THE ASSESSMENT OF CREATIVITY

by

VANESSA ANN BOTHA

submitted in fulfilment of the requirements for

the degree of

MASTER OF EDUCATION

in the subject

PSYCHOLOGY OF EDUCATION

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR I STRYDOM

NOVEMBER 1999
To my beautiful mother, who started it all,
my sons, who sparked my interest in creative
development,
my husband for his enriching, all enduring
support, encouragement and motivational input,
and my very kind, loving and creative father.
THANKS TO:
A very special thanks to Irene Strydom for her unconditional support and constant encouragement from whom I continue to learn and grow
I declare that "The Assessment of Creativity" is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Signature: ................................................. Date: 20 Sept 1990

(MRS V A BOTHA)
THE ASSESSMENT OF CREATIVITY

SUMMARY:

Prominent definitions and theories of 'Creativity' provide core data for themes that frame the Creative Process Assessment Matrix (CPAM). Its framework is based on Wallas' stages of the creative process and the P theory (Person, thinking Process, Press/Persuasion and Product). The CPAM's structure and content was derived from current, reliable and valid research. Issues relating to assessment procedures, as well as psychological factors (blockers and stimulators) gave rise to the Creative Assessment Test Questionnaire (CATQ#4), containing questions that document creative assessment prerequisites. Recognized creativity tests (Word-Association, Instances and TCT-DP) were evaluated to determine whether they successfully address and test for relevant creative process criteria. Results indicated that all three tests only addressed a minority of CPAM's 60-point criteria. CPAM offers understanding of the environmental impact and influence on creativity, and renders it measurable. Finally, the CPAM measures the setting, sensory stimulation and what postulates the initial spark of creativity.

KEY TERMS: Creative, Creativity tests, Creativity assessment, Creative process, Wallas Four stages of the creative process, P theory, Creative Process Assessment Matrix, CPAM, Illumination, Creative Eco-System.
TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION ...................................................................................................................................... 8
  1.1 INTRODUCTION ........................................................................................................................................... 8
  1.2 BACKGROUND TO THE PROBLEM (CREATIVE ASSESSMENT) ................................................................. 9
  1.3 STATEMENT OF THE PROBLEM (FINDING CRITERIA) .............................................................................. 16
    1.3.1 In search of the definition for creativity ............................................................................................ 17
    1.3.2 Analysing Definitions ..................................................................................................................... 17
    1.3.3 In search of creativity tests .......................................................................................................... 20
  1.4 DELIMITATION ............................................................................................................................................ 22
  1.5 PURPOSE OF STUDY .................................................................................................................................. 24
    1.5.1 The first purpose ............................................................................................................................. 25
    1.5.2 The second purpose ....................................................................................................................... 25
  1.6 METHOD OF INVESTIGATION .................................................................................................................... 25
  1.7 EXPLANATION OF CONCEPTS ................................................................................................................ 26
    1.7.1 Creativity .......................................................................................................................................... 26
    1.7.2 The Creative Process ....................................................................................................................... 27
      1.7.2.1 PREPARATION ............................................................................................................................. 27
      1.7.2.2 INCUBATION .................................................................................................................................. 27
      1.7.2.3 ILLUMINATION .......................................................................................................................... 28
      1.7.2.4 VERIFICATION ............................................................................................................................ 28
    1.7.3 Assessment ........................................................................................................................................... 31
  1.8 THE RESEARCH PROGRAM ....................................................................................................................... 32
  1.9 IN SUMMARY ............................................................................................................................................ 34

CHAPTER 2 DEFINITIONS OF CREATIVITY ........................................................................................................... 37
  2.1 INTRODUCTION ........................................................................................................................................... 37
  2.2 IN SEARCH FOR A UNIVERSAL DEFINITION ............................................................................................ 37
    2.2.1 Davis: Creativity has no unified psychological theory ......................................................................... 38
    2.2.2 Eysenck: There is a lack of integration in creativity research ........................................................ 42
    2.2.3 Gardner: An understanding of the different dimensions of creativity is essential ......................... 45
    2.2.4 Albert: Creative behaviour is contrasted to the conventional ....................................................... 47
    2.2.5 Milgram: Specific creative talent and general creative ability .................................................... 48
    2.2.6 Harrington: The Private/Social dimension ...................................................................................... 49
    2.2.7 Rogers: Constructive and destructive creativity in relation to social values ............................... 50
    2.2.8 Rothenberg: Janusian and Homospatial thinking ....................................................................... 51
    2.2.9 Piirto: “The Need for Theory” ......................................................................................................... 51
      2.2.9.1 PHILOSOPHIC CATEGORY ........................................................................................................... 52
      2.2.9.2 PSYCHOLOGISTS CATEGORY .................................................................................................. 52
      2.2.9.3 PSYCHOANALYTIC CATEGORY ............................................................................................. 55
      2.2.9.4 DOMAIN-SPECIFIC DEFINITIONS ......................................................................................... 56
    2.2.10 De Bono: Lateral thinking ............................................................................................................... 57
    2.2.11 Olivier: Dynamics of various abilities ............................................................................................ 57
    2.2.12 Clark: Creativity is the integration of four functions ..................................................................... 58
    2.2.13 An Endeavour To Capture ‘Creativity’ .......................................................................................... 59
  2.3 CONCLUSION ................................................................................................................................................. 62
  2.4 IN SUMMARY ................................................................................................................................................. 62
CHAPTER 3 THEORIES OF THE CREATIVE PROCESS................................................................. 64

3.1 INTRODUCTION ............................................................................................................. 64
3.2 THE DEFINITION OF THE ‘CREATIVE THINKING PROCESS’ VERSUS THE
‘CREATIVE PROCESS’ ........................................................................................................ 66
3.3 THEORIES OF THE CREATIVE PROCESS ..................................................................... 66
  3.3.1 Similarities vs. differences ......................................................................................... 66
  3.3.2 An Environmental and Psychosocial Approach...................................................... 67
  3.3.2.1 Harrington’s Psychosocial Demands and Available Resources: A
         BALANCING OF FORCES ..................................................................................... 69
  3.3.2.2 Csikszentmihalyi’s Domain and Field of Creativity: A Systems
         Perspective ........................................................................................................... 70
  3.3.2.3. Amabile’s Componential Model of Individual Creativity .............................. 73
  3.3.3 Behavioural Process Theories ................................................................................ 75
  3.3.3.1 Skinner’s Behavioral Model of Creation ......................................................... 75
  3.3.3.2 Epstein’s Generativity Theory ......................................................................... 76
  3.3.4 Antithetical Theories .............................................................................................. 77
  3.3.4.1 Rottenberg’s “Janusian Thinking” ................................................................... 77
  3.3.4.2 Mednick’s Associative Basis of the Creative Process ...................................... 78
  3.3.4.3 Koestler’s Biosociation .................................................................................... 80
  3.3.4.4 Gordon’s Theory of Synectics ......................................................................... 82
  3.3.4.5 Davis’s Analogical and Metaphorical Thinking .............................................. 84
  3.3.4.6 Bergquist’s Symbiotic Explanation of the Creative Process ......................... 85
  3.3.5 Psychoanalytic Approach ....................................................................................... 88
  3.3.5.1 Kubie’s Threefold Explanation of the Creative Process ............................... 88
  3.3.5.2 Kris Emphasizes Preconscious and Conscious Mental Activity .................... 89
  3.3.5.3 Rugg’s Theory of the ‘Off-Conscious’ Mental Activity .................................. 90
  3.3.6 Humanistic Theories ............................................................................................. 92
  3.3.6.1 Rogers’s Theory Embraces the Uniqueness of the Individual ......................... 92
  3.3.6.2 Maslow’s Selfactualization Theory .................................................................. 93
  3.3.6.3 Stein’s Three Phase Model ............................................................................ 95
  3.3.6.4 Arnold Highlights Essentials ......................................................................... 96
  3.3.6.5 Clark’s Holistic Model .................................................................................... 96
  3.3.7 Unique Theories of the Creative Process .............................................................. 101
  3.3.7.1 Young: Creativity is Loving Something New and Valuable into Being ........... 101
  3.3.7.2 Guilford’s Factorial Approach ....................................................................... 102
  3.3.7.3 Shallcross’s Sensational Thinking Model ...................................................... 107
  3.3.7.4 Eyseck’s Focus on Cognitive Variables .......................................................... 109
  3.3.7.5 Edward de Bono’s Lateral Thinking ............................................................... 110
  3.3.7.6 Tannenbaum’s Researches the Creative Process ........................................... 111
  3.3.7.7 Osborn and Parnes’s Creative Problem Solving (CPS) Model ....................... 112
  3.3.7.8 Herrmann’s Model of Whole Brain Creativity .............................................. 115
  3.3.7.9 Feldman’s Three-Part Model .......................................................................... 116
  3.3.8 Additions to ‘Creative Process’ ............................................................................. 119

3.4 CONCLUSION .................................................................................................................. 121
3.5 IN SUMMARY ................................................................................................................. 122

CHAPTER 4 ASSESSMENT ........................................................................................................ 129

4.1 INTRODUCTION ............................................................................................................. 129
4.2 ASSESSMENT ................................................................................................................ 130
  4.2.1 Assessment procedures ........................................................................................ 130
  4.2.1.1 Guidelines for Assessment .......................................................................... 130
  4.2.1.2 Validity and Reliability .................................................................................. 137
  4.2.1.3 Code of Fair Testing and Test Evaluation Guides ......................................... 142
  4.2.2 Psychological aspects of creativity ...................................................................... 143
4.2.2.1 BLOCKERS OF CREATIVITY ................................................................. 144
4.2.2.2 STIMULATORS OF CREATIVITY ................................................................. 148
4.2.3 Assessment of the ‘Creative Process’ ................................................................................. 152
4.2.3.1 SCORING ........................................................................................................... 152
4.2.3.2 AUTHOR ............................................................................................................ 153
4.2.3.3. PREPARATION STAGE ......................................................................................... 154
4.2.3.4 INCUBATION STAGE ............................................................................................ 155
4.2.3.5 ILLUMINATION STAGE ......................................................................................... 156
4.2.3.6 VERIFICATION ..................................................................................................... 156
4.2.4 New trends and research implications .............................................................................. 157
4.2.4.1 MOTIVATION PRINCIPLE OF CREATIVITY ......................................................... 157
4.2.4.2 PRE-SCHOOL RESEARCH FINDINGS ..................................................................... 158
4.2.4.3 PERCEPT-GENESIS ............................................................................................. 159
4.2.4.4 BIOLOGICAL ........................................................................................................ 159
4.2.4.5 ALPHA ................................................................................................................ 160
4.2.4.6 BINAURAL BEATS ................................................................................................. 162
4.2.4.7 MEYERS BRIGGS TYPE INDICATOR (MBTI) ......................................................... 164
4.3 CREATIVITY TESTS ........................................................................................................... 165
4.3.1 The uses of creativity tests ............................................................................................... 165
4.3.2 Types of creativity tests.................................................................................................... 165
4.3.2.1 TESTS OF DIVERGENT THINKING ........................................................................ 166
4.3.2.2 ATTITUDE AND INTEREST INVENTORIES ............................................................... 166
4.3.2.3 PERSONALITY INVENTORIES ................................................................................ 167
4.3.2.4 BIOGRAPHICAL INVENTORIES ............................................................................ 167
4.3.2.5 RATINGS BY TEACHERS, PEERS, AND SUPERVISORS ........................................ 168
4.3.2.6 JUDGEMENT OF PRODUCTS .................................................................................. 168
4.3.2.7 EMINENCE (PROMINENCE) ................................................................................... 169
4.3.2.8 SELF-REPORTED CREATIVE ACTIVITIES AND ACHIEVEMENTS .................................. 169
4.3.3 Prerequisites of creativity tests .......................................................................................... 170
4.3.3.1 AUTAG MODEL OF CREATIVE OBJECTIVES .......................................................... 170
4.3.3.2 "ARE YOU CREATIVE?" ......................................................................................... 171
4.3.3.3 THRESHOLD THEORY ............................................................................................. 171
4.3.3.4 FIGURAL TESTS YIELD MORE RELIABLY ORIGINAL RESPONSES .......................... 171
4.3.3.5 OPEN-ENDED PROBLEM SOLVING ....................................................................... 172
4.3.3.6 DIMENSION OF ORIGINALITY IS KEY ESSENCE ............................................... 172
4.3.3.7 TESTS MUST MEET THE STANDARDS .................................................................... 173
4.3.3.8 FAKABILITY .......................................................................................................... 173
4.3.3.9 REAL-TIME AND MULTISTAGE CREATIVITY ....................................................... 174
4.3.3.10 SOME UNANSWERED QUESTIONS ....................................................................... 174
4.3.4 Problems with creativity tests............................................................................................ 175
4.3.4.1 ADDRESS SOCIAL ISSUES WITH OPEN-ENDED CREATIVITY TASKS .................... 176
4.3.4.2 CRITERION PROBLEM ............................................................................................. 177
4.3.4.3 CREATIVITY IN YOUNG CHILDREN ....................................................................... 177
4.3.4.4 TESTLIKE OR GAMELIKE CONDITIONS ................................................................. 178
4.3.4.5 LONGITUDINAL VALIDITY ..................................................................................... 178
4.3.4.6 CULTURAL DRAWBACKS ....................................................................................... 179
4.3.4.7 ADDITIONAL PROBLEMS ....................................................................................... 180
4.3.5 Creativity Tests Research-findings ..................................................................................... 181
4.3.5.1 IDEATIONAL ORIGINALITY .................................................................................. 181
4.3.5.2 IDEATIONAL FLUENCY MAY BE A DOMINANT ...................................................... 182
4.3.5.3 TESTLIKE CONDITIONS ........................................................................................ 182
4.3.5.4 THREE-DIMENSIONAL TASKS HAVE BETTER CONSTRUCT VALIDITY .................... 183
4.3.5.5 ORIGINAL RESPONSES NEED A NORM OF SOME KIND ........................................... 183
4.3.5.6 CULTURAL ASPECTS ............................................................................................... 184
4.3.5.7 FLUENCY, ORIGINALITY AND ELABORATION MAKE PREDICTIVE VALIDITY MOST RELIABLE ... 185
4.3.5.8 VALIDITY OF IDEATIONAL ORIGINALITY VERSUS IDEATIONAL FLUENCY .......... 185
4.3.5.9 ENVIRONMENTAL INFLUENCES ............................................................................. 186
4.3.6 How To Measure Supreme Creativity ............................................................................. 187
4.4 CONCLUSION ...................................................................................................................... 188
4.5 IN SUMMARY ...................................................................................................................... 189
CHAPTER 5 CREATIVE PROCESS ASSESSMENT PARAMETERS

