The Maximum-Likelihood method was chosen because of its desirable asymptotic properties (Bickel & Doksum, 1977; Lawley & Maxwell, 1971). Promax rotation was used because of the hypothesized true correlation between the factors.

The procedure yielded five factors. The Eigenvalues for the five factors were 8.27, 1.68, 1.47, 1.21, and 0.83, respectively. The factor loadings are displayed in Table 18. The items have been grouped in the table according to which factor they were assigned. The first eight items make up Factor 1, the next nine make up Factor 2, the following four are Factor 3, the next four define Factor 4 and the last three are Factor 5. Within each factor grouping, the items have been listed in the order of descending factor loadings. For example, item 24, the first item listed, also has the greatest loading on the first factor.

One problem with this grouping is that many of the items loaded highly across several or all of the factors. This limits the distinctions that can be made between these factors. Another problem was that all of the factors contained items that made them difficult to summarize with unidimensional or global descriptions. With this in mind, an attempt has been made to describe the five factors.

Table 18. Factor loadings of the New CM Scale with the items grouped by factor.

Factor one (7 items)	FACTORS				
	-1-	-2-	-3-	-4-	-5-
24 I have thought up interesting stories which could be used in novels, movies or television.	(.62)	.06	.19	.26	.30
79 I can think up a new product or service that if marketed could sell.	(.58)	.35	.20	.45	.14
54 I enjoy the feeling of thinking up and toying with novel or way out ideas just for the sake of it.	(.55)	.24	.36	.16	.35
50 When I learn about a new technological breakthrough I think of additional uses or applications for it.	(.52)	.51	.45	.11	.03
43 I think of unusual or unintended uses of tools.	(.50)	.38	.33	.20	.18
47 When assembling something from a kit, I think of ways of improving it or making it more attractive.	(.48)	.44	.42	.18	.07
34 When I write a story or letter, I imagine many interesting scenarios or directions it can take at various points.	(.41)	.23	.34	.31	.28
69 When I look at a work of art, I find it easy to visualize how it could have been done differently.	(.39)	.14	.27	.09	.23

Table 18. (Continued)

Factor two (9 items)	FACTORS				
	-1-	-2-	-3-	-4-	-5-
59 At work, when I have to perform a task I have never done before and without instructions, I can generate a variety of different ways to proceed.	.30	(.55)	.29	.21	.10
46 When there is a clash of ideas in a group discussion it is difficult for me to think up an alternative position that can reduce the conflict.	.09	(.52)	.22	.36	.24
53 Brainstorming long lists of ideas comes naturally to me.	.40	(.46)	.42	.31	.18
4 At work, when I get a new idea about how to do things, I have the opportunity to test it out.	.16	(.45)	.30	.09	.06
20 I seem to think up the same kinds of things to do every weekend.	.12	(.41)	.12	.27	.13
7 Creative ideas of mine have been put to use by others who found them successful.	.34	(.38)	.28	.27	.10
1 When I am discussing ideas with friends we come up with some pretty wild and innovative ideas.	.27	(.38)	.25	.13	.07
80 It takes effort to come up with creative ideas.	.29	(.37)	.18	.32	.26
25 It does not pay off to try to adapt procedures That have been designed for a specific purpose to a very different purpose.	.09	(.33)	.11	.17	.13

Table 18. (Continued)

Factor three (4 items)	FACTORS				
	-1-	-2-	-3-	-4-	-5-
48 I get good ideas by elaborating or building upon the ideas of others.	.33	.27	(.62)	.06	.11
9 My parents have rewarded me for showing creativity in problem solving.	.21	.22	(.41)	.15	.01
6 If I don't have all of the ingredients called for by a recipe, I can improvise with what I have.	.19	.15	(.36)	.11	.17
19 When giving advice to someone, it is beneficial to suggest ideas that are very different from their thinking.	.16	.18	(.29)	.18	.06
Factor four (4 items)					
63 When I'm explaining a concept or principle to someone, It takes a lot of effort to come up with a variety of different examples.	.15	.31	.34	(.71)	.19
73 It would be difficult for me to invent a new game or sport.	.47	.35	.22	(.61)	.12
71 I find it hard to make up a funny joke.	.28	.23	.03	(.42)	.19
22 When I need a favor from someone who appears reluctant, I can think of a variety of different ways to increase their willingness.	.33	.34	.32	(.41)	.33

Table 18. (Continued)

Factor five (3 items)	FACTORS				
	-1-	-2-	-3-	-4-	-5-
67 I enjoy surprising others by being unconventional.	.23	.13	.06	.16	(.68)
52 Others consider me to be a creative person.	.44	.40	.42	.27	(.55)
21 In school, I have found that writing papers and essays on unusual subjects resulted in better grades.	.20	.26	.31	.22	(.33)

Factor 1 is best characterized as confidence in one's ability to generate artistic, literary, technological, and entrepreneurial ideas. This factor also contains the expectation of experiencing internal satisfaction for generating novel ideas.

Factor 2 is best characterized by self confidence in one's ability to solve work related problems, generate ideas in group discussions, and solve interpersonal problems. Also, the tendency to do different activities every weekend loads highly on this factor.

Factor 3 is more difficult to characterize. It can be described as a combination of confidence in being able to build upon the ideas of others, in cooking improvisation, and in the expectation being rewarded for suggesting creative ideas to others.

Factor 4 can best be characterized as confidence in being able to generate humorous games and sports related ideas along with being able to illustrate concepts with examples.