5.1 INTRODUCTION ................................................................. 196
5.2 CREATIVE PROCESS COMPONENTS OF THE P THEORY ........................................... 197
  5.2.1 Summary: Components of the Creative Process ........................................... 201
5.3 FUNDAMENTALS FROM RESEARCHED CRITERIA ........................................... 203
  5.3.1 Lowenfeld ................................................................. 203
  5.3.2 Guilford ................................................................. 204
  5.3.3 Runco ................................................................. 206
5.4 SOME IDENTIFIED CRITERIA WITHIN THE FOUR STAGES OF THE CREATIVE PROCESS ................................................................. 207
  5.4.1 Summary: Vertical Components of the Creative Process ........................................... 207
5.5 CREATIVE PROCESS ASSESSMENT PARAMETERS (CPAP) ........................................... 210
  5.5.1 CPAP#1 ................................................................. 211
  5.5.2 CPAP#2 ................................................................. 217
  5.5.3 CPAP#3 ................................................................. 223
  5.5.4 CATQ#4 (Creative Assessment Test Questionnaire) ........................................... 233
5.6 CONCLUSION ................................................................. 236
5.7 IN SUMMARY ................................................................. 236

CHAPTER 6 THE CREATIVE PROCESS ASSESSMENT MATRIX ........................................... 239

6.1 INTRODUCTION ................................................................. 239
6.2 EMPIRICAL STUDY: THEORY AND PURPOSE OF CPAM ........................................... 240
6.3 CPAM’S COLOR CODED FRAMEWORK ................................................................. 243
6.5 SELECTED TESTS ................................................................. 251
  6.5.1 Getzels and Jackson: “Word Association” (1962) ........................................... 251
  6.5.2 Wallach and Kogan: “Modes of Thinking: Instances” (1965) ........................................... 252
  6.5.3 Urban and Jellen: TCT-DP (Test for Creative Thinking-Drawing Production) (1986) ................................................................. 253
6.6 IMPLEMENTATION OF CPAM: AN EMPIRICAL INVESTIGATION ........................................... 254
  6.6.1 CPAM’s Preparation Questionnaire ................................................................. 255
  6.6.2 CPAM’s Incubation Questionnaire ................................................................. 265
  6.6.3 CPAM’s Illumination Questionnaire ................................................................. 274
  6.6.4 CPAM’s Verification Questionnaire ................................................................. 279
  6.6.5 CATQ#4 (Creative Assessment Test Questionnaire) ........................................... 287
CPAP#4: TEST QUESTIONNAIRE ................................................................. 287
6.7 DISCUSSION AND RESULTS OF SELECTED TESTS ................................................................. 292
  6.7.1 Results: Getzels and Jackson: ‘Word Association’ ........................................... 295
  6.7.2 Results: Wallach and Kogan: “Modes of Thinking: Instances” ........................................... 295
  6.7.3 Results: Urban and Jellen: TCT-DP (Test for Creative Thinking-Drawing Production) ................................................................. 296
6.8 CONCLUSION ................................................................. 298
6.8 IN SUMMARY ................................................................. 298

CHAPTER 7 SUMMARY, FINDINGS AND RECOMMENDATIONS ........................................... 299

7.1 INTRODUCTION ................................................................. 299
7.2 SUMMARY AND FINDINGS OF THEORY ................................................................. 299
  7.2.1. Chapter 2 ................................................................. 300
  7.2.1 Chapter 3 ................................................................. 300
  7.2.3 Chapter 4 ................................................................. 300
LIST OF TABLES

Table 1: Rossman/Dewey Stages ................................................................. 30
Table 2: Creative Process Matrix ............................................................... 64
Table 3: Amabile ...................................................................................... 73
Table 4: Koestler ....................................................................................... 81
Table 5: Guilford ....................................................................................... 106
Table 6: Shallcross ................................................................................... 109
Table 7: Sattler ....................................................................................... 141
Table 8: Persuasion Matrix ................................................................. 179
Table 9: Persuasion Matrix ................................................................. 200
Table 10: Guilford's Factorial Elements of D.P. ........................................... 205
Table 11: Wallas' 4 Stages of Creative Process ......................................... 209
Table 12: CPAM (CPAP#1) ....................................................................... 216
Table 13: CPAM (CPAP#2) ....................................................................... 222
Table 14: CPAM (CPAP#3) ....................................................................... 232
Table 15: CPAM (Colour Coding) ............................................................ 243

LIST OF FIGURES

Figure 1: Dissertation Map ..................................................................... 32
Figure 2: Eysenck ................................................................................. 44
Figure 3: Clark .................................................................................... 59
Figure 4: Csikszentmihalyi .................................................................... 71
Figure 5: Amabile's Model ................................................................. 74
Figure 6: Mednick ................................................................................ 79
Figure 7: Koestler ............................................................................. 81
Figure 8: Gordon .............................................................................. 83
Figure 9: Bergquist ........................................................................... 86
Figure 10: Bergquist (Yin Yang) ........................................................... 87
Figure 11: Bergquist (Chaos Theory) ...................................................... 87
Figure 12: Guilford .......................................................................... 104
Figure 13: Guilford's SOI .................................................................... 105
Figure 14: Shallcross ......................................................................... 108
Figure 15: CPS Model ........................................................................ 113
Figure 16: Osborn and Parnes ............................................................. 115
Figure 17: Herrmann ........................................................................ 115
Figure 18: Feldman ........................................................................ 117
Figure 19: Sattler ............................................................................ 135
Figure 20: Theory of Creative Evolution ................................................. 187
Figure 21: CPAM Hierarchy ............................................................... 239
Figure 22: CPAM Flow ...................................................................... 241
Figure 23: Dissertation Overview ....................................................... 242
CHAPTER 1

INTRODUCTORY ORIENTATION

1.1 INTRODUCTION

Defining and understanding the concept of creativity has always posed a challenge for humankind. During the Biblical times of the Old Testament, humanity had yet to discover the profound significance of the 'creative' human being. A man or woman was not considered creative - only God held this license as Supreme Creator of the Universe. As recent as two centuries ago, the creative actions of a person were still regarded as blasphemy. The 20th century has brought a renewed interest as evidenced in the avalanche of new research and information done on creativity and, it seems that this could be but the tip of the ensuing creative phenomena. The past decade's focus on 'logic' has finally stepped into matrimony with the future's creative requisite. An untapped source of creative potential has finally been awakened. This promising partnership could lead to the birth of a new and exiting dimension of human existence.

It was Guilford's inaugural address in 1950, which sparked the flame. It was here, when he challenged researchers into exploration of creativity, that a new wave of sprouting interest was activated. This wave of research evolved and gave rise to the numerous definitions, theories and considerable speculation regarding the term 'creativity'. Fortunately the fundamentals are now integrated into much greater and more sophisticated approaches, and the creative phenomenon is better understood today than it was ever before. Society has come to appreciate the necessity and value of creative contribution and this in turn has brought about change in its value system. The futile attempt of a school system that rewards memory recall abilities rather than problem solving abilities has resulted in a paradigm shift in human assessment needs. Meeting the needs of an industrial society is a far cry from the needs of the new explosive information age. It demands a 'change' process, the nature of which is dynamic and complex. Now the value system has an ever-growing openness to the potentialities and respect for the creative resources of mankind. Today, the
challenge is to develop appropriate research methodologies and assessment techniques.

And finally a word of heed as noted by Constas (1989:279) to the empirical researchers of creativity:

Almost by definition, creativity supersedes that which is conventional. If we, as a community of researchers, are to achieve any substantial progress, it is imperative that we keep pace with phenomenon under investigation. Conceptual barriers must be removed, methodological approaches must be widened, and analytical procedures of a more innovative variety must be employed (Constas 1989:279).

How is it possible to assess such an abstruse concept? What needs to be done is first assess what has been hypothesised and scientifically directed, and finally, what the results have dictated. Many have ventured into this exciting research field only to find it opening up even further, revealing a much larger domain of unsolved creative mysteries. The next section will endeavour to ‘keep pace with the phenomenon under investigation’ by examining what research has produced thus far.

1.2 BACKGROUND TO THE PROBLEM (Creative assessment)

All rewards in life seem to arise from rules that are followed, or simply getting it right rather than approaching problems from new inventive ways, or exploring unique possibilities from many different angles. The information age has brought about an avalanche of knowledge based power, available to all on a global communications network. This change has brought about a multitude of neoteric problems. If we are to survive this era, it is imperative that our only survival will depend on differentiation by means of our ever-increasing reliance on our innovative creative powers.
Therefore creative assessment has become an invaluable tool to all sectors of society. It was Fromm (Anderson 1959:44) who said that creativity is the ability to see (or to be aware) and to respond. This 'ability' and 'response' has been labelled the creative process, which in turn activates the creative person into the creation of a creative product. Numerous research studies to date have proved the following:

- We can assess the creative person [biographical inventories, questionnaires] (Davis 1992; Piirto 1992; Torrance 1962; Bloomberg 1973).

- We can assess the creative product [useful, meeting a cultural, social or mutual need] (Davis 1992; Torrance 1962).

However:

- Can we assess the creative process?

- Can we understand what the (place) environment's impact and influence (sociological) is, as being pertinent to this process (Runco & Roberts 1990:61-66)?

- Can we assess what motivates and supports (persuasion) this process (Runco & Roberts 1990:235-249)?

From the numerous theory studies, it became evident that it was important to find out what abilities were crucial in the 'fuzzy realm' of the creative process, and once known, these abilities had to be isolated for further investigation. This would lead to the next question which asks, are there 'creativity tests' that measure these specific abilities? Eysenck (Boden 1994:199) reiterated the belief that everything exists in some quantity, and can therefore be measured. Our knowledge of science begins when one can measure what he is speaking about, and express it in numbers. Eysenck cautions the reader that the faults, errors, and disputations discovered in the measurement of creativity are not peculiar to psychology: They are universal in science, and most noticeable in the early development of any science.

In his book "Creativity and its Cultivation", Anderson (1959) explores creativity from a variety of approaches. Starting with the process of creativity as seen in the biological, social and natural sciences, he set out to recognise common
denominators for evaluating the process of creativity. It was a statement giving direction to a lifetime of research.

- *We can assess the creative person...*

Predicting creative behaviour with personality and biographical information is considered to be the most fruitful way to presently assess creativity. It measures attitudes, motivations, interests, values and personality traits such as spontaneity, adventurousness, willing to take risks and make mistakes, curiosity, attracted to the complex and mysterious, to have a wide interest field and be open to new ideas and experiences. A sense of humour and a childlike playfulness has proved to be important by most researches (Davis 1992:76). Emotionality, sensitivity, idealism, reflectiveness and outspoken cynicism are also considered to be creative traits, as well as many other 'negative' characteristics such as being conceited, disorderly, egotistical, hostile, outspoken, uninhibited, quarrelsome, asocial and some speculate psychopathic (Davis 1992:79-84). An example of the best known test instruments measuring personality or biographical information to predict creative behaviour would be Taylor's Alpha Biographical Inventory (ABI-1966) (Davis 1975:77).

There are, as recognised by Davis, three types of characteristics that intertwine and combine to produce creativity. They are personality, implying traits that refer to the affect, cognition aptitudes, which are abilities that include information processing styles and biographical traits (Davis 1992:184). The former and latter have been extensively researched and countless tests of human traits and abilities have been constructed to confirm that creativity as a trait exists, that people strong in this trait may be identified and that creativity is related in meaningful ways to other characteristics and behaviours. Piirto’s (1992:103) Checklists are popular: such as the Williams Creativity Assessment Packet (CAP) program and the Renzulli-Hartman Creativity Scale in the Scales for Rating the Behavioural Characteristics of Children. Other examples of inventories include the 1982 Davis and Rimm GIFT and GIFFI I and II and PRIDE tests, Gough’s 1952 Adjective Check List and the well known Myers-Briggs Type Indicator. Piirto (1992: 108) verified research done by Myers and McCaulley for the MyersBriggs Manual (1985) by pointing out the fact that the creative personality closely resembled the NFP (Intuitive, Feeling, Perceptive) Type Indicator, with Introversion and Extraversion divided equally (Piirto 1992:103-109). The third characteristic that Davis referred to, cognition abilities, needs to be
measured by means of divergent thinking tests. These tests are said to assess the creative process of creative thinking.

- We can assess the creative product ...

Here it is imperative to examine past creative interests, habits, activities and any creative excellence achieved. Test examples include the Adjective Check List and Schaefer's Biographical Inventory- Creativity (BIC) as well as Davis's own HDYT (how do you think?) test and many more (Davis 1992:183-236).

But measuring creativity by means of the final product may not always be as justifiable as one is led to believe. Csikszentmihalyi (In Runco & Alberts 1990:199.) conceded that creativity is not an attribute of individuals but of social systems making judgements about individuals. To highlight this subjectivity he recalls the fact that Rembramdt's contemporaries did not believe he was creative and preferred the works of several painters less well known by our standards. Rembrandt's creativity was only pointed out as being creative by art historians who placed his work in context of the development of the European painting era (Runco & Alberts 1990:199). The creative judgement that is made, is always laden with subjectivity. Runco himself devoted much time of his research, by focusing on implicit theories (Runco & Roberts 1990:234).

And, just how 'fakable' are these tests? In research done by Ironson and Davis (1979) on faking high or low scores on the Adjective Checklists, the results indicated that there was no doubt that subjects could easily fake either high or low creativity scores (Davis & Ironson 1979. 139-144).

Epstein (Runco 1990:139) in an attempt to analyse novel behaviour, concluded that the language of creativity is often reserved for the 'product of behaviour', and not for the behaviour itself. He felt that 'the product is of necessity a poor index of the creative process' and goes on to explain that the product is continuously edited and even judged by the creative individual and rejected. Action here is generative, but reaction is often corrective and inhibiting.

It has become clearly evident that both the assessment of the person and product are not the ideal evaluation methods but constitute a need for an additional measuring instrument that is both unpredictable (unfakable) and reliable. We must
however remember that it is not simple to develop an all-purpose omnibus instrument that has the ability to measure both the cognitive abilities but the affective predisposition as well.

It was during the sixties and seventies that affective education programs spurred up an interest in the identification of the assessment of non-cognitive traits such as creativity. It was Guilford (1956:267-293) that distinguished between convergent and divergent thinking operations in his Structure Of Intellect (SOI) theory. Here he highlighted the four main criteria involved in divergent production, which were fluency, flexibility, originality and elaboration (Guilford 1956). Torrance was the first to develop a standardised test to measure creative thinking along these dimensions and in 1966 published the research edition of the Torrance Test of Creative Thinking (Lissitz & Willhoft 1985).