Factor 5 can be characterized as the expectation of receiving both internal and external reward for being creative.

The intercorrelations between the factors was investigated. The results of this investigation show definite intercorrelations between many of the factors.

These results are depicted in the correlation matrix shown in Table 19.

Next, the validity of the five factors against the TTCT, CAI, and eight CAI subcriteria was examined. Table 20 presents these coefficients. All of the coefficients for the index TTCT and CAI criteria were significant ($p < .001$). Many of the coefficients for the eight CAI subcriteria were significant ($p < .01$). Generally, the lowest validity was for Factor 4.

These findings were then cross validated by using the factor structure from the primary sample to generate factor scores in the holdout sample. These results are presented in Table 21. Again, all of the coefficients for the index TTCT and CAI criteria were significant ($p < .001$). A smaller number, however, of the coefficients for the eight CAI coefficients were significant ($p < .01$).

As one final cross check, the items were grouped into five scales based on their factor loadings and then correlated with the five factors. The correlations for the primary sample are in Table 22 and for the holdout sample in Table 23. The results substantiate the factor groupings by showing higher correlations between the matching factor scale and factor than between nonmatching ones.

Table 19. Intercorrelations between the five factor scores.

	FACTOR ONE	FACTOR TWO	FACTOR THREE	FACTOR FOUR	FACTOR FIVE
FACTOR ONE	---	.41	.42	.28	.24
FACTOR TWO		---	.48	.37	.17
FACTOR THREE			---	.20	.19
FACTOR FOUR				---	.29
FACTOR FIVE					---

Table 20. Validation of the New CM Scale's factor structure against the TTCT criterion and the CAI criterion.

	FACTOR ONE	FACTOR TWO	FACTOR THREE	FACTOR FOUR	FACTOR FIVE
Index TTCT	.35 ***	.33 ***	.32 ***	.24 ***	.26 ***
CAI	.35 ***	.34 ***	.34 ***	.24 ***	.39 ***
Literature	.37 ***	.25 ***	.28 ***	.29 ***	.43 ***
Art	.32 ***	.22 ***	.26 ***	.09	.25 ***
Music	.17 **	.15 *	.17 **	.09	.21 ***
Perf. Arts	.13 *	.15 *	.17 **	.11	.27 ***
Crafts	.26 ***	.28 ***	.31 ***	.17 **	.25 ***
Science	.28 ***	.31 ***	.22 ***	.26 ***	.13 *
Leadership	.07	.16 **	.15 *	.12	.33 ***
Misc.	.41 ***	.34 ***	.27 ***	.30 ***	.29 ***

Note: N = 252 subjects.

* $\underline{P} < .05$.
 ** $\underline{P} < .01$.
 *** $\underline{P} < .001$.

Table 21. Cross validation of the New CM Scale's factor structure against the TTCT criterion and the CAI criterion.

	FACTOR ONE	FACTOR TWO	FACTOR THREE	FACTOR FOUR	FACTOR FIVE
Index TTCT	.43 ***	.47 ***	.42 ***	.44 ***	.38 ***
CAI	.33 ***	.40 ***	.38 ***	.25 ***	.32 ***
Literature	.45 ***	.37 **	.42 **	.39 **	.54 ***
Art	.15	.30 *	.20	.08	.18
Music	.08	.07	.06	.16	.25
Perf. Arts	.23	.09	.07	.14	.14
Crafts	.21	.38 **	.20	.13	.19
Science	.41 **	.42 ***	.41 **	.50 ***	.15
Leadership	.07	.00	.09	.11	.11
Misc.	.48 ***	.52 **	.41 **	.53 ***	.33 *

Note: N = 60 subjects for the TTCT criterion.
N = 176 subjects for the CAI criterion.

* $P < .05$.
** $P < .01$.
*** $P < .001$.

Table 22. The confirmation of the New CM Scale's factor structure by its correlation with its matching Factor Scales.

	Factor Scale 1	Factor Scale 2	Factor Scale 3	Factor Scale 4	Factor Scale 5
FACTOR 1	[.96]	.49	.46	.52	.44
FACTOR 2	.55	[.94]	.48	.52	.41
FACTOR 3	.63	.55	[.76]	.40	.43
FACTOR 4	.43	.52	.32	[.92]	.35
FACTOR 5	.41	.34	.13	.38	[.87]

Note: N = 252 subjects.

Table 23. The cross-validated confirmation of the New CM Scale's factor structure.

	Factor Scale 1	Factor Scale 2	Factor Scale 3	Factor Scale 4	Factor Scale 5
FACTOR 1	[.96]	.56	.45	.62	.53
FACTOR 2	.68	[.93]	.52	.64	.50
FACTOR 3	.69	.61	[.69]	.50	.56
FACTOR 4	.50	.64	.38	[.87]	.42
FACTOR 5	.47	.46	.41	.40	[.88]

Note: N = 176 subjects.

VI. DISCUSSION

Test of the Major Hypothesis

The results of this study supported the hypothesis that an expectancy-based measure of creative motivation can predict creative ability and prior creative accomplishments. This is demonstrated by the significant correlations between the CM Scale and the TTCT and CAI criteria in both the primary and cross validation samples. Additionally, for the primary sample, the CM Scale demonstrated validity for all three TTCT subcriteria and all eight CAI subcriteria. For the holdout samples, the CM Scale demonstrated validity for all TTCT subcriteria and 6 of the 8 CAI subcriteria. Only the music and performing arts subcriteria failed to cross validate.

Moreover, both CM subscales validated and cross validated for the total TTCT and CAI criteria. They were, however, less consistently validated against each of the subcriteria in the holdout sample.

There is, however, an alternative interpretation of the high Expected Creativity scale validity. This is, that the Expected Creativity scale is more a measure of one's general creative ability than a measure of one's expectation of their creative efforts yielding creative output. Although this interpretation is simpler, its plausibility is reduced when the high validity of item 80,

which captures the essence of Expected Creativity, is considered. This item reads: "It takes effort to come up with creative ideas." Yet, based on the present study, this interpretation cannot be completely ruled out.

The most unexpected result was the finding that the Expected Creativity subscale showed consistently higher validity than the Expected Reward subscale. This difference held up for both the TTCT and CAI criteria and for all samples. Upon closer inspection, the validity difference appeared for each of the three TTCT subcriteria and each of the eight CAI subcriteria in the primary sample. Most of these differences were replicated in the holdout sample.

The validity difference of these constructs was further substantiated by its occurrence in the most conceptually pure items. That is, the items that rationally appeared to measure the Expected Creativity and Reward constructs best. The "purest" Expected Creativity items were some of the most valid, while the purest Expected Reward items were by and large without validity. One notable exception was item 54, which was the only item from the pure Expected Reward set to specify an intrinsic instead of extrinsic outcome.

Surprisingly, in the pure Expected Creativity set, it was the least conceptually direct item (item 52: "Others

consider me to be a creative person") that showed the highest validities in the entire 81 item set. Both its TTCT and CAI validities were equivalent to the validities obtained for the full CM Scale. This could be, in part, because the item measures Expected Creativity by having the respondent assess how others rate his or her creative ability. Assuming that one's understanding of their appraisal by others is reasonably accurate, such an appraisal may have high validity resulting from the use of multiple observers making ratings across different settings and times.

Campbell and Pritchard's (1976) review of VIE theory provides some clues as to why Expected Reward showed lower validity than Expected Creativity. They state that there is an inherent difficulty in measuring Instrumentality (which is analogous to Expected Reward). This difficulty stems from the fact that the reward value of an outcome is individually determined. Therefore, when a particular reward is specified, its desirability can vary greatly across individuals resulting in lower item validities. Since most of the Expected Reward items described specific outcomes that were contingent on creative performance, they were vulnerable to this problem.

The high validity of the Expected Reward item (item 54: "I enjoy the feeling of thinking up and toying with

novel or way-out ideas just for the sake of it") which measured the intrinsic reward of creativity, may be because the outcome, general enjoyment, is global enough to be universally relevant.

Verbal Versus Visual Validity Differences

It should also be noted that the CM Scale appears to predict verbal creativity better than nonverbal or spatial creativity. For the TTCT, this is evidenced by higher validities for verbal over nonverbal subcriteria. For the CAI, this is evidenced by higher validities of the CAI Literature subcriterion over the art, performing art, and crafts subcriteria. This is not surprising since the majority of the items addressed verbal and social problems rather than spatial ones.

The New CM Scales

The attempt to develop shorter and more valid scales was moderately successful. The one general and eight domain-specific CM Scales all showed higher validities than the original 81 item CM Scale. Although differences in validity coefficients were moderate, they held up in the cross validation sample. The new 28 item CM Scale appeared more valid and is substantially faster to administer than the original 81 item Scale. Also, the eight specialized CM Scales appear more valid (for both

samples) than either the original or new CM Scales for predicting achievement within their specified domains.

The New CM Scale shows some factorial complexity. Its five factors are all moderately intercorrelated and all significantly predict the TTCT and CAI criteria. Unfortunately, these factors do not lend themselves to easy interpretation with unidimensional constructs. To make matters worse, many items loaded highly across most or all of the factors.

This difficulty, in part, can be understood by the inherent complexity of creative thinking. As discussed in Chapter One, Torrance (1974) maintains that creative ability can be exhibited in an almost limitless variety of ways. Any attempt to measure creativity would have to sample many different types of creative abilities and expressions. These abilities and expressions are likely to be grouped in varying configurations across individuals. Therefore, it is unlikely that they can be described with a set of conceptually and statistically distinct factors. This difficulty in interpreting the factors, however, does not detract from the utility of the scale for measuring and predicting creativity.

Implications and Applications

The demonstrated validity of the Creative Motivation Scales help substantiate the viability of their

theoretical basis. This is especially the case for the Expected Creativity construct and, to a lesser degree, the case for the Expected Reward construct. Although the Expected Reward construct showed lower validity, it still demonstrated sufficient validity to remain viable.

The validity of the CM Scale also suggests the usefulness of Expectancy Theory for studying creativity, an application not previously made. Additionally, the findings indicate that future efforts at defining, operationalizing and measuring creative capacity might benefit from employing an expectancy-based creative motivation factor. This may not only improve understanding of the causal factors in the creative process but also improve the prediction of creative performance.

A limitation in the present study is its concurrent or correlational design. This precludes making an inference about the causal relationship of both Expected Creativity and Reward with creative performance, past and present.

There are at least two plausible causal alternatives. The first is that self perception of greater creative performance leads to increased creative self confidence and consequently, increased motivation. The second is that higher creative motivation leads to increased

creative performance and consequently, increased self confidence.

Since these two alternative processes are not mutually exclusive, they can both operate in a concurrent and reciprocal determined fashion. It is certainly plausible that increased creative motivation can lead to increased creativity. Although this dissertation did not directly test these causal linkages, the validity of the CM Scale suggests that these variables are associated. If, in fact, increased creative expectancies lead to increased creativity, it would have several implications. The following discussion will attempt to elaborate them.