Since then as a result of a much broader knowledgeable scope, hundreds of creativity tests have surfaced. There are so many variables that need to be taken into consideration that the performances on tests cannot always be accurately justified. Lissitz and Willhoft (1985) investigated the Torrance Test in regard to an experimenter-induced response set. It had already been proven that creativity scores were affected by whether or not children were interrupted, from either interesting or uninteresting classroom activities.

Still more studies proved findings that leads one to believe that there seem to be an important affective dimension to the undertaking of creativity tests, both before and during the session. Lissitz and Willhoft (1985:5) refer to previous studies done to the antecedent conditions, the motivational effects and instructions given. They concluded that an univariate approach to their research's data analysis could be misleading. 'These high intercorrelations indicated that, despite Torrance's claim that the scales represent three dimensions of creativity (fluency, flexibility and originality) a multivariate analysis of the data would be more meaningful than univariate analyses of three scales'. Their results clearly indicated an affective aspect in that it was the degree as to which test takers 'felt restricted or encouraged that may well have had a critical effect on individual performance' (Lissitz & Willhoft 1985:9).
But, has the creative process been evaluated here? Surely the results were significant in the sense that it pointed out just how subjective and emotionally sensitive the taking of creativity tests was. And, in particular those of the creative process.

Coney and Serna (1995:110) refer to the fact that ‘the idea has persisted that while many factors may contribute to the development of the creative individual, there is a particular and elusive cognitive process which is crucial to the act of creation’. They quote Amabile’s theory that creativity cannot be relegated to one isolated personality trait or cognitive process, but must be conceptualised as a behaviour resulting from particular constellations such as cognitive abilities, social environment and personality. What then, is the social significance as pertaining to creativity? How would one set about to measure the creative process when all the above, and in particular the social environment, were to be analysed?

Amabile (Runco & Roberts 1990:65) referred to Torrance’s tests as being quite inappropriate for social-psychological studies of creativity. She theorised that in general, the creative process will depend on the same components and be affected by the same social factors independent of what domain it is. ‘Can creativity be recognised as a quality of products? I believe that the assessment of creativity is much like the judgement of attitude statements on degrees of favourability’ (Runco & Roberts 1990: 66-67). She feels that a focus on the creative product would seem to be the most straightforward and scientifically conservative way of assessment.

Harrington (Runco & Roberts 1990:146) emphasised three aspects of creativity in regard to the definition given by Donald MacKinnon (definition follows later):

- Creativity exists in nearly any domain of organised human activity.

- There is a distinction between private and social creativity. Here it is the degree to which the creative act has impact beyond the creative agent(s), not the degree to which the act appears to have been the product of one creative agent or many.

- The fact that the modern psychology of creativity should begin to view ‘value’ of novel human products as a combination of complex functions, capacities and tendencies of which the social world can extract and create value from these novel products. (Runco & Roberts 1990:146.)
Runco’s implicit theories and ideational creativity is based on a sensitivity to sociocultural and personal factors. ‘There is no doubt that social, cultural, historical, and variables are vital for our understanding of creativity’ (Runco & Roberts 1990:235). His social validation procedure means involving the individual’s social or extra clinical environment to assist in the assessment process. Many of our current tests are based on a verbal response and Runco stresses the fact that what is needed is a test of ideation that is completely free of verbal requirements (Runco & Roberts 1990:248).

What then is the ‘implicit’ value of potentially creative acts? Harrington (Runco & Roberts 1990:147) aligned himself with the fact that ‘the process of discovering, creating or adding to an original act’s potential value, a social system enters into and becomes an integral part of the creative process’. It has become evident that the creative process is radically distributed and its product is not that of a single individual.

A research project regarding the role of imagery brought about another line of thought. Daniels-Mc Ghee and Davis (1994:151-176) reasoned that sensation actually precedes imagination, and that imagination culminated in thought. Their research cited the work of Plato who linked imagery to memory, and Aristotle, who felt that images provided substance for thought. In fact many eminent innovators have confirmed that mental imagery and creativity are related intimately. Could one then conclude that settings, and sensory stimulation (visual, auditory, kinesthetic, and gustatory) has a profound effect on evoking aesthetic affective modes that precede creative thinking and are therefore crucial to the initial spark of the creative process? And, would this creative process phenomena be measurable (Daniels-Mc Ghee & Davis 1994:151-176)?

Moran III, Sawyer, Fu and Milgram (1988:254-263) point out the belief that creativity is ‘natural’ in young children and that most pre-schoolers generate a larger percentage of original responses than children who are considerably older. This trend could be attributed to socialisation processes, which may have lead to a more cautious approach to responding throughout middle childhood. One is left to postulate that an early age assessment of creativity would provide a more stable personality base free from indoctrination of cultural prejudices, of a value system,
and of media exposure that could result in responses that were more spontaneous and authentic (MoranIII. et al 1988).

In conclusion one is lead to believe that there are many ambivalent areas in the process of creative assessment on which the researcher hopes to shed some degree of light. Some of the puzzling issues that have surfaced thus far are:

- Can we understand just what the environment's impact and influence (sociological) on creativity really is and is this measurable?
- Are there creativity tests that measure specific abilities as seen in the biological, social and natural sciences?
- Are there creativity tests that measure what motivates and supports (persuasion) this process?
- How does one set about to measure the social environment's significance on the creative process?
- Can the radical distribution of creative factors be measured within the environment of the creative individual?
- Do settings and sensory stimulation such as auditory, kinesthetic and gustatory has an effect on the initial spark of creativity? Would this be measurable?

With all these questions in mind it is necessary to streamline creativity questions and direct them functionally into a statement of the problem to be investigated.

1.3 STATEMENT OF THE PROBLEM (finding criteria)

The main focus here is whether the creative process can be measured through creativity tests. If it does, then what criteria do creativity tests base their evaluation on? These questions lead the researcher in pursuit of finding credible and researched rudiments, which would serve as a yardstick for my criteria selection. The investigation will evolve around the following hypotheses:

- A set of criteria exist by which the creative process can be measured, and that;
existing tests for measuring the creative process do succeed, if to limited degree, in identifying useful assessment criteria.

1.3.1 In search of the definition for creativity

The hypotheses addressed through this research are in solidarity with the need for a universal set of assessment criteria, which should culminate from the definition for the term "creativity" as defined by the pioneers and main researchers in the field. It is imperative to understand the criteria that leading tests base their evaluation on. Mednick (Bloomberg 1973:169) made the very apt observation that 'the definition dictates the structure of a test'. A definition ought to be at the roots of any assessment giving meaning and direction, closely outlining and introducing clarity.

As soon as the relevant definition's content has been analysed and scrutinised for their principal significance, they will be organised in relation to all other researched criteria sources and ranked accordingly. From here categories will be grouped in a matrix, which is drawn up to evaluate existing creativity tests that are thought to measure the creative process.

1.3.2 Analysing Definitions

There have been many discrepancies associated with testing of creativity and in particular the need for a general type of measuring instrument as well as meaningful criteria of the holistic concept 'creativity'. The challenge of creative assessment was stimulated by the fact that there was a lack of consensus in terms of a universal definition. In fact it would seem that all who have researched this phenomenon whether he/she be a theoretician, educationalist or expert in the field of creativity, has their own interpretation, theory or definition which is based on their own particular bias, disposition and interest.

Piirto (1992:317) herself insisted that the incentive for theorising about creativity may come from a person's thinking about his or her own creativity. In her book
"Understanding Those Who Create", she formulated several basic species of creativity theory. She has investigated numerous interdisciplinary forerunners who have written, studied, summarised, and agonised over what creativity really is. Her categorised theories are derived from the works of psychoanalysts (persons that probe the human psyche looking for events that lead creative persons to be as they are), psychologists (researching what happens in the mind of the person creating, also referred to as cognitive psychologists), psychometrists (making the perfect test for predicting future creative potential), humanistic psychologists (who do not focus on the creative product but concentrate on enhancing the creative potential within every human), information processing theorists (probing the brain to find out with what speed the creative person’s dendrons flash in order to artificially replicate it with computers), philosophers (assessing the meaning of creativity as it relates to certain philosophical problems) and domain-specific theorists who are the artist/scientist theorist themselves that attempt to explain just what it is that happens when they are ‘creative’.

Piirto’s (1992:318) interdisciplinary categories present a broad outline of theoretical summations that are ‘implicitly stated and not fully developed’. They do however, provide an excellent foundation from which the researcher aims to formulate different creative process assessment criteria. The intention is to classify them and all other definitions and theories located in the literature study.

It was Jung (Piirto 1992:321) that stated ‘The creative act can never be explained’. Piirto (1992:321) points out the contrary by highlighting the words of Isaksen who said: ‘There is mounting evidence that creativity can be assessed systematically and scientifically’. Since then the research into creativity has come a long way. It is perhaps Guilford’s 120-factor Structure of Intellect Model that was the largest single breakthrough in the cognitive approach to the understanding of creativity. Guilford made it clear that intelligence tests measure convergent forms of thinking while creativity involved divergent thought processes, which accounted for 30 of the 120 factors of intelligence. Working through a factor analytic paradigm, he identified over 100 of the 120 factors. Measurement of creative thought which is generally referred to as divergent production and includes items such as fluency, category formation and reformation, ideational fluency and original uses for common
Botha 19

objects, which is opposite for its 'functional fixedness'. (Guastello, Bzdawka, Guastello, & Rieke 1992:261).

The general definition of creativity may be defined as a process of original problem solving. This indicates a process by means of which original products are produced. Here a product can be a response, an idea, a solution, or an actual problem of some kind. Original refers to the unusual, statistically infrequent, and of high quality, productive, valuable and worthwhile.

Harrington’s (Runco & Albert 1990:145-146) referral to the widely accepted and frequently cited definition as proposed by MacKinnon is probably the most in- as well as conclusive as they get:

We came easily to agreement that true creativeness fulfills at least three conditions. It involves a response or an idea that is novel or at the very least statistically infrequent. But novelty or originality of thought or action, while a necessary aspect of creativity, is not sufficient. If a response is to lay claim to being a part of the creative process, it must to some extent be adaptive to, or of, reality. It must serve to solve a problem, fit a situation or accomplish some recognizable goal. And, thirdly, true creativeness involves a sustaining of the original insight, an evaluation and elaboration of it, a developing of it to the full. Creativity, from this point of view, is a process extended in time and characterized by originality, adaptiveness, and realization. (Runco & Albert 1990:145-146.)

Does the definition of creativity embody the term intelligence? Numerous studies have delved into this correlation study and brought about answers that needed additional research. There have been some similarities but Piirto (1992:76) points out a 1988 study by Zaregar, Hovecar, and Michael where they examined the construct of issues such as 'originality' which they determined were definitely distinct from measured intelligence as indicated by the Stanford Binet IQ score, and needed to be separated from divergent production factors, yielding an ongoing problem. She noted the caution left by Borland who investigated flexibility and originality, and concluded that despite the certainty with which many educators speak of fluency, flexibility, and originality, this is a murky area (Piirto 1992:77). Still
more studies such as that of Runco and Albert (Piirto 1992:88), stated that the ‘threshold theory’ suggesting one needs above-average intelligence to be creative, is incorrect! Mark Runco’s book “Divergent Production” (1990) is a good source to consult concerning the validity of divergent and creative thinking theories.

Once the literature study has been completed and all relevant definitions analysed, an outline will be compiled of creative prerequisites that should provide an offering for understanding just exactly what abilities should be tested. This will render it possible to allocate criteria that could measure the creative process. The big question will still remain as to which creativity tests include the above criteria and if not, what are the gaps? Once the definition of creativity has been established, categorised and perused for ‘process components’, the search for ‘tests’ measuring the creative process will follow.

1.3.3 In search of creativity tests

It is no surprise that the recent spark of creative interest ignited the need for adequate, testing procedures and since then hundreds of creativity test have surfaced. They generally measure creative abilities or evaluate personality dispositions for creative thinking. But, as can be expected with a phenomena such as creativity is, many lack validity and reliability. ‘Validity’ refers to degree to which a test measures what it is suppose to measure and ‘reliability’ is the accuracy or time-to-time consistency of a test (Davis 1992:184). Since creativity involves every sense—sight, smell, hearing, feeling, taste, and even perhaps the extrasensory, it is obvious that it would be very difficult to assess much that is unseen, non-verbal, and done unconsciously. Creativity and innovation is after all, found in every aspect of human activity. Some are creative in many ways while others are perhaps only creative in one area.

Piirto (1992:76) warns that people using ‘creativity tests’ should validate their content and questions the validity to equate divergent production with creative potential. She refers to Treffinger’s research done on numerous tests including Khatena’s work on creative imagery and imagination, Rimm and Davis’s work on GIFFI (Group Inventory For Finding Interests- a 60-item inventory for use in grades 6 through 9), their personality and product instrument, Guilford’s work on divergent production in
the SOI, Torrance's test of creative Thinking, Mednick's work on the Remote Associates Tests, Wallach and Kogan's work on their tests and concluded that even though there are many fragmented studies, there had been some promising signs of progress in the validation of creativity assessment procedures.

Davis (1992:186) also stresses the issues surrounding the creators of these tests by quoting Treffinger's remarks concerning the assumptions made by test builders. He highlights the particular set of beliefs and preconceptions that all test-creators possess and, that are mirrored in their creative measuring instruments. The test developer's idiosyncratic assumptions about creativity, contribute to his/her own definition of creativity that form the ground criteria each test will inevitably test for.

The researcher was able to discover a sizeable list of a variety of different types of published and unpublished creativity tests that were indexed in the Journal of Creative Behaviour. In fact between 1971 and 1980 there are 186 tests listed. Since then many more tests have surfaced. Davis (1992: 190-236) divided them into two groups: 'divergent thinking tests' (Davis 1992:192) and 'personality and biographical characteristics' (Davis 1992:217). The intention is to categorise the former group, as they relate to the person, thinking process, product and persuasion (including place, environment) theories of creativity. In this way the researcher will be able to eliminate all tests that do not relate to the actual 'process' of creative thinking.

It is also good to know that that both type test groups, as listed by Davis, carry strong evidence for construct validity as well as criterion-related validity. The former refers to persons who possess divergent thinking abilities and these personality traits tend to show other characteristics of creative people such as a tendency to do creative things. The latter coexists in the sense of establishing significant correlations between test scores and some other current criteria of creativity (ratings of a creative product, from the teacher, supervisor, parent or other creativity tests). There does however seem to be a criterion problem in order to validate creativity tests. Davis (1992:191) asks how do you decide who is creative or what products justify merit? It is because of this that many test developers rely solely on establishing construct validity such as the Wallach and Kogan and the Getzels and Jackson tests.

In the next section the field of study will be demarcated.
1.4 DELIMITATION

There is no doubt to the fact that much regarding creative abilities and creative processes are complex and their dynamics mysterious. The main focus here is on what the researcher believes to be the most challenging assessment of all - the creative process.