First, when considering the determinants of creativity it would appear warranted to add to the list of ability variables, an expectancy-based motivation variable. It is also possible that the importance of the roles played by motivation and ability factors in creative performance depends on level of creativity demanded by the problem; that is, on the problem's resistance to conventional solutions. More intransigent problems might benefit from higher levels of creative motivation. If this were true, then the CM Scale may be more valid for those who face these more difficult problems.

The validity of creative motivation might also have implications for those who attempt to increase creative

performance in themselves and others. Creative motivation might be increased by enhancing individuals' self confidence in their ability to create and by raising their perceived instrumentality of creativity for obtaining desired outcomes. Several potential techniques for increasing these expectancies will be described.

To increase creative self confidence (Expected Creativity) in oneself, one technique is the use of positive verbal affirmations. This involves making private positive comments about one's own creative ability. These comments are best repeated frequently, and can be made silently or out loud when alone. The author has heard accounts of individuals who listen to self-recorded tapes of their affirmations every morning while dressing.

To increase creative self confidence in one's subordinates, such as employees, students, and children, a similar approach can be used. This is the giving of specific and sincere verbal expressions of confidence in their creative abilities. Their abilities are evidenced whenever they exhibit original ideas or demonstrate resourcefulness, ingenuity or improvisation, both big and small.

To increase the perceived instrumentality of creativity for reward (Expected Reward) in oneself, one technique is the use of guided imagery. This is the

engaging in deliberate guided fantasies that portray oneself receiving specific rewards for being creative. The more realistic and detailed these imaginary scenarios are, the more they help reinforce the expected contingency between creativity and reward.

To increase Expected Reward in one's subordinates, a similar approach can be used. This prescription is similar to the concept of path-goal leadership described by House and Mitchel (1974). It is the communication to others of a contingency between their creativity and the obtainment of personally meaningful outcomes. Ultimately, for this approach to work, the contingencies have to be genuine and be periodically demonstrated.

Organizations can boost Expected Reward in their members by expanding upon this approach. Instead of just communicating existing performance-reward contingencies, they can help build up the contingencies by issuing a variety of rewards for beneficial creative performance.

The rewards could be made contingent on rated overall creativity in performance as well as made contingent on suggested ideas that reduced costs, increased quality and productivity, or resolved important crises. The rewards can include plaques, merit pay, free vacations, management development, better office furniture, gifts (car, personal computer, etc.), or promotion to list a few. It is

important, however, that the reward be personally meaningful to the individual. This could be insured by employing a cafeteria method that allowed the recipient to choose their own reward from an equivalently priced set.

Areas in Need of Further Investigation

A variety of investigations, which if undertaken, could strengthen the construct validity of the CM Scale. Three such studies are proposed below.

The first study could investigate the CM Scale's capacity to differentiate high from low creative individuals. These individuals could be defined by teacher, superior, peer and/or subordinate creativity ratings. Another investigation could define these individuals by identifying highly recognized creative artists, scientists, and entrepreneurs. These individuals would be compared to a matched comparison group of less recognized members in their profession. If the scale significantly differentiated these groups, it would add discriminant validity.

The second study could examine the scale's convergent and divergent validity in a partial multi-method multi-trait framework. Specifically, the CM Scale, TTCT and CAI (different methods) could be administered along with other scales that copied the CM Scale's format, but measured theoretically unrelated attributes like

intelligence, competitiveness and political orientation (different traits). Construct validity would be suggested if three results occur. First, the intercorrelations between the CM Scale, TTCT and CAI should be high (mono-trait hetero-method). Second, the intercorrelations between the CM Scale and the scales measuring unrelated traits with the same method should be low (hetero-trait mono-method). Third and finally, the intercorrelations between scales measuring different traits with different methods should be low (hetero-trait hetero-method).

The third study could look at the scale's sensitivity to development of creative expectancies. Development could occur from participation in a program containing the types of techniques described previously for boosting Expected Creativity and Rewards. This program could be a creativity training workshop or an organizational-level intervention. Ideally, the CM Scale would be used as a pretest and posttest in a randomized control-group design. If the scale reflected improvements in creative expectancies over a comparison group it would lend construct validity. Additionally, if these above three studies sampled a variety of different populations then the scale's generalizability would be revealed.

After demonstrating the scale's construct validity, its long term stability needs to be explored. This can be

accomplished with multi-year longitudinal studies involving repeated administrations in a heterogeneous population. Such investigations may reveal how creative expectancies change as a function of certain life events like promotions, public recognition or even marriage.

One of the weaknesses of the CM Scale is its Expected Reward items. As previously discussed, this may be due to the idiosyncratic nature of reward making it difficult to specify outcomes that all subjects find rewarding. One way of overcoming this may be to construct a series of population-specific CM Scales that describe rewards known to be meaningful to a certain group. Even better, would be to employ a computer to create a customized test for each respondent. This would entail having respondents type into a computer a list of rewards they find meaningful. Specifically, the respondent could be asked to list rewards in different categories such as desired outcomes provided by job working conditions, coworkers, bosses, friends, family, and intrinsically, by oneself. The computer could then take this list and construct a customized set of Expected Reward items. In this way, each respondent would be measured with items that described personally meaningful rewards.

The CM Scale could also have utility as an employment selection instrument with the inclusion of valid lie or

fake-good scale. These are questions that measure the tendency to bias oneself description in a socially desirable direction. One well established instrument is Crowne and Marlow's 33 item social desirability scale (1960) which includes such questions as "It is sometimes hard to go on with my work if I am not encouraged," "There have been occasions when I took advantage of someone," or "I sometimes feel resentful when I don't get my way."

For the scale to have utility in selection, it would require demonstrated validity of the fake-good items for detecting faking and validity of the CM Scale items for predicting job performance. To demonstrate the former, the scale and fake-good items could be administered to three groups of subjects differentially instructed to fake good, fake bad or respond honestly. To demonstrate the latter, however, special criteria would have to be developed that were sensitive to a creativity component in job performance. These criteria could include the number of cost saving or quality improving ideas submitted. These criteria could also include ratings from superiors, coworkers, and subordinates. The ratings could consist of global assessments of originality, ingenuity, and resourcefulness demonstrated in on the job problem solving.

Conclusion

The constructs of Expected Creativity and, to a lesser degree, Expected Creativity significantly relate to creative skill and accomplishments. This outcome has implications for the utility of an expectancy-based creative motivation factor for understanding and predicting creative performance. There are also implications for those who attempt to increase creativity in themselves and others. Therefore, it is important that there be further investigation on the scale's construct validity, generalizability, as well as on the feasibility of a computer-customized administration to improve Expected Reward validity.

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LIST OF REFERENCES

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APPENDIXES

APPENDIX A
THE CREATIVE MOTIVATION SCALE

A. THE CREATIVE MOTIVATION SCALE (CMS)

INSTRUCTIONS READ TO RESPONDENTS

This is a questionnaire, not a test. This questionnaire is simply a list of attitudes and beliefs related to problem solving. Please read each statement carefully and then rate how often each statement is true of you. Indicate your rating by marking the letters A through E in your scan form. These are:

- (A) - ALL OR NEARLY ALL OF THE TIME
- (B) - MOST OF THE TIME
- (C) - SOME OF THE TIME
- (D) - ONCE IN A WHILE
- (E) - HARDLY EVER OR NEVER

If you have not experienced the particular situation described, try to imagine how you would act if it were to happen to you. It is important that you answer every item.

There is no right or wrong answer. Every answer is equally good. The purpose of this questionnaire is to determine your attitudes and experiences related to problem solving.

All of your answers are completely anonymous and will only be used for the purpose of developing and refining this scale.

When marking your answers, it is very important to make sure that the number along side each statement matches the number on your scan form.

-----+
 LEGEND

(Not shown to respondents)

(+) Scored positively

(-) Scored negatively

(C) Measures one's expectation that their effort will result in creative performance.

(R) Measures one's expectation that their creative performance will lead to a rewarding outcome.
 -----+

A-ALL OR NEARLY ALL OF THE TIME B-MOST OF THE TIME
C-SOME OF THE TIME D-ONCE IN A WHILE
E-HARDLY EVER OR NEVER

- 1 (+)(C) When I am discussing ideas with friends we come up with some pretty wild and innovative ideas.
- 2 (-)(R) When I'm falling behind on an important deadline it is more effective to just work harder and longer hours than try to change my methods by creating time-saving shortcuts.
- 3 (-)(R) My friends don't enjoy zany or unusual recreations.
- 4 (+)(R) At work, when I get a new idea about how to do things, I have the opportunity to test it out.
- 5 (-)(R) Highly innovative thinkers are not very popular.
- 6 (+)(C) If I don't have all of the ingredients called for by a recipe, I can improvise with what I have.
- 7 (+)(R) Creative ideas of mine have been put to use by others who found them successful.
- 8 (-)(C) When I don't have enough money to accomplish a goal it is hard to discover ways of inventing a means to do so with what money I do have.
- 9 (+)(R) My parents have rewarded me for showing creativity in problem solving.
- 10 (+)(C) I have awakened in the morning to think of the solution to a problem I was working on the night before.
- 11 (-)(R) Managers are intimidated by creative thinking in their subordinates.
- 12 (-)(C) When someone asks for a favor that I either can't or won't provide, it is hard to think of ways out that will not offend the other person.
- 13 (-)(R) To advance in an organization, one should avoid being too innovative in what is said or done.

A-ALL OR NEARLY ALL OF THE TIME B-MOST OF THE TIME
C-SOME OF THE TIME D-ONCE IN A WHILE
E-HARDLY EVER OR NEVER

- 14 (+)(C) By the time I put the finishing touches on a hobby or craft project, I have thought of several completely different ways it could have been done.
- 15 (-)(R) When bureaucratic red tape prevents achievement of my goals, it is more effective to go along with the regulations and accept the delays rather than try to innovate a way around.
- 16 (-)(C) I find it difficult to come up with new ways to resolve reoccurring family conflicts.
- 17 (-)(R) Highly creative ideas are too impractical or unfeasible.
- 18 (-)(C) When deciding on recreational activities to do with a friend I find it difficult to come up with many that we will both enjoy.
- 19 (+)(R) When giving advice to someone, it is beneficial to suggest ideas that are very different from their thinking.
- 20 (-)(C) I seem to think up the same kinds of things to do every weekend.
- 21 (+)(R) In school, I have found that writing papers and essays on unusual subjects resulted in better grades.
- 22 (+)(C) When I need a favor from someone who appears reluctant, I can think of a variety of different ways to increase their willingness.
- 23 (-)(R) When planning recreations for a group, it is better to avoid unfamiliar or nontraditional activities.
- 24 (+)(C) I have thought up interesting stories which could be used in novels, movies or television.
- 25 (-)(R) It does not pay off to try to adapt procedures That have been designed for a specific purpose to a very different purpose.