Approaches to the understanding of creativity have centred on a number of aspects to which Davis (1992:39) comically refers to as the three P's theory. They are the creative person, the creative product, the creative process and, what was to follow - the creative press, also known to be referring to the environment or climate in which creation occurs. It is important to remember at this point that they are all interconnected and function interdependently with each other. To these four, Davis added his own called mysterious mental happenings (Davis 1992:50). Here he refers to the creative genius whose inexplicability will forever elude human understanding. A product or response will be estimated to be creative to the extent that it is both a novel and appropriate, useful, correct, or valuable response to the task at hand, and the task being heuristic rather than algorithmic. Each of these attributes is essential since a product that is novel, but inappropriate may be bizarre, and a product that is appropriate, but not novel may be considered mundane.

Albert and Runco (1990:260) refer to the fourth added dimension as 'places' that has been used to divide creative research areas. They cite Dean Simonton in his chapter called "History, Chemistry, Psychology, and Genius: An intellectual Autobiography of Historiometry". Here he stresses the interpersonal factors of creativity such as the 'focal relationships', the influence of personality, and of creative leadership which is exerted by significant others who interact with the creative person. They agree with Simonton that yet another category of creativity that of 'persuasion' should be added. They conclude that creativity is never a private hidden experience that was once believed but is an intricately shared experience with no one identifiable origin or only one participant intrinsically involved with the process at any moment (Runco & Alberts 1990:261.) Creativity is considered to be a social behaviour and one that entails successful 'persuasion' (Runco & Alberts 1990:98).
A summary of an interesting observation regarding the four P's made by Simonton (Runco & Roberts 1990:98 & 99) in his chapter called 'Motivation and Personal Histories' is as follows:

- **Process**: a viewpoint favoured by Gestalt psychologists and cognitive psychologists fascinated with insight and problem solving.

- **Person**: personality psychologists conceive creativity in regard to the person with many creativity tests that tap individual differences on relevant motivational or cognitive attributes.

- **Product**: Psychologists such as those who investigate experimental aesthetics as related to a particular product such as scientific publication or artistic composition that possesses certain essentials.

- **Persuasion**: Here a growing number of researchers have come to view creativity as a social behaviour that calls for 'successful persuasion'.

Simonton (Runco & Roberts, 98 & 99) urged that because persuasion, and not any of the above mentioned, was creativity's 'ultimate arbitrator', it was distinctly evident that creativity was the proper topic for the social psychologists!

But, as has already previously been stated, the creative process is complex and its dynamics mysterious. It became very clear that the above mentioned five-R theory of Simonton covered a vast area of the creative process but their interrelated components made the process of categorising and separating criteria virtually impossible. The researcher concluded that the creative process components would need to be examined separately (in order to find criteria) and therefore required to be investigated in terms of its relevance within the 'p' theory. In the literature search, the researcher has come upon numerous creativity theories explaining its origin, its intricacies, the motivation needed to stimulate its onset, the influences that determine its eventual product, the ideal conditions in which it can best be transferred, the cognitive processes involved with divergent production, the value-system regarding this product and a substantial amount of additional information, making it apparent that it was important to choose a theory that best suited the need to organise all creative-process-criteria found. It was with much deliberation that the researcher...
eventually decided upon the one theory that seemed to cover all aspects of the creative process and was extensive enough to cover the broad spectrum of criteria that was about to be unfolded. The theory chosen was that of Wallas. The researcher does however intend to briefly describe the theories of other researchers such as of Osborn, Amabile, Kubie, Kris, Parnes, Torrance, Runco, Davis, Dewey, Csikszentmihalyi and others that have all made a significant contribution to the insight of the creative process and whose input is needed for the formulation of what the researcher has chosen to refer to as the Creative Process Assessment Parameter (CPAP). The latter refers to a diagram composed to organise the main definitions and theories in order to cite and generate relevant criteria for the assessment of the creative process. Reference to CPAP will be given in more detail in Chapter 5.

1.5 PURPOSE OF STUDY

There is a need to index creativity. The past two decades have marked countless projects in furthering the understanding of creativity and in finding its universally acceptable definition. This is, according to Davis (1975:75), because of two main stumbling blocks. They are (a) that creativity takes on innumerable forms and (b) that it has been difficult to isolate meaningful criteria against which to validate tests. What needs to be done is start at the very roots of creativity and first assess just where ideas originally stem from. Davis asks whether or not they are simple manipulations of diverse memories, which have been rearranged and regrouped to suit the needs of the problem (Davis 1975:75).

A prominent enigma that has been associated with many creativity tests is the uncertainty of whether it has accurately measured the creative potential of an individual or not. Assessing the creative personality type has brought about much success, as so too has the assessment of the creative product. However, the problem still remains whether or not drawing pictures inside circles accurately measures the creative process. Khatena (1976:191) pointed out the need to test for creative imagination imagery. What we need is a 'construction of scoring systems that are rooted to a qualitative analysis of imaginative responses, creative analogies, and imagery.' To understand the concept of creativity as a whole, Khatena directed that the analysis and interpretation of this imagery was to be a part of the total and more comprehensive patterns.
of mental functioning and personality. It is therefore imperative that the research not only refer to the creative thinking process, but also briefly incorporate criteria within the entire creative process that pertain to the creative person, persuasion (place & environment) and product. (Khatena, J. 1976:191.)

1.5.1 The first purpose

The first purpose of this research paper is to do a literature study into the following:

- The definitions of the term ‘Creativity’
- The theories of the Creative Process
- Assessment and current creativity tests

1.5.2 The second purpose

The second purpose of this research paper is to develop a series of instruments that will generate criteria that will assess existing creativity tests:

CPAP or the Creative Process Assessment Parameter refers to a diagram composed to organise the main definitions and theories in order to cite and generate relevant criteria for the assessment of the creative process. The criteria will provide the groundwork from which the researcher intends to develop a Creative Process Assessment Matrix (CPAM). This instrument will to evaluate existing creativity tests to assess whether they include measurement of the creative process or, if not, to assess where the gaps lie. The CPAM’s main purpose is to bring more clarity, more limpidity and detail according to decades of research done into the creativity question.

1.6 METHOD OF INVESTIGATION

A literature study of articles and books will be done in order to find information as to what definitions, what theories, abilities and what interdisciplinary perspectives there are, as relating to the creative process. Here the researcher intends to draft a set of matrices (CPAP) which will collectively summate definitions, theories and the ‘p’
theory in terms of how they relate to Wallas' four stages as regards to the creative process. The CPAP matrices will enable exploration of criteria that surface and what would ultimately, evaluate the 'creative process', and, in particular within a creativity test.

CPAP will investigate most of the main definitions and theories of the term “creativity” to ascertain categories for assessment of the creative process. All the relevant information obtained through the CPAP matrices will be used to formulate a framework (CPAM) for the assessment of the creative process within certain creativity tests.

Current creativity tests that claim to fully or partially, test the creative process will be selected and assessed according to the selected criteria. Possible gaps will be highlighted.

1.7 EXPLANATION OF CONCEPTS

Specific concepts will be referred to often and in the following section they will be clarified.

1.7.1 Creativity

Is a 'precise meaning' that is 'closely outlined', bringing 'clarity of detail' (Dictionaries' meaning of definition) by means of a definition, possible with a term such as creativity?

The American Heritage Dictionary defines 'creative' as follows:

(krē-ā' tiv) —adj. 1. Having the ability or power to create. 2. Creating; productive. 3. Characterised by originality and expressiveness; imaginative.

'Ability' and 'power to create' lies within the potential of the creative process whereas 'creating' and 'productive', in this context, implies process. 'Originality and expressiveness' refers to the characteristics of a creative product while 'imaginative' alludes to the thinking processes of the creative person.
Defining the term creativity has brought about an avalanche of ideas, theories and definition. I intend to seek out the most prominent and relevant, and investigate their potential as a source for criteria.

1.7.2 The Creative Process

It was Wallas (Parnes & Harding 1962:86) who in 1926, was first to describe the creative process in terms of four distinct stages namely Preparation, Incubation, Illumination and Verification. These concepts will be briefly explained.

1.7.2.1 PREPARATION

Here the problem is investigated from all directions. The person 'finds out the problem situation' and what exactly it is, what the difficulties are, what methods have been already been tried and what their success rate was. According to Youtz, (Parnes & Harding 1962:194) information is gathered and integrated with previous experience. The individual is assembling or receiving new ideas and associations are being made while in a state of disequilibrium. Stein (Parnes & Harding 1962:86) assured that creativity is initiated either through an active or a reactive process.

1.7.2.2 INCUBATION

Now the individual is not consciously thinking about the problem. This stage is described (Youtz in Parnes & Harding 1962:194) as a peculiar stage in creativity. It is the interval between the completion of 'preparation' and the sudden insight when 'illumination' occurs. Timing can be a few minutes or even several months. It is a very active period although the person does not report much 'conscious activity' but seems preoccupied and abstracted. Here the individual controls his capacity to tolerate ambiguity: a state in which he does not comprehend all that he perceives or feels. Stein believes that the individual may now experience depression, anxiety, and feelings of inadequacy (Parnes & Harding 1962:88). The individual also possesses boundaries between the regions within the self. This 'permeability' may be self-induced as a result of the regression in the service of the ego (Selecting certain environments, taking drugs, etc.). Stein (Parnes & Harding 1962:87) adds that for
some it may involve greater flexibility in the intellectual sphere and for others a flexibility in the affective sphere although both are vital for creativity.

Youtz (Parnes & Harding 1962:194) refers to the French mathematician, Poincare who reported on incubation in his analysis of the process of solving difficult problems. Osborn he believed, brought about a practical method of producing novel solutions by intentionally and consciously producing it. Incubation follows and ‘accompanies’ preparation. Now, Youtz (Parnes & Harding 1962:199) observed, the subject is thinking of other things and mood or idea involuntarily repeats itself and keeps recurring. Poincare (Parnes & Harding 1962:117) himself explains: “It is certain that the combination which present themselves to the mind in a kind of sudden illumination after a somewhat prolonged period of unconscious work are generally useful and fruitful combinations, which appear to be the result of preliminary sifting”.

1.7.2.3. ILLUMINATION

Here it is Stein (Parnes & Harding 1962:86) who explains that this is the stage during which the ‘happy idea’ occurs, as well as the psychological factors that immediately precede and accompany its appearance. Sudden insight brings about the ‘Eureka!’ or better known as the ‘Aha!’. Now a pattern emerges that anticipates a solution or answer. Here predictions of the outcome and the ability to ‘foresee’ play an important role. Youtz (Parnes & Harding 1962:199) refers to this stage as the crystallisation of the idea, which is incubating into definite form. Stein (Parnes & Harding 1962:89) adds that initially criticism has been absent, but as the process evolves and fantasy becomes art, the imagination has to submit its work to the scrutiny of the critical faculties. From here on the individual assumes a new role and it is here that the interpersonal aspects of the creative process become evident. He now proceeds to communicate his findings or solutions in a way acceptable to others.

1.7.2.4. VERIFICATION

Now Stein (Parnes & Harding 1962:86) verifies, the validity of the idea is tested and the idea reduced to exact form. Here elaboration and modification of the idea take place. It is interesting to note that in the realm of mental health, the lack of
verification or revision is the major difference between psychotic imaginative thinking and the creative thought of the healthy individual. (Parnes & Harding 1962:36.)

Stein (Parnes & Harding 1962:90) noted that as soon as the individual has completed his work does not mean that the total creative process is at an end, but now needs to be presented to and accepted by a group of significant others as 'tenable, useful or satisfying'. This covers the areas of ideas, objects and aesthetic experiences. Significant others refers to either formally or informally 'organised group of persons which is recognised as capable of evaluating developments in its own field' (Parnes & Harding 1962:90).

Youtz (Parnes & Harding 1962:199) reviewed a number of experimental psychology findings which, not only had interesting results but supported Osborn's teachings. He shows how Osborn's principles tend to reduce the effects of inhibiting factors such as rigidity in thinking.

Four stages of creative thought are apparent, although there is much overlapping. The primary of the whole over the parts is apparent, particularly in the last two stages. When the idea first becomes definite, in the illumination stage, it is a general one. Details are added and changed during revision. In the preparation and incubation stages, either the general or the detail may come first, although the general is more prevalent, but the idea first written or drawn is a general one. (Youtz in Parnes & Harding, 199.)

According to Guilford (Mooney & Razik 1967:97), Wallas was not intending to make a serious contribution to the theory of creative thinking but rather help divide the total chain of events for the purpose of closer examination and discussion. He notes the similarity there exists between Wallas' breakdown and those of other researchers such as Rossman after his study of over 700 productive inventors and that of John Dewey. What follows is a list of these stages as set out by their authors:
Rossman's stages are:

i. Observation of need or difficulty

ii. Analysis of the need

iii. Survey of all available information

iv. Formulation of objective solutions

v. Critical analysis of the solution

vi. The birth of the new invention- the idea proper

Experimentation to test out the idea

Dewey's five stages are:

i. Recognition of a problem

ii. Analysis of the problem

iii. Suggestion of possible solutions

iv. Testing of the consequences

v. Judgement of the selected solution

Table 1: Rossman/Dewey Stages

Guilford (Mooney & Razik 1967:97) highlights the significance in similarity and their resemblance to a number of sets of hypothetical descriptive stages proposed for the rough description of problem solving.

Von Oech (1986:11-20) defined the creative process in terms of seven areas: the Germinal phase where ideas sprout into being, and a Practical phase where the ideas are evaluated and processed. The former phase includes motivation, searching, manipulation, incubation and illumination. This is known as the sprouting phase. The latter refers to evaluation and action, which he termed harvesting.

Even though the research field of this study has been scaled down to include only the creative process itself, the researcher aims to not loose track of the fact that the components of the majority of creativity theories are all connected in some way or other. They need to be seen as part of a 'creative whole' and evaluated holistically.
from time to time. Their objectives tend to be 'antagonistic' toward one another and it is because of this that Mooney (Parnes & Harding 1962:75) expressed the need for a way of taking hold of all these perspectives at once so each could serve and support, rather than threaten the others. CPAP #1 will strive to capture the main objectives as set forth by the four stages of Wallas. Each stage will be summarised according to the descriptions provided by Parnes. CPAP#1a will elaborate more and incorporate further aspects as they relate holistically toward each other in the creative process. CPAP#1a's main function is to organise the 'P' theory of creativity (the creative person, the creative thinking process, creative persuasion, the creative product) as it relates to the four stages of Wallas in a matrix format.

The last concept, which will be defined, is 'Assessment'.

1.7.3 Assessment

It was Thorndike (Sattler 1988:12) that said: "We conquer the facts of nature when we observe and experiment upon them. When we measure them we have made them our servants. A little statistical insight trains them for invaluable work."