A-ALL OR NEARLY ALL OF THE TIME B-MOST OF THE TIME
C-SOME OF THE TIME D-ONCE IN A WHILE
E-HARDLY EVER OR NEVER

- 26 (-)(C) I find it hard to think up fresh new ways to improve my important relationship(s).
- 27 (-)(R) When I need a favor, I'm unlikely to get it if it requires the other to do something that is very unconventional for them.
- 28 (-)(C) When I'm investigating a subject and I don't know where to start looking, it is difficult to think up several different places to begin.
- 29 (+)(R) When I take risks by using untried and innovative solutions I am rewarded.
- 30 (-)(C) For tools that I need but can't afford to purchase, I find it hard to improvise with what I have.
- 31 (-)(R) When researching a subject, it is better to stay on the main track rather than digress into potentially promising but uncertain directions.
- 32 (+)(C) When drawing or doodling, I draw very unusual or "way out" figures.
- 33 (+)(R) When I'm writing letters, it is desirable to include unconventional but attention grabbing expressions rather than stay with a more standard and accepted format.
- 34 (+)(C) When I write a story or letter, I imagine many interesting scenarios or directions it can take at various points.
- 35 (-)(R) When I don't have the assistance needed to perform a task, it is better to wait until I can get more help than to try to "wing it" without.
- 36 (+)(C) When performing a routine task I dream up unusual or nontypical ways of doing it.
- 37 (-)(R) In getting ahead in life, rational and logical thinking is more important than creative and imaginative thinking.

A-ALL OR NEARLY ALL OF THE TIME B-MOST OF THE TIME
C-SOME OF THE TIME D-ONCE IN A WHILE
E-HARDLY EVER OR NEVER

- 38 (-)(C) When I am prevented at the last moment from attending a planned social activity I find it hard to come up with a satisfying alternative.
- 39 (-)(R) Very innovative solutions often just replace an old set of problems with a new set.
- 40 (+)(C) When someone complains about a problem, I think of unconventional solutions.
- 41 (-)(R) When people ask for your advice, they really want you to reaffirm or support their thinking rather than suggest new ideas.
- 42 (-)(C) When I'm deciding how to begin a task, the first method to come to mind is usually the best.
- 43 (+)(C) I think of unusual or unintended uses of tools.
- 44 (+)(C) When I observe another person at work, I can think of a variety of ways they can do their job better.
- 45 (+)(R) I admired people for their originality and creativity even though they were not successful by society's terms.
- 46 (-)(C) When there is a clash of ideas in a group discussion it is difficult for me to think up an alternate position that can reduce the conflict.
- 47 (+)(C) When assembling something from a kit, I think of ways of improving it or making it more attractive.
- 48 (+)(C) I get good ideas by elaborating or building upon the ideas of others.
- 49 (+)(C) I can see opportunities for profit or benefit in situations that others miss.
- 50 (+)(C) When I learn about a new technological breakthrough I think of additional uses or applications for it.

A-ALL OR NEARLY ALL OF THE TIME B-MOST OF THE TIME
C-SOME OF THE TIME D-ONCE IN A WHILE
E-HARDLY EVER OR NEVER

51 (+)(C) After reading or watching a story I like to fantasize different ways it could have turned out.

52 (+)(C) Others consider me to be a creative person.

A-VERY MUCH B-MUCH C-SOME D-LITTLE E-NOT AT ALL

Now please rate how much each of the following statements applies to you by using the following scale.

A-VERY MUCH B-MUCH C-SOME D-LITTLE E-NOT AT ALL

- 53 (+)(C) Brainstorming long lists of ideas comes naturally to me.
- 54 (+)(R) I enjoy the feeling of thinking up and toying with novel or way-out ideas just for the sake of it.
- 55 (-)(C) I find it difficult to think of several different ways I could make a satisfying living.
- 56 (+)(R) I enjoy experimenting with new foods or ethnic cuisines.
- 57 (+)(C) When I want to meet somebody or get to know them better, my mind starts to rapidly think of ways of doing so.
- 58 (+)(R) Being labeled an eccentric or nonconformist thinker does not bother me.
- 59 (+)(C) At work, when I have to perform a task I have never done before and without instructions, I can generate a variety of different ways to proceed.
- 60 (-)(R) To achieve in life, hard work and playing by the rules are more important than cleverness and ingenuity.
- 61 (+)(C) When repeating a humorous story or joke on different occasions, I find it easy to improve it for each telling.
- 62 (-)(R) I am more likely to succeed if I finish a project as planned than if I change directions part-way through in an attempt to improve it.
- 63 (-)(C) When I'm explaining a concept or principle to someone, It takes a lot of effort to come up with a variety of different examples.

A-VERY MUCH B-MUCH C-SOME D-LITTLE E-NOT AT ALL

- 64 (-)(R) In clothing, furniture or architectural design, attractiveness depends more on conformity to an accepted or classical standard than deviation in some innovative direction.
- 65 (-)(R) My friends and acquaintances would rather stick with what they know than experiment with new and innovative approaches to life.
- 66 (-)(C) When looking at an arrangement of furniture in a room, I find it hard to mentally visualize how it would look with a different configuration.
- 67 (+)(R) I enjoy surprising others by being unconventional.
- 68 (-)(R) In group discussions, it is better not to express very farfetched or way-out ideas.
- 69 (+)(C) When I look at a work of art, I find it easy to visualize how it could have been done differently.
- 70 (-)(R) When I lack the money to undertake a project, where the quality of the outcome is important, it is better to avoid improvising with what I have.
- 71 (-)(C) I find it hard to make up a funny joke.
- 72 (-)(R) The people whose evaluation of me will affect my future opportunities (i.e. employers, teachers, etc.) value the conventional over the innovative.
- 73 (-)(C) It would be difficult for me to invent a new game or sport.
- 74 (+)(R) I feel really good about myself when I come up with an innovative or unique idea.
- 75 (-)(R) People distrust the ideas of creative thinkers.
- 76 (+)(C) I can solve all most any problem encountered at school or at work.

A-VERY MUCH B-MUCH C-SOME D-LITTLE E-NOT AT ALL

77 (-)(R) It makes me feel uneasy when I get praise
for being creative.

78 (-)(R) I avoid expressing innovative ideas to
someone unless they are likely to be receptive.

79 (+)(C) I can think up a new product or service that if
marketed could sell.

80 (-)(C) It takes effort to come up with creative ideas.

81 (+)(C) I find it easy to think of several different
ways I could make a satisfying living.

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APPENDIX B
THE CREATIVE ACHIEVEMENT INVENTORY

B. THE CREATIVE ACHIEVEMENT INVENTORY (CAI)

INSTRUCTIONS READ TO RESPONDENTS

This is an inventory, not a test. This inventory is simply a list of some of the things you may have done from the start of high school to the present.

Please read each statement carefully and then indicate how often you performed the described activity. Indicate your response by marking the letters A through E in your scan form. These are:

- (A) - NEVER
- (B) - ONCE
- (C) - TWICE
- (D) - 3 TO 5 TIMES
- (E) - MORE THAN FIVE TIMES

There is no proper or correct way to respond. The purpose of this inventory is only to indicate some of the activities you have performed from the beginning of high-school to the present.

All of your answers are completely anonymous and will only be used for the purpose of developing and refining this inventory.

When marking your answers, it is very important to make sure that the number along side each statement matches the number on your scan form.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

PART ONE

1. (LITERATURE) Wrote poetry.
2. (LITERATURE) Wrote the lyrics to a song.
3. (LITERATURE) Wrote a short story.
4. (LITERATURE) Wrote something humorous such as jokes, limericks, satire, etc.
5. (LITERATURE) Wrote a clever or humorous letter.
6. (ART) Drew a picture for aesthetic reasons (not part of a course).
7. (ART) Drew cartoons.
8. (ART) Painted an original picture.
9. (ART) Made an original sculpture.
10. (CRAFTS) Made candles.
11. (CRAFTS) Designed and made your own greeting cards.
12. (CRAFTS) Built a hanging mobile.
13. (CRAFTS) Constructed and put on a puppet show.
14. (CRAFTS) Made a craft out of plastic, plexiglass, stained glass, or a similar material.
15. (CRAFTS) Made an original leather craft.
16. (CRAFTS) Made an original ceramic craft.
17. (CRAFTS) Designed and constructed a craft out of wood.
18. (CRAFTS) Made jewelry.
19. (CRAFTS) Made a craft out of metal (not jewelry)
20. (CRAFTS) Designed and made a costume.
21. (CRAFTS) Designed and made a piece of clothing (not a costume).

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

22. (CRAFTS) Cooked an original dish that tasted good.
23. (CRAFTS) Prepared an original floral arrangement.
24. (CRAFTS) Planned and kept a garden.
25. (CRAFTS) Made your own holiday decorations.
26. (CRAFTS) Knitted or crocheted something of your own design.
27. (CRAFTS) Participated in a craft workshop.
28. (MISCELLANEOUS) Designed a game.
29. (MISCELLANEOUS) Made up magic tricks.
30. (MISCELLANEOUS) Helped design a float for a parade.
31. (MISCELLANEOUS) Made a musical instrument.
32. (MISCELLANEOUS) Made or helped make a film or video tape.
33. (MATH & SCIENCE) Constructed something that required scientific knowledge such as an electronic device, a telescope, scientific apparatus, etc. that was part of a course.
34. (MATH & SCIENCE) Constructed something that required scientific knowledge that was not part of a course.
35. (CRAFTS) Sold an original craft.
36. (CRAFTS) Received an award for making a craft.
37. (LITERATURE) Had piece of literature, (e.g. poem, essay, short story, etc.) published in a school or university publication.
38. (LITERATURE) Had piece of literature, (e.g. poem, essay, short story, etc.) published in a publication that was not school or university related.
39. (LITERATURE) Started to write a novel, but did not finish it.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

40. (LITERATURE) Wrote and completed a novel.
41. (LITERATURE) Won an award for some achievement in literature.
42. (LITERATURE) Founded a literary magazine or similar publication.
43. (ART) Had a work of art displayed in a home.
44. (ART) Had a work of art exhibited publicly (not in a home).
45. (ART) Entered a work of art or photograph into a contest.
46. (ART) Submitted a work of art or photo to an artistic publication.
47. (ART) Had artwork published in a school or university publication.
48. (ART) Had artwork published (not in a school or university publication).
49. (ART) Received an award for an artistic accomplishment.
50. (MUSIC) Gave a music recital.
51. (MUSIC) Entered a contest as a musician.
52. (MUSIC) Won an award for musical accomplishments.
53. (MUSIC) Directed a choir.
54. (MUSIC) Organized a singing group.
55. (MUSIC) Wrote music for one instrument.
56. (MUSIC) Wrote music for several instruments.
57. (MUSIC) Arranged music for public performance.
58. (MUSIC) Had original music publicly performed.
59. (MUSIC) Had original music published.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