The assessment process brings together all available relevant information gathered from various sources such as past records and test results. According to Sattler (1988:3-4), the four pillars of assessment include norm-reference tests, interviews, observations, and informal assessment. These assessment tools as well as guidelines for assessment such as for evaluating a test, the need to consider ethnic and cultural diversity and many aspects relating to the assessment process such as somatic, psychological, social and interpersonal factors, reliability and validity will be discussed in detail in Chapter 4. General assessments are often based on information obtained from a variety of sources whereas standardised tests provide a means of assessment in a systematic way. Once the test stimuli and scoring procedures are standardised, norms can be established (Sattler 1988:329).
1.8 THE RESEARCH PROGRAM

The diagram below explains the methodology of how the literature study will be conducted. All documented information relevant to the assessment of creativity tests will be explored and analysed in preparation for the construction of a Creative Process Assessment Matrix that will be referred to as CPAM. Relevant research material will be clarified for use by means of a series of Creative Process Assessment Parameters termed CPAPs'. These parameters will eventually form the foundation and framework for the assessment instrument CPAM, which will ultimately be used to evaluate creativity tests. The final chapter will highlight how the creativity tests' rated, what gaps have realised and what recommendations can be made.

Figure 1: Dissertation Map
Chapter 2:

Definitions of the general term ‘Creativity’ will be investigated from the major contributors to Creative Thinking Research. These sources will provide ample definitions which the researcher will use to ascertain which ‘elements’ refer to person, persuasion (place & environment), product or, the creative thinking process, in order to ‘categorise’ future process criteria. Several leading researchers perspectives will be approached, their findings documented and their conclusions concerning the lack of a universal definition considered. Similarities and gaps will be noted and discussed in chapter five. Relevant criteria from chapter 2 will be documented in CPAP #2 in chapter 5.

Chapter 3:

Here prominent theories, which in particular refer to the ‘Creative Process’, will be analysed. These sources too, will be used to ascertain which ‘elements’ refer to the p theory and in what stage of Wallas they are located. Relevant criteria from chapter 3 will be documented in CPAP #3 in chapter 5.

Chapter 4:

Relevant issues relating to assessment procedures, guidelines for the assessment for the evaluation of tests, and many more issues relating to the assessment of the creative process such as the somatic, the psychological etc. will be discussed. CPAP# 4 will give rise to a matrix that documents assessment criteria within the Wallas/p-theory matrix.

A selected group of current creativity tests will be examined to determine which evaluate the creative process. Each test’s main theme for testing is analysed and grouped accordingly. Once the process-testers are identified, all the relevant research regarding the particular tests are taken into consideration for the CPAM-evaluation.
Chapter 5:

Relevant 'criteria' as derived from the above theories and definitions will be grouped according to the four stages of Wallas (CPAP#1) as well as within the four P categories of creativity (CPAP#1a).

The definitions' creative process criteria will be grouped in CPAP#2.

The theories' creative process criteria will be grouped in CPAP#3.

The assessment prerequisites will be grouped in CPAP#4.

The creative process components are highlighted, investigated, scrutinised and justified with related research source material and discussed accordingly and recorded on the CPAM model.

Chapter 6: (A culmination of the results of chapter 2, 3, 4 and 5)

The Creative Process Assessment Matrix: (CPAM)

Selected 'criteria' are now classified according to the four stages of Wallas and listed in an assessment matrix (CPAM). The selected tests are now to be assessed according to the matrix's categorised criteria.

Chapter 7:

The selected tests' are evaluated in terms of their strengths' as well as their deficiencies. Gaps are identified as well as recommendations made and discussed accordingly. A brief summary of this research's results will endeavour to highlight the significance of this research paper.

1.9 IN SUMMARY

In creativity there is a need for (a) a universal set of meaningful assessment criteria and (b) a general instrument that can measure creativity holistically. Because the definition dictates the structure of a test, it is imperative that the definition of creativity be examined in detail. The lack of consensus in terms of a universal
definition has made it necessary to examine a variety of definitions that need to be analysed and explored. Assessment elements need to be identified and categorised in a more functional matrix format.

A general definition can be defined as a process of original problem solving where the product can be a response, idea, solution or an actual problem of some kind. McKinnon's (Runco & Albert 1990:145-146) definition aptly explains the prerequisites of the creative product:

True creativeness fulfils *three conditions*:

- A response that is novel and adaptive to or of reality
- Must serve to solve a problem, fit a situation or reach a goal.
- Sustaining of original insight, an evaluation and elaboration to the full.

Research relevant to creative testing has brought to light the following:

- Final product assessment is not always as justifiable as it was presumed.
- Many creative tests such as the Adjective Checklist are prone to faking high or low scores.
- Measuring instruments that are both unpredictable and reliable are needed.
- It has been proved that creativity scores are affected by external influences. There is an affective dimension to the undertaking of creativity tests (before and during testing).
- Creativity cannot be relegated to one isolated personality trait or cognitive process but as behaviour from a *constellation of attributes* such as cognitive abilities, social environment and personality. One must take into consideration creative acts impact beyond the creative agent(s). Social, cultural, historical and variables are vital for the understanding of creativity. The social system is an
integral part of the creative process through the process of discovery, recreation or adding to an original act's potential value.

- Torrance's test is inappropriate for social psychological studies of creativity.

- Sensation precedes imagination, which in turn culminates in thought. Mental imagery and creativity are related.

- Creativity is more natural and spontaneous in young children. An early assessment of creativity would provide a more meaningful base.

- Borland proclaims that fluency, flexibility and originality are still a cloudy researched area.

- The threshold theory suggesting one needs above average intelligence to be creative, is incorrect.

- It is difficult to assess creative factors that are unseen, non-verbal and done unconsciously.

- The P theory of creativity has been expanded to include the creative person, the creative product, the creative thinking process and the creative persuasion (place/press/environment).

Wallas' four stages of the creative process and the P theory will be investigated and used to give structure to the impending assessment instrument. Their interrelated components make the process of separation impossible. Their collective purpose as the Creative Process should be researched in its entirety. The purpose of this study is to develop a Creative Assessment Parameter that will pursue to organise all creative process criteria according to the creative definitions and creative process theories. This will give structure to a Creative Assessment Matrix for the assessment of the creative process within certain creativity tests.

In the chapter that follows the researcher proposes to seek criteria as can be found in the definitions of prominent Creativity Researchers.
CHAPTER 2 DEFINITIONS OF CREATIVITY

2.1 INTRODUCTION

The way in which civilisation has evolved has primarily been the responsibility of the processes of creative thinking. Nevertheless, a process we frequently look upon with great scepticism, mostly because of the enigma attached to some of its components. This process is explicit in the ways we identify problems and attain solutions and whose products we sometimes find hard to accept because of our inability to define them in apparent terms. Is it possible to ever explain such a process in logical or scientific terms? The success of this research paper is dependent on explaining this process in such terms and therefore it is only appropriate that we try. Before embarking on the ensuing research, it is important to remember that the cognitive processes that produce creative products are not fundamentally different from the cognitive processes that produce non-creative products. It is therefore appropriate to estimate that a definition that sets out to justify creativity according to its uniqueness and particular distinction would prove to be indispensable. This chapter will strive to pursue this uniqueness through the foundations set by the general term 'creativity' and how these fundamentals have been upheld and parsimoniously distinguished by various authors in order to formulate the essence of a definition.

2.2 IN SEARCH FOR A UNIVERSAL DEFINITION

In the researcher's attempt to decipher the mystery of creativity, the intention will be the taking of what could take a split second, a year or a lifetime and, examining it to bare more limpidity and insight (acuity) into the creative enigma. In order to achieve this, the researcher aims at organising all definitions within the four stages that Wallas proposed and comparing it to the four components of creativity: creative person, the creative thinking process, creative persuasion (press, environmental, social) and the creative product. Again it is imperative to keep in mind that creativity is a phenomenon that is not ruled by fixed categories or rigid methodologies, but has a dynamic essence of its own accord. Inherent understanding
arises from a grasp of the entirety of the creative episode and this is not possible when each
creative element is individually focused upon and examined in particular. However,
a list of indexed criteria is imminent and there are many discreet elucidations that
could be congruous to all of the stages set out by Wallas. And, if not, be conformant
to some or all of the creative components from the P -Theory of creativity.

Various authors have sought trends, categories and commodities of numerous
creativity definitions before stating their particular convictions. The researcher
intends to refer to their classifications quoting around 100 definitions in order to
find similarities, differences as well as agreements. The latter will only be referred to
in chapter five. All italics used in the aforementioned quotations are those of the researcher and
have not been retained as set out in the original text. Most researchers including Davis, are
in agreement that no universal definition of creativity exists.

2.2.1 Davis: Creativity has no unified psychological theory

Davis (1992:38) sets the scene by confessing that there are about as many definitions
of creativity as there are people who have set their ideas on paper. He summarised
the conclusion drawn by Freeman, Butcher and Christie that there is no unified
psychological theory of creativity and that we freely use such terms as imagination,
ingenuity, innovation, intuition, invention, discovery, and originality in relation with
the term creativity. Davis’s research into the fuzzy demesne of definitions and
theories directed him into categorising the main interpretation of each definition
according to the five-p theory. The first of which concerns the personality and
biographical attributes of the creative person.

2.2.1.1 THE CREATIVE PERSON

Jung’s (Davis 1992:41) definition claims it a primordial experience which surpasses all
understanding. Creativity is said to be an activation of one’s archetypes or primordial
images which lies buried in man’s unconscious since the dawn of culture and are
activated instinctively. Therefore the creative process 'consists in an unconscious
animation of the archetype, and in *development and shaping of this image till the work is completed* (italics mine) (Davis 1992: 40-41).

Sternberg's warrants the creative person with a three-facet model of creativity that refers to a peculiar intersection between *three psychological attributes: intelligence, cognitive style, and personality (motivation)* (Davis 1992: 41). These will be used by the researcher to subcategorise the psychological attributes of the creative person within the P-theory (discussed in chapter one).

### 2.2.1.2 THE CREATIVE PROCESS

Torrance's (Davis 1992) definition comes close to including all of the Wallas stages:

- Sensing difficulties, problems or gaps in information [Preparation].
- Making guesses and formulating hypotheses concerning the above [Incubation].
- Evaluating and testing these guesses [Incubation & Verification].
- Revising and retesting them [Incubation & Verification].
- Communicating the results. (Davis 1992: 43.) [Verification].

Torrance defines creativity as the process that includes *original ideas, a different point of view, breaking out of the mould, recombining ideas or seeing new relationships among ideas.*

Moving the focus to the behavioural perspective, Torrance describes four components by which individual creativity can be assessed:

- **Fluency:** the ability to produce a large number of ideas
- **Flexibility:** the ability to produce a large variety of ideas
- **Elaboration:** the ability to develop, embellish, or fill out an idea
- **Originality:** the ability to produce ideas that are unusual, statistically infrequent, not banal or obvious

Koestler's (Davis 1992) idea combining definition distinguishes between *biotic or associative originality from associative routine.* Here previous independence of mental skills are
transformed and integrated into a novel synthesis. Davis quote's Koestler's explanation that creativity is the *amalgamation of two realms as wholes*, and the integration of the laws of both realms into a unified code of greater universality (Davis 1992:44). He (Davis) perceived that idea combining had a strong *intuitive* appeal but cautioned that assembling high quality creative combinations required considerable *experience, skills, energy, imagination and aesthetic taste* in order to comprehend a successful outcome. Here are a few of the one sentence definitions put forth by Davis (1992:44) in recognition of the idea-combining concept:

Keep: 'The intersection of two ideas for the first time'.

Harmon: 'Any process by which something *new* is produced: an idea or an object, including a new form or arrangement of old elements'.

Porshe: 'The integration of fact, impressions, or feelings into a new form'.

Read: 'That quality of the mind which allows an individual to juggle scraps of knowledge until they fall into new and more *useful patterns*'.

Rogers: 'The creative process is the emergence in action of a novel relational product, growing out of the *uniqueness of the individual*'.

Allen: 'Creativity is the production of *meaning by synthesis*'. (All italics are mine) (Davis 1992:44)

The idea to test for the idea combining concept would warrant an assessment of the person's experience, skills, energy, imagination and aesthetic taste as well as an in-depth analyses of the product outcome.

Another line of thought is persued by Perkins who queries invention with the *ex nihilo* question that ask how can something come from nothing (Davis 1992:46). His answer includes a process analogous to natural selection: the *generation, selection, and preservation of ideas*. 


The potential combinatorial explosion of possibilities is mindfully directed by creative people - people who are motivated, have creative patterns of deployment or personal maneuvers of thought, and have raw ability in a discipline (Davis 1992: p.46).

The question here would be whether these ‘combinatorial possibilities’ as directed by creative people, can be measured or not. The assessment of the creative thinking processes poses many significant and practical problems that do not feature pertinently in the case of the creative product.

2.2.1.3 THE CREATIVE PRODUCT

Here Davis (1992: 48) distinguished between those who mention novelty and those who emphasise the social value of the creative outcome:

Newell, Shaw, & Simon: ‘Creative ability appears to be a special class of psychological activity characterized by novelty’.

Barron: ‘Creativity may be defined, quite simply, as the ability to bring something new into existence’.

May: Creativity is ‘...the process of bringing something new into birth’.

Rhodes: ‘Creativity...is a noun naming the phenomenon in which a person communicates a new concept’.

Mason: ‘Creativeness, in the best sense of the word, requires two things: an original concept, or ‘idea,’ and a benefit to someone’.

Lasswell: ‘Creativity is the disposition to make and to recognise valuable innovations’.

Fox: ‘The creative process is any thinking process which solves a problem in an original and useful way’.

Haefele: ‘Creativity is defined as the ability to make new combinations of social worth’. (All italics are mine) (Davis 1992:48.)

What Davis omits to mention or refer to is the rather debatable but relevant concept of ‘private value’ that qualifies the product as having creative significance.
2.2.1.4 THE CREATIVE PRESS (SOCIAL AND PSYCHOLOGICAL ENVIRONMENT)

Does the environment accept or reject creativity? Isaksen (Davis 1992:49) affirms the necessary conditions for the healthy functioning of the preconscious mental processes which produce creativity: 'The absence of serious threat to the self, the willingness to risk:...openness to the ideas of others' (Davis 1992:49). Rhodes proclaims that creativity is a response to current social needs and that innovators that are based in the technology, must be part of an environment that offers a 'sufficiently advanced stage of culture and a proper technical heritage' while Csikszentmihalyi maintains that it is society that has the final say in determining what is genuinely creative. Social agreement comes from artistic and scientific establishments and judgement becomes part of a social process (Davis 1992:49).

It is interesting to note that Davis points out the social influences, opportunities and involvement in almost all (except illumination) of the four creative stages. Illumination is an individually experienced phenomena that is only shared socially within the next phase (verification) when it is communicated, brought into existence and evaluated. Another view of opposing definition correlates comes from Eysenck.

2.2.2 Eysenck: There is a lack of integration in creativity research

Eysenck's (1995:245) interest in the link between psychoticism and creativity lead him to pursue the theory of 'overinclusion'. This 'looseness thinking' is fundamental to creative concrete thinking and may be due to the failure of inhibition, characteristic of psychotics, creative people and geniuses (Eysenck 1995: 248).

Eysenck's (In Boden 1994:200) explanation reiterated the fact that even though there has been a good deal of agreement on what we mean by the term creativity, there still remained the lack of integration in creativity research due to the lack of a sound general definition of creative behaviour. He noted that Guilford defined it in terms of the production of ideas (creative thinking process), MacKinnon as an attribute of
Botha 43

personality (creative person), Cattell as a form of problem-solving ability (creative person & thinking process) and others in terms of actual achievement (creative product) (Eysenck in Boden 1994:207). He also refers to the definition suggested by Vernon, cited in 1989. Here creativity denotes a person's capacity (creative person) to produce (creative thinking process) new or original ideas, in sights, inventions, or artistic products (creative products), which are accepted by experts as being of scientific, aesthetic, social, or technical value (creative press/persuasion). He cautions that we must incorporate in our definition the acceptability or appropriateness of the creative product, even though this may change with time. (Eysenck in Boden 1994:200.) Not only does he include all of the stages (Wallas) of creativity but, touches on the aspect of time related issues which will be discussed later on in this chapter.

Eysneck (In Boden 1994:200) also refers to Mednick who defines the creative process as the forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution. He postulated an associative hierarchy, which refers to the way in which people produce associations to words or problems. Creative individuals have a shallow gradient and resemble generalised gradients and may be measured by Mednick's Remote Associates Test (RAT). It has however, been reported that RAT is a failure and, that the test correlates well with IQ but poorly with actual creative productivity (Eysenck in Boden 1994:227).

Eysneck (In Boden 1994) concluded that the theories of neogenetic processes (Spearman), transfer recall (Guilford), remote associations (Mednick), bisociation of matrices (Koestler) and Janusian thinking (Rothenberg) all agree that that the processes involved are the conscious. He also regards that many definitions fail to discriminate between the different conceptions of novelty. He clearly distinguished between private and public novelty. The former is that which the individual discovers and is new to him while the latter is that which the individual discovers which is new to everyone. Some of the definitions of creativity likewise in their explanation, refer to creativity as a trait and creativity as shown by productivity. Again the former infers to a characteristic of the person him- or herself to produce acts, items, and instances of private novelty while the second refers to actually producing works that are novel in the public sense. Creativity as a trait involves four components: the creative process and when
repeated regularly, gives rise to the notion of trait, the creative product, the creative person and the creative situation (Eysenck in Boden 1994:202). Creativity as an achievement may be one of three kinds. Overt production criteria e.g. publication counts or patent awards (social worth, quality of products); nomination of professional recognition criteria e.g. awards given because of product or new idea's value in an occupational field and social recognition criteria e.g. peers or supervisors.

Trait creativity is supposedly universal while creative achievement is nearly always strictly tied to a field (Eysenck in Boden 1994:208-210).

**Figure 2 : Eysenck**
(Boden 1994:209).

Eysenck cites Simonton who claimed that creative potential declines with age (In Boden 1994:225). He even gave a formula for the relation between age and output: 
\[ p(t) = c(e^{-at} - e^{-bt}) \]
where \( p(t) \) is creative productivity at time \( t \); \( a \) is the ideation rate; \( b \) is the elaboration rate; and \( e \) is the exponential constant.

Eysenck (In Boden 1994) manages to elevate the importance of the conscious as well as bring clarity to the distinctions made in terms of the creative product but fails to note the significance of the sub- and unconscious in the creative process. His distinction between the private and social creative product as well as the different components of creativity as a trait and creativity as shown by productivity provides more clarity and insight to the evaluation and organisation of the verification stage. On the other hand researchers such as Gardner recognise and incorporate a different perspective, the interdisciplinary nature of creative thinking.
2.2.3 Gardner: An understanding of the different dimensions of creativity is essential

Gardner (1993:4) focused his studies on the specific elements of the creative process within the lives of seven 'creators of the modern era'. He labelled this new perspective the seven human intelligences. Sigmund Freud was the exemplar of interpersonal intelligence; Albert Einstein, logical mathematical intelligence; Pablo Picasso, spatial intelligence; Igor Stravinsky, musical intelligence; T.S. Eliot, linguistic intelligence; Martha Graham, bodily-kinesthetic intelligence; and Mahatma Gandhi interpersonal intelligence. In his second perspective he claims that a particular tension, or lack of it, between the elements involved in productive work called 'fruitful asynchrony' characterises creative individuals. The creative individual is marked by one or more asynchronies; an unusual configuration of talents, and an initial lack of fit among abilities, the domain in which the individual seeks to work, and the tastes and the prejudices of the current time and field (Gardner in Boden 1994:146).

Gardner's (In Boden 1994:145-146) definition accent some different aspects in the following phrases:

I focus equally on problem solving, problem finding, and the creation of products, such as scientific theories, works of art, or the building of institutions. I emphasise that all creative work occurs in one or more domains. Individuals are not creative (or noncreative) in general; they are creative in particular domains of accomplishment, and require the achievement of expertise in these domains before they can execute significant work. No person, act, or product is creative or noncreative in itself. Judgements of creativity are inherently communal, relying heavily on individuals expert within a domain. [italics mine](Gardner in Boden 1994:145.)

His definition affirms that creativity is inherently interdisciplinary. One needs to be rooted in psychology as well as informed about epistemology (the nature of knowledge in different domains) and about sociology (the ways in which experts in different domains reach judgements).

Gardner (1993:359) is convinced that there exist at least five different kinds of creativity. He underscores the importance to understand the dimensions of each activity before one can search for generalisations that may be obtained across these
varieties. Certain creative activities are related to a particular domain. He has devised them as follows:

- **Scientific Domains:**

  The solution of a well-defined problem: Here work is pursued in the course of training. He quotes an example of the discovery of the double helix by James Watson and Francis Crick.

  The devising of an encompassing theory. E.g. the widely incorporated theories of Freud studying the unconscious, and of Einstein pondering the riddles of relativity. In creating such a theory the individual reconfigures existing data and concepts and gives direction to future research.

- **Artistic Domains:**

  The creation of a ‘frozen work’; Most individuals create some kind of work within a ‘symbolic system’ (Boden 1994:152). Their work can then be examined, performed, exhibited and evaluated by others knowledgeable in that domain.

  The performance of a ritualised work: Certain works can only be apprehended in performance and its creativity is particular to the characteristics of the specific performance. His prototypical example is that of a dance by Martha Graham and he highlights the fact that even though someone else may perform it, it is in fact Graham’s creativity that heeded her to perform in a distinctive way. He adds that in art forms where notations do not exist or fails to capture important aspects of the performance, the performance is the work.

- **Political Domain:**

  A ‘high-stakes’ performance: Here an individual actually carries out a series of actions in public to bring about some kind of social or political change. Protests, fasts, and non-violent confrontations such as was engaged by Ghandi. He adds that in contrast to ritualised artistic performances, where the steps can be worked out in advance, this performance is determinedly ‘high stake’ because much of it depends upon the reactions of the audience.
He claims that they may overlap and have a paradigmatic aspect about them and added that the concept of field is the social counterpart to the concept of the domain.

The domain is a set of practices associated with an area of knowledge: the field consists of the individuals and institutions that render judgement about the work in the domain. An important feature of the field is the extent to which it is hierarchical: that is, the extent to which a few powerful individuals can render influential judgements about the quality of work (Italics mine) (Gardner in Boden, 1994:152).

Gardener’s recounting of the epistemological and sociological aspects of creativity opens areas within the creative environment, which highlight the field and domain in which creativity occurs. Albert on the other hand describes ‘creative behaviour’ and contrasts its repertoires with those of the not so creative...

2.2.4 Albert: Creative behaviour is contrasted to the conventional

Albert (Runco & Albert 1990:26) addresses the behaviour of the creative person within the preparation phase and goes on to elaborate on the consequential implications of the creative product as it relates to non-creative behaviour.

To be clear, I am suggesting that, to the degree to which one’s behaviour is intentionally problem oriented whether it be in problem discovery or problem solving, emergent, not highly predictable, not completely rational or intelligible but understandable to some persons in its consequences, that behaviour is creative when contrasted to behaviour that is rote, easily predictable, and excessively adaptive to the conventions and dictates of the contemporary state of field and one’s associates [italics mine] (Runco & Albert 1990:26).

By focusing on non creative behaviour, Albert directs our attention to a contradictory manner of assessing the loci of creativity. Needles to say, some authors such as Milgram, examine the more specific annotations of creative ability.
2.2.5 Milgram: Specific creative talent and general creative ability

Milgram (1993:135) proposed a 4 x 4 model of the structure of giftedness. In it, two categories define intelligence. The first a general intellectual ability and the second considers the aspects of original thinking and specific creative talent. "Creative thinkers generate ideas that are imaginative, clever, elegant, or surprising. This ability is measured by tests of divergent thinking" (Milgram 1993:136).

Milgram (In Runco & Albert 1990:220) defines creativity as 'a process of original problem solving, that is, a process by means of which original products are generated. A product can be a response, an idea, a solution, or an actual product. Original means unusual (i.e., statistically infrequent) and of high quality (i.e., productive, valuable, worthwhile). In her discussion concerning the four categories of giftedness, Milgram cites general / creative thinking as the process of generating solutions that are unusual and of high quality (In Runco & Albert 1994:217).

Original thinking people are different from others not only at the output stage as reflected in ideational production but also at the input stage. They perceive and define problems differently and notice things others ignore. They probably store and retrieve information differently as well. As a consequence of these basic differences, they produce unique and imaginative solutions. This general ability has been referred to by Barron and Harrington (1981) as "raw creative ability", as distinguished from "effective creative ability,"... specific creative talent, refers to a clear and distinct domain-specific creative ability. Talent is manifested in both children and adults in socially valuable, novel products in science, mathematics, art, music... The realization of potential talent often requires time to incubate and develop as a result of life experience. It is, therefore, more fully manifested in adults. [italics mine] (In Runco & Albert 1994:217.)

Here the creative person (characteristics), the creative process (information processing) and the creative product (talent/general) are addressed. By separating the creativity into two distinctive categories, Milgram distinguishes raw creative
Botha 49

(general/ effective ability) from specific creative talent. She touches on life experience and the issue of time needed to incubate. This is particularly noteworthy hence her reference to talent being more manifested in adults. Harrington on the other hand, pursues the creative press, which constitutes the social dimension and implications of the creative endeavour.

2.2.6 Harrington: The Private/Social dimension

Harrington's (1975:434) interest in creativity testing made him pursue the possibility that the potential inherit in divergent thinking tests have never been fully realised. In a study done on child-rearing antecedents of creative potential in young adolescents, he examined Rogers external conditions conductive to constructive creativity (Harrington 1987:851). Harrington (In Runco & Roberts 1994:146) adopted the definition offered by MacKinnon (previously quoted) but adds an important private-social dimension involving the degree to which the act has 'impact beyond the creative individual. He points out the fact that most creative acts are of value to, and have impact on only those who produce them. These he referred to as 'private creativity' while those that are novel, add value to or substantial impact on people far removed from those who initiate them, he calls 'social creativity'. He urges modern psychology of creativity to view the concept of 'value' as a complex function of the properties of the products themselves and the capacities and inclination of the social world to extract and create value from those novel products (In Runco & Roberts 1994:146 & 147). Each member of a 'creativity ecosystem' of gadgeteers, programmers, theorists, visionaries, and entrepreneurs saw 'potential' value in the novel actions and products of other people and then 'added to and created new value from' the last persons' work by making a new creative contribution. He argues that the value and consequently the 'creativity' of each persons' 'novel' contribution in this collective enterprise was 'inextricably contingent on the existence of other value creating people and processes' within this so-called creativity ecosystem (Runco & Roberts 1994:148).

The Creative Ecosystem extends beyond the creative products and even beyond the motivation of the creative person. The magnitude of its implications and influence are almost impossible to consider let alone assess. The importance here centres
around the realisation and understanding of this Ecosystem and its dynamics on the social system. Rogers too, considers another social issue: that of constructive and destructive creativity in relation to social values.

2.2.7 Rogers: Constructive and destructive creativity in relation to social values

‘My definition, then, of the creative process is that it is the emergence in action of a novel relational product, growing out of uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other’ (Rogers in Rothenberg & Hausman 1976:297; Anderson 1959:71; In Parnes & Harding 1962).

Criteria emanating from Rogers suggest the following:

- Openness to experience: extensionality.
- An internal locus of evaluation.
- The ability to toy with elements and concepts.

These three conditions must be met for constructive creativity to occur. Rogers asks how we can establish the external conditions with which to foster and nourish the internal conditions described above. They are:

- Accepting the individual as of unconditional worth.
- Providing a climate in which external evaluation is absent.
- Understanding empathetically.
- Psychological Freedom. (Rogers in Rothenberg & Hausman 1976:297-304.)

He recognises that with psychological safety, we maximise the likelihood of an emergence of constructive creativity.

Rogers also dealt with the puzzling issue of the social value of a creative act by distinguishing between constructive and destructive creativity. He confirms how history has proved that the genuinely significant creation is most likely to be seen at first as
erroneous, bad, or foolish. And, that many of the discoveries that were to have great social value, were motivated by issues having more to do with personal matters rather than filling a social need (Rogers in Parnes 1962:66). This social or personal need once met brings about another creative product prerequisite as pointed out by Rothenberg.

2.2.8 Rothenberg: Janusian and Homospatial thinking

Rothenberg (1976) defined two types of thought processes in creativity which he called Janusian (simultaneous opposition) and Homospatial (conceiving two or more entities as a new identity) thinking which will be discussed in the chapter three (Theories of creativity). In his definition of creativity, he warrants that creativity is not synonymous with originality, productivity, spontaneity, good problem solving, or craftsmanship.

Creations are products which are both new and valuable and creativity is the capacity or state which brings forth creations...creations are products which appear new and are considered valuable by consensus, i.e., experts have considered them creations over extended periods of time (italics mine) (Rothenberg & Hausman 1976:311 & 312).

The significance of 'time related issues' are often mentioned by various researchers and provides opportunity for future investigation. Each definition seems to focus on a particular area coalesce of creative possibilities. Piirto highlights even more.

2.2.9 Piirto: “The Need for Theory”

Theories and definitions that seek to explain what, why and where creativity can be found, have been summarised by Piirto (1992) in her chapter called ‘Creativity Theory: The Need for Theory’. Her overview of around seventy statements has been divided into four categories: (three of which fall into psychological categories) Philosophic, psychological, psychoanalytic and domain-specific theories (Piirto 1992:318). Some of her definitions will be examined while the intention will be to focus on all relevant proclamations that refer to creativity in a way that elevates
possible criteria components: Again it is important to remember that for the sake of this research paper, all italics indicated are that of the researcher and does not represent text as set out by the Piirto (1992:318) herself:

### 2.2.9.1 PHILOSOPHIC CATEGORY

Collingwood: In creative people, *imagination is the synthesising activity* that occurs before discursive or relational thought [person/process/pre-product].

Langer: Creativity is found where the abstract apparition of a form produces a *symbolic emotional reaction in the perceiver* [product/product response].

Blanshard: What the creator creates is an end that results from *inner necessity*. The *subconscious is present* in invention [person/process/product/persuasion].

Hausman: Creativity is *spontaneous, nonrational, and produces true novelty* [process/product].

Hofstadter: The crux of creativity is the *ability to manufacture variations on a theme* [person/process/persuasion/place].

### 2.2.9.2 PSYCHOLOGISTS CATEGORY

Thorndike: *Relevant experience* is essential to creative problem solving [person/place/persuasion as precondition for process].

Guilford: *Divergent production*, an intellectual factor, is present in the creative response: the divergent producer provides *alternate solutions to open-ended problems* [process/person/place/persuasion/product].

Osborn: There are *seven stages* in the creative process. These evolved to the *Creative Problem-Solving Process* [process].

Rogers: The creative individual has an openness to experience internal locus of evaluation and the ability to toy with element and concepts [person/process].
Watson: Creative problem solving comes because of transfer. Similar old problem solutions are generalised to the new solution. [Person/ process/ place/ time-related.]

Gordon: Previous theories of creativity were elitist and stressed inspiration and genius. Everyone can be creative. Making metaphors is the creative process. [Person/ process.]

Vygotsky: Creative imagination is developmental, requiring the collaboration of concept formation [Developmental: pertains to a time frame/process].

Mednick: Remote associations are combined to form creations by contiguity, serendipity, and mediation [process/persuasion/place].

Roe: The creative process is separate from the final product. It happens in most people and is not unique only to those who produce superior final products. [Person/process/product.]

Dabrowski and Piechowski: Creativity is talent in a specific field, exemplified by intense emotional, imaginational, intellectual, sensual, and/or psychomotor overexcitability, or intensity [place/person/process].

Barron: Creative people have the paradoxical presence of high degrees of ego strength along with psychopathologic qualities [person].

Maslow: Creativity is in everyone, and many of the people who created tangible achievements were not self-actualised. There is 'special talent creativeness' and 'self actualising creativeness'. [Person/product.]

Bogen & Bogen: Creativity results from the co-ordinated function of the repositional mind and the appositional mind. The connecting structure between right and left hemispheres is the seat of creativity. [Person/process.]

Skinner: Creativity is a result of natural selection over evolved time [process/ product/ place/ persuasion/ time frame related].

Gowan: The creative individual develops as a result of certain childhood experiences [personal development from place & persuasion/time-related].
Krippner & Murphy: The capacities for *extrasensory perception, telepathy, precognition, clairvoyance, and psychokinesis* are very necessary for creativity [person/ process].

Gruber: Creativity is an evolving system; key phases of this system are *insights, metaphors, the transformation of experience, and organisation of purpose* [person/ process/ place & persuasion].

Getzels & Csikszentmihalyi: Creativity comes around in *problem-finding*, and not in problem solving [person/ process/ place/ persuasion].

Renzulli: Creativity is a necessary component of gifted behaviour, along with *above-average intelligence and task commitment* [person/ process].

Willings: Creative people have defensive, productive, adaptive, elaborative, or developmental personalities [person].

Perkins: Creativity is inevitable invention produced by people with certain personality attitudes using tactics of *selection, planning, and abstracting* [person/ process].

Feldman: Creativity is the developmental transformation of insight into novelty that makes a product that changes the field [person/ process/ product/ place].

Amabile: Creative people have certain personality traits such as intrinsic motivation, which can be temporarily affected by external interference [person/ place/ persuasion].

Brown: Transpersonal psychology helps to understand creativity through exploring higher states of awareness [person/ process].

Weisberg: (Anti-theorist) Creativity is *incremental*, that is, *grounded in the work of those who came before* [place/ persuasion/ time-related].

Csikszentmihalyi: Creativity is the *interaction of domain, person, field and time* [person/ place/ persuasion/ time-related].

Gardner: Creativity is the interaction of a certain time in history on a certain mind in a certain domain [person/ place/ persuasion/ time-frame related].
Langley & Jones: Creativity involves reasoning by analogy and qualitative mental models [person/process].

Schank: The creative person can program him or herself to ask the right questions. [person/process].

Simonton: Creativity comes about through the chance-configuration theory, which postulates that social factors interact with personality factors to produce genius. Also, high productivity and great ego strength are involved. [Person/place/persuasion.]

Sternberg: Creative giftedness is dependent on insight and novel reactions to the insight [person/process/product].

Cohen: Creativity is developmental, adaptive [person/place/process/persuasion/time frame related].

2.2.9.3 PSYCHOANALYTIC CATEGORY

Lombroso: Creative genius is related to insanity (He differentiated between ordinary insanity and the insanity with genius) [person].

Freud: Fantasy is essential in producing literary works. Such fantasy is primarily a manifestation of preconscious thought and feelings. The Unconscious also has a role in creation. [Person/process/persuasion/place.]

Jung: Creativity is located in autonomous complexes, which unearth the Collective Unconscious. These have a determining effect on the consciousness in creation. The Collective Unconscious accounts for an audience's favourable response to a creation. The creative act can never be explained. [Person/process/response to product/time frame related.]

Lee: Artistic creation is the result of symbolically compensating for disabilities [person/process/product].
Kris: Regression in the service of the ego. Ego-controlled regression is the specific means whereby preconscious and unconscious materials appear in the creator’s consciousness [person/process].

Kubie: Preconscious processes produce creations [process/product].

Schachtel: Allocentric perception, or openness to the world, is necessary for creativity to occur. This characterises the most mature stage of human perceptual development. [Place/process/persuasion.]

Arieti: Creativity is a primitive magic synthesis performed by gifted people [person/process].

Miller: Creative production is a result of childhood trauma where warmth was present [person/process/place/persuasion/timeframe related].

2.2.9.4 DOMAIN-SPECIFIC DEFINITIONS

Cannon: Creativity is an extraconscious process rather than unconscious, with no necessary determining effect upon consciousness. Hunches are important in certain phases of the scientific approach. [Person/process.]

Huxley: The use of psychedelic drugs can enhance creativity [person/persuasion].

Ehrenzweig: The role of the unconscious in artistic creation follows a specific process called ‘unconscious dedifferentiation’ [person/process].

Findlay and Lumsden: Creativity is evolutionary. Creative products and people have evolved through a mutational process. (Piirto 1992:318-322.) [Person/place/persuasion/timeframe related.]

Piirto’s research makes it possible to study a kaleidoscope of definitions at a glance and pinpoint interrelated components as they relate to the collective process and different stages of creativity.
2.2.10 De Bono: Lateral thinking

De Bono's (1993) definition of creativity ties in with his phrase 'Lateral thinking' in which he artificially ignites the creativity process in a similar way such as Osborn's brainstorming procedures: 'The search for alternatives is the most basic of all creative operations' (De Bono 1993:119). He said that there might be several entirely different processes involved in this wide definition of 'creativity' and stressed that the term Lateral thinking was very precise. Lateral thinking is concerned with changing concepts and perceptions... Lateral thinking is based on the behaviour of self-organising information systems' (italics mine) (De Bono 1993:54 & 55). De Bono's step-by-step practical approach brings about a way for businesses to tackle problems of the 1990's such as 'improvement' which is by far the biggest use of creative thinking (De Bono 1993:67). He recognised other uses such as problem solving, bringing value and utilising opportunities, confessing that creativity is required for laying out the future in which we may have to work and stressing the motivational aspects: 'Creativity is a great motivator because it makes people interested in what they are doing. Creativity gives hope that there can be a worthwhile idea. Creativity gives the possibility of some sort of achievement to everyone. Creativity provides a framework for working with others as a team' (De Bono 1992:73).

De Bono's contribution brings to light the fact that creativity can be taught, nurtured and utilised in effective ways and his definition of Lateral thinking emphasised some of the essences of creative behaviour.

The very multifaceted nature of creativity dictates the need to search for authors that, in their definition address its complexity such as those of Olivier and Clark.

2.2.11 Olivier: Dynamics of various abilities

Olivier (1985:21) quotes Revesz who maintained that creativity had the capability of raising the standard of living of its community. He also acknowledged Jones's definition that declares many factors work together as a sum total of different factors, to set in motion and maintain the creative process. Creativity is not the result of an individual ability but the result of the dynamics of a cluster of various
abilities (Olivier 1985:22). This is essentially in agreement with Runco, who reasoned that the individual may often be only a 'small point of energy in a longer, broader-based web of cultural processes of influence and engagement' (Runco 1990:258). Olivier went on to pointedly affirmed that 'The fact that it is man, as never complete, always developing being, who is central in the creative process, makes a precise definition hardly possible'. He defined creativity with a somewhat comprehensive description: 'The conclusion reached is that creativity is a creative force from which an original and novel product or achievement emanates. This achievement is the result of the spontaneous, original and imaginative ingenuity of the highly creative person' [italics mine]. (Olivier 1985:23.) Clark likewise describes the creativity as an integration of various abilities, but her definition's approach is entirely different from those of Olivier.

2.2.12 Clark: Creativity is the integration of four functions

Clark (1988:46) claimed that creativity centres around four characteristics: thinking, intuiting, feeling and sensing. The integration of these functions releases creativity. In addition to this, a spark form another dimension is needed. She advised that the understanding of creativity from the higher levels of consciousness should be understood experientially and that verbal explanations could dilute the events explained. Taylor, she quotes aptly proposed:

There is no reason to think that much of the creative process is intuitive in nature and that it entails a work of the mind prior to its arising to the conscious level and certainly also prior to its being in expressible form. It is most likely preconscious, non-verbal or preverbal, and it may involve a sweeping, scanning deep, diffused, free and powerful action of almost the whole mind [italics mine] (Clark 1988:65).

Clark's whole brain view of creativity is demonstrated in her model of the creative personality, as shown below (Clark 1988:47).
A state of higher consciousness—not of the conscious, rational mind, available from the unconscious or during altered consciousness. Enhanced by growth toward enlightenment.

Intuitive

A thinking state—rational, measurable. Can be developed by deliberate, conscious practice.

Thinking

Creativity

A feeling state—emotionally impactful, requires self-awareness, process of self-actualization. Releases emotional energy from the creator, transfers this energy to the viewer or consumer, eliciting an emotional response.

Sensing

A state of talent—creating new products seen or heard by others. Requires high levels of physical or mental development, high level of skill in area of talent.

Feeling

A state of talent—creating new products seen or heard by others. Requires high levels of physical or mental development, high level of skill in area of talent.

Figure 3: Clark

It is when these integrated brain systems perform at higher levels, that creativity occurs. Both brain hemispheres have to be active and combine dependently in order to interact creatively.

Clark’s holistic view inspired the researcher to endeavour to analyse and suggest her own particular perspective of the definition of creativity.

2.2.13 An Endeavour To Capture ‘Creativity’

In an attempt to define the general term creativity, the researcher first considered all the prerequisites when addressing such a complex phenomena. A comprehensive definition of the general term ‘creativity’ should encapsulate all its critical issues and fundamental principles, and, attempt to address the diversity of its universality. To capture creativity’s dynamic essence without peripheral interferences, no attempt to include any detailed analyses of any kind pertaining to the creative person, process, persuasion or product should, in the researcher’s opinion, be referred to.

The researcher concluded that a definition should however, indicate or, at least allude to, all the process and components contributing to its final realization.
- Components of the creative endeavour's motivation within the preparation phase (roots) has shown up as a *perceptive* ability to sense difficulties, an openness or sensitivity to experience gaps in information or, respond to a need.

- The anticipated response or solution is, in its entirety, still unknown to *conventional thinking*, previously generated methods or conformant to the established and accepted standards.

- What follows is a state of ambiguity during which the thinking processes within the incubation period, generates alternatives through a process of *synthesis*.

- Sudden insight occurs during the *illumination* stage followed by an urge to communicate its significance.

- This actualises during verification and is completed after a process of evaluation and assessment has distinguished the result as being *unique*, *functional* and of value.

- The creative product is not necessarily a solution. It could, in some cases, be fulfilling a coincidental need that had not been identified before its conception and not initially intended by its creator. This makes it an *outcome* or result rather than an answer or a solution. The researcher has attempted to 'capture creativity' in the following parsimonious description:

The above explanation will now be synthesised to give form to the researcher's endeavour to capture the definition of creativity:

**A perceptive synthesis that illumines a unique and functional outcome beyond the realm of conventional thinking.**

The Electronic Thesaurus's (Microsoft Word 97) explanation of each term further qualifies this definition's significance and its relevance in addressing creativity in its entirety:

- *During the Preparation Phase:*
Perceptive: Openness, involving all senses, alert, sensitive, aware, observant, conscious, keen, incisive, discerning, sharp, sagacious, astute and perspicacious

(Creative person, process, persuasion [environmental/historical])

- *During the Incubation Phase.*

Synthesis: Creation, amalgamation, integration, construction, organisation, amalgamation, formation, assembling, aggregate, and union

(Creative person, process)

- *During the Illumination Phase.*

Illumines: Sudden insight, illumination, enlightens, reveal, inspirit, and elucidate

(Creative person, process, product)

- *During the Verification Phase.*

Unique: Particular, sole, unequalled, alone, strange, uncommon, unusual, odd, peculiar, rare, singular, and peerless

Functional: Practical, useful, necessary, advantageous, effectual, and contributive

Outcome: Result, consequence, end, effect, and purpose

Beyond the realm: Beyond the region, domain, cultural and reality

Conventional Thinking: Established, common, traditional, customary, proper, accepted, standard, general, ordinary, trite, regularised, decorous and conformant ways of reasoning

(Creative product, persuasion [social/cultural])

This definition is *unique* in the sense that it is *the only definition* that consolidates all four the different stages of Wallas as well as the components of the P-theory, which both are universally accepted and constitute the basics of the creative process.
2.3 CONCLUSION

The definition of creativity characterises the fundamental principles that will guide and provide meaning to the assessment of creativity for the balance of this research paper. The foregoing literature study of this chapter has reiterated the absence of a universally acceptable description of creativity. It is evident that each definition is influenced by the distinctive disposition of the researcher quoted each of which supports to a more or lesser degree, the Four Stages of Wallas and the p-Theory of creativity. With the exception of Dabrowski's reference to emotional intensity during illumination, Newel's mention of psychological activity, and, Rhodes', Torrance's and many others' remarks about communicating a new concept (usually the immediate follow-up to illumination), the absence of a concern with the illumination stage in the noted definitions is pervasive. Most explore aspects of the incubation stage, a smaller number direct their definitions to the preparation stage, while others pursue common characteristics and traits that constitutes the creative personality.

2.4 IN SUMMARY

Creativity should not be ruled by fixed categories or rigid methodologies but distinguished because of its ambivalences and studied in its entirety. The search for an appropriate definition is done in terms of research already completed.

Davis proposed that most definitions focus on one or more of the P-theory components and maintained that there was no unified psychological theory. Eysenck supposed that creative behaviour was a conscious process and that a sound general definition would be descriptive of that creative behaviour. Gardner points out that creativity occurs in one or more domains and those communal experts within particular domains make judgements. He observed five kinds of creativity in order to establish a generalised definition. His research perspective focused on seven human intelligences and claimed that particular tension or the lack of it characterises creative people. This led him to term of fruitful asynchrony. Albert's definition explains creative behaviour while Milgram touches on issues such as creative characteristics, information processing and specific creative talent. She highlights raw creative ability from effective creative ability and suggested that because the realization of talent takes time to incubate, it could only be more fully
manifested in adults. Harrington takes on a private/social dimension and explains the creative Ecosystem's collective, value-adding contributions. Rogers acknowledged the uniqueness of the individual as well as the external conditions such as the materials needed, events, people and circumstances. The former needs to be nourished by four distinct external conditions that guarantee psychological safety. They are acceptance, non-evaluative, understanding and psychological freedom. Piirto's classification is based on an interdisciplinary approach to a variety of diverse views which were implicitly stated and not fully developed. She concluded that the impetus for theorising about creativity may come from a person's thinking about his or own creativity.

De Bono's Lateral Thinking highlights the behaviour of self-organising information systems and addresses the need for a more practical approach to creative thinking by working with others in a team and an understanding that creativity can be taught, nurtured and utilised in effective ways. Olivier points out the social significance such as the ability to raise the standard of living of a community and that the creative product is not necessarily the result of one individual but the dynamics of a cluster of various abilities that are spontaneous, original and imaginative ingenuity.

Clark's humanistic view of thinking, feeling, sensing and intuiting reflects a whole brain view of the creative personality. Another holistic perspective is: 'A perceptive synthesis that illumines a unique and functional outcome beyond the realm of conventional thinking'. This definition consolidates all the elements and creative process stages and, will provide meaning in the assessment of the creative process. Chapter three will focus in more detail on the different perspectives placed on creativity and the diverse theories put forward by the pioneers of this research field.
3.1 INTRODUCTION

The creative process has for decades fascinated society. Where does creation begin? How is it possible to measure such an ephemeral marvel? Some researchers focus on the personality factors while others find value only in examining the verified product. Special aptitudes of creative problem finding and solving behaviours have traditionally been inferred from the quality of work completed rather than from performances or products in the making. Still, it is the researcher’s aim to study and recognise the ‘general process variables in the creative process’ as they are commonly found in all perspectives (composers, writers, scientists, social leaders, mathematicians). It is important to remember that each specialisation dictates its own unique method of creatively finding and solving problems.

In order to maintain the full detail of the creative episode, the researcher gave form to a structure (see table 2) that sets out to explain the interrelated components as they relate to the creative process in its entirety. The matrix below represents the creative process according to the four stages of Wallas and the five components of the p-theory.

<table>
<thead>
<tr>
<th>Components of creativity:</th>
<th>Wallas' four stages of the Creative Process:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preparation</td>
</tr>
<tr>
<td>Creative Person</td>
<td></td>
</tr>
<tr>
<td>Creative thinking process</td>
<td></td>
</tr>
<tr>
<td>Persuasion, press &amp; place</td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 2: Creative Process Matrix

Here the creative process has been set out according to the four stages of Wallas while the ‘creative thinking process’ falls within all four stages of the creative process and involve patterns and theories of information processing which will be researched accordingly. The ‘creative thinking processes’ are influenced by important creative abilities (such as fluency, flexibility, originality) and occur within the realms of the conscious, subconscious and unconscious mind, and are essentially either
convergent or divergent. The distinction between the 'creative process' and 'creative thinking process' does however merit further explanation.

3.2 THE DEFINITION OF THE 'CREATIVE THINKING PROCESS' VERSUS THE 'CREATIVE PROCESS'

The objective of this research paper is to find criteria in order to determine 'whether certain creativity tests successfully assess the creative process'. It is therefore imperative that the 'creative process' and 'creative thinking process' be clearly distinguished and defined.

The complexity and multifaceted nature of creativity forces one to pay utmost respect to its interrelated spectrum of components and, how they relate, depend on and intersect with each other. All research so far has reiterated a holistic approach to the creative endeavour, which in turn has provided a sound structure and bedrock for the researchers analyses of the creative process. It is by definition clear that the process referred to, ranges from conception to completion and, in its entirety, involves all the components of the p-theory (the creative person, process, persuasion, product). This 'process' has been subdivided by Wallas into four distinctive stages (Preparation, Incubation, Illumination and Verification). There is however, a 'duality' here as to what exactly is meant by this term. Davis (1992:96) too, pointed out this perplexity by distinguishing two distinct lines of thought.

- The creative processes as a sequence of steps or stages that need to be worked through to resolve a problem (a phase-process).
- Or, the relatively rapid perceptual change or transformation that takes place when a new idea is suddenly produced (cognitive-process) (Davis 1992:96).

This distinguishes between the creative process as a chain of events (stages) and the creative process as a function of the creative thinking processes (cognitive operation). For the sake of this research paper, the researcher will from this point onwards refer to the cognitive 'process component' of the p-theory as the “creative thinking process” in order to clearly define and outline the preceding chapter.
The definition of the Creative Process in this paper involves creativity as it evolves from creation, through incubation, its climactic illumination leading to the eventual, but final verification, when the creative product has established itself and become useful. This episode has fascinated many researchers and what follows is a look into the various theories that have held their ground for the past century.

3.3 THEORIES OF THE CREATIVE PROCESS

3.3.1 Similarities vs. differences

It was Eysneck who said it didn’t matter how primitive theories are, they still remain an integral part of measurement and, in this instance, creative assessment (Boden 1994:199).

At a global level, most new creations are a result of a similar set of stages or steps the problem solver needs to go through in order to define, clarify or solve a problem and are, in most part, a combinations of previously unrelated ideas. Many unique, idiosyncratic experiences, abilities, perceptions, thinking styles and strategies that all dictate thinking with different concepts and techniques, influence this process. Davis (1992:96-97) contended that even though the creative process may own many global similarities, it also must be different according to the media in general, the requirements of the creative task, and the idiosyncrasies of every creative individual.

Wallas’ four stages (see chapter one) of the creative process sets the stage for the ‘Creative Theories’ that follow. Before reviewing and exploring them, it seems only appropriate to investigate Wallas’ theory in more detail:

According to Rothenberg and Hausman (1976:71), these stages constantly overlap each other in the process of exploring different problems. The creator may in the course of some conscious activity, while ‘incubating’ on a problem that he proposed to himself a few days earlier, be accumulating knowledge in ‘preparation’ for a second problem, and be ‘verifying’ his conclusions on a third problem. In exploring the same problem, his mind may very well be unconsciously ‘incubating’ on one aspect of it,
while it is consciously employed in 'preparing' for or 'verifying' yet another aspect (Rothenberg & Hausman 1976:70). The first and last stage resembles each other because both are achieved by conscious effort. The second and third stage, Incubation and Illumination involve subconscious functioning although there does need to be a voluntary abstention of conscious thought regarding the particular problem. Therefore the conscious takes on two forms: the period of abstention may be spent either in conscious mental work on other problems (economising time), or in a relaxed state away from all conscious mental work (Rothenberg & Hausman 1976:71). During Illumination a new idea is instantaneous and unexpected. This 'flash' cannot be directed by direct effort or will. This sudden insight is...

...the culmination of a successful train of associations, which may have lasted for an appreciable time, and which has probably been preceded by a series of tentative and unsuccessful trains. The series of unsuccessful trains of associations may last for periods varying from a few seconds to several hours. H. Poincare, who describes the tentative and successful trains as being, in his case, almost entirely unconscious, believed that they occupied a considerable proportion of the whole Incubation stage. (Italics mine) (Rothenberg & Hausman 1976:72.)

The theories of the creative process are in many ways just as diverse as was the definitions in chapter two, although there are far more overlapping issues and similar trails of thought. The researcher's intention is to discuss each author's perception as it (where possible) relates to the four stages of Wallas. The recent decade has marked a keen interest in the area of the social influences and involvement in and during the creative process. Mark Runco is a prominent author in this environmental and psychosocial domain.

3.3.2 An Environmental and Psychosocial Approach

Runco and Albert's (1990) book 'Theories of creativity' casts new light in creative research, away from the humanistic oriented and child centred, robust individualistic approach of the 1960's and 1970's. The individual now finds himself as a small point of energy in a longer, broader-based web of cultural processes of influences and engagements. There seems to be a growing awareness of the complexities, both
conceptually and methodologically such as the interaction of individuals within social systems, and, according to Runco (1990:9), in particular the impact of diverse social systems. His book embraces the insight of a variety of perspectives such as that of anthropological, behavioural, cognitive, developmental, ecological, historiometric, psychometric, personological, and social issues of the creative process. Most of the writers in his book focus their attention on the contiguous environments of family and work, especially as these constitute systems of values, priorities, reinforcements, resources, and, to a lesser degree, the dynamics of interest of acceptance, encouragement, and identity formation (Runco & Albert 1990:255). To them creativity was the product of two broad complementary sets of influences. One centres around the ‘extrinsic environmental conditions’ and ‘distal sources of motivation’ (preparation) while the other focuses on a set of influences centred on intrinsic motivation (preparation). Here Harrington pertinently refers to the distinctions involving a dimension that stretches from ‘private creativity’ at one end to ‘social creativity’ at the other (verification) (Harrington in Runco & Albert 1990:146). The personologist viewed intrinsic motivation in terms of an ‘intrapsychic’ conflict, identity formation, an interaction of self, talent and ego and some very significant relationships (All stages). The location and influence of extrinsic motivations ranged from the most distal such as the historical processes, to a more adjacent but nonetheless removed social system (Runco & Albert 1990:257). Runco (1990:261) also criticised the fact that their existed a great need to distinguish between different types of interactions mentioned such as additive, synergistic or modifying.

There are three differences between the person-oriented authors and technique-orientated authors (the sources of creativity are so deeply ingrained within the individual that techniques or experiences are needed to free it). These are the ‘length of time’ needed to free it, the ‘depth of application’, and whether or not, and if so, to what degree the interventions need to be specifically ‘tailored’ to the particular person or problem (Runco & Albert 1990:264). The types of creative interactions include the hard fact that the same environment does have different effects on different persons because of some of their own characteristics. Amabile (Runco & Albert 1990:265) described some of the environmental conditions that weaken an individual’s creative potential by acknowledging the effects of social evaluations on the individual’s efforts. This led to a productive experimental design for freeing several categories of motivation and the possible interactions among them. Epstein (Runco & Albert 1990:266) viewed the individual as an organism that acts as a generator both of changes in the environment and
of novel behaviour. His definition of creative behaviour consists of three characteristics: continuous in time, novel or different, and probabilistic. Creative behaviour therefore does 'not' happen unexpectedly, announcing its onset or as either-or behaviour but develops through a set course of events or stages. Although discreet, it is observable and therefore he concluded that 'creative behaviour has the same orderliness and predictiveness of any behaviour and is influenced by contingencies' (Runco & Albert 1990:266). He adds another principle with the notion that organisms acquire, over a lifetime, multiple behaviour repertoires that become the bases of novelty when systematically aligned with each other according to the influences of eventualities this he calls the '...principle of resurgence... Noting that, when first faced with a problem in the proximal environment, the organism attempts to solve the problem with responses that are already part of its existing repertoires. This explains creative behaviour characteristic of continuousness' (Runco & Albert 1990:266). In time unsuccessful behaviours that weren't reinforced drop out of sequence and get replaced by more appropriate behaviours that had previously worked successfully. He added that the steady stream of failure is a significant characteristic of the continuous nature of behaviour applicable to the creativity of man. Runco (1990:267-268) also reveals his focus on the evaluative component of the ideational process, with implicit theories when the individual evaluates the worth and appropriateness of possible solutions (verification). He urges us to take a closer look at the effects and qualities of evaluation.

3.3.2.1 HARRINGTON'S PSYCHOSOCIAL DEMANDS AND AVAILABLE RESOURCES: A BALANCING OF FORCES

Harrington (1987:851) acknowledged Rogers's theory of creativity which proposes that constructive creativity is most apt to occur when three internal psychological conditions are present: openness to experience, an internal locus of evaluation, and the ability to toy with elements and concepts. The establishment of two external conditions foster these internal conditions. They are psychological safety and psychological freedom. Harrington (In Runco & Albert 1990:154) also believes that creative processes are psychological demands that have been placed on creatively active individuals and their ecosystems (see chapter two). They require certain levels of knowledge, imagination, skills, physical resources, time, workspace, communication channels, and
access to appropriate audiences. If the requirements are not available and if the psychological demands are not met, the process is ‘apt to be stunted’. His diagram represents the psychological demands placed on creatively active people and their ecosystem by creative processes (Harrington in Runco & Albert 1990:150).

![Diagram of Creative Processes and Resources]

Figure 3:1

The downward arrows represent *psychosocial demands* placed on creatively active people and their *ecosystems*. The upward arrows represent personal and ecosystem resources meeting the psychosocial demands of creative processes. If the upward arrows match the downward arrows in strength, the creative process will be supported but if the reverse yields true, the process will collapse and fail (Harrington in Runco & Albert 1990:155). Another entirely different approach to the psychosocial influences on the creative personality is that of Csikszentmihalyi.

### 3.3.2.2 CSIKSZENTMIHALYI'S DOMAIN AND FIELD OF CREATIVITY: A SYSTEMS PERSPECTIVE

Csikszentmihalyi’s (1994:19-21) model, called DIFI (Domain Individual Field Interaction), organises the ‘field of creativity’ by dividing the problem into three main parts which form a set of continuously interrelated issues, moving