60. (MUSIC) Had a record cut.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

PART TWO

1. (PERFORMING ARTS) Performed ballet or modern dance in a show or contest.
2. (PERFORMING ARTS) Had a role in a dramatic production.
3. (PERFORMING ARTS) Performed on television.
4. (PERFORMING ARTS) Entered a contest as a singer.
5. (PERFORMING ARTS) Put on a radio show.
6. (PERFORMING ARTS) Assisted in the design of a set for a dramatic production.
7. (PERFORMING ARTS) Choreographed a dance.
8. (PERFORMING ARTS) Directed or managed a dramatic production.
9. (PERFORMING ARTS) Received an award for acting.
10. (PERFORMING ARTS) Received an award for performance in modern dance or ballet.
11. (PERFORMING ARTS) Received an award for performance in popular dance.
12. (MISCELLANEOUS) Wrote a play which has not yet been publicly performed.
13. (MISCELLANEOUS) Wrote a play which was publicly performed.
14. (MATH & SCIENCE) Wrote an original computer program.
15. (MATH & SCIENCE) Developed a design for a scientific experiment.
16. (MATH & SCIENCE) Applied math in an original way to solve a practical problem.
17. (MATH & SCIENCE) Performed an original scientific experiment that was not part of a course.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

18. (MATH & SCIENCE) Wrote an unpublished scientific paper that was not part of a course.
19. (MATH & SCIENCE) Presented an original scientific or mathematical paper to a professional or special interest group.
20. (MATH & SCIENCE) Entered a scientific or mathematical paper or project into a contest.
21. (MATH & SCIENCE) Won an award for a scientific or mathematical project or paper.
22. (MATH & SCIENCE) Had a scientific or mathematical paper published.
23. (LEADERSHIP) Planned and presented an original speech.
24. (LEADERSHIP) Entered a speech or debate contest.
25. (LEADERSHIP) Won an award for speech or debate.
26. (LEADERSHIP) Actively campaigned to elect another student to office.
27. (LEADERSHIP) Actively campaigned to elect someone to a political office (not school related).
28. (LEADERSHIP) Was nominated to a student office.
29. (LEADERSHIP) Was elected to a student office.
30. (LEADERSHIP) Planned or directed a school or community event (not political)
31. (LEADERSHIP) Planned or help lead an off-campus political activity.
32. (LEADERSHIP) Initiated or helped organize a student movement to change institutional rules, procedures or policies.
33. (LEADERSHIP) Received an award or special recognition for leadership.
34. (MISCELLANEOUS) Initiated a business enterprise of any kind.

(A)-NEVER (B)-ONCE (C)-TWICE (D)-3 TO 5 TIMES
(E)-MORE THAN FIVE TIMES

35. (MISCELLANEOUS) Invented a new product or service that if marketed probably would be successful.
36. (MISCELLANEOUS) Experienced a major change in your philosophy and outlook on life.

(A)-NEVER (B)-1 YEAR (C)-2 YEARS (D)-3 TO 5 YEARS
(E)-MORE THAN 5 YEARS

For the following activities, please indicate your response by using this scale:

- (A) - NEVER
- (B) - ONE YEAR
- (C) - TWO YEARS
- (D) - THREE TO FIVE YEARS
- (E) - MORE THAN FIVE YEARS

- 37. (ART) Kept and used a sketch book.
- 38. (MUSIC) Played a percussion instrument (including piano) with a reasonable degree of proficiency.
- 39. (MUSIC) Played a brass instrument with a reasonable degree of proficiency.
- 40. (MUSIC) Played a string instrument with a reasonable degree of proficiency.
- 41. (MUSIC) Played a wind instrument with a reasonable degree of proficiency.
- 42. (MUSIC) Sang in a choir.
- 43. (MUSIC) Was a participating member of a symphony orchestra.
- 44. (LITERATURE) Worked as an editor for a newspaper or similar organization.

(A)-NEVER (B)-1 ORGANIZATION (C)-2 (D)-3 TO 5
(E)-MORE THAN 5 ORGANIZATIONS

For the following activities, please indicate your response by using this scale:

- (A) - NEVER
- (B) - ONE ORGANIZATION
- (C) - TWO ORGANIZATIONS
- (D) - THREE TO FIVE ORGANIZATIONS
- (E) - MORE THAN FIVE ORGANIZATIONS

- 45. (PERFORMING ARTS) Participated in a drama workshop, club, or similar organization.
- 46. (LITERATURE) Participated in a writer's workshop, club, or similar organization.

VITA

David Elliot Lewis was born in Los Angeles, California on October 26, 1955. He received his primary and secondary education in that city. He received his B.S. in Psychology from the University of California, at Los Angeles in June 1980. He traveled through Europe that summer and then began graduate study at the University of Tennessee at Knoxville after returning in the Fall. He received the Ph.D. degree in Industrial and Organizational Psychology from this program in August of 1984.

Throughout his graduate study, the author worked part-time as a Graduate Research Assistant for the Department of Management. In addition to his research assistantship, the author worked independently designing, selling and conducting management training workshops in the areas of creativity, quantified decision making, and leadership for local organizations and the general public. He also worked as a consultant for a city government in the areas of goal setting and strategic planning.

The author is a local and national member of the American Society for Training and Development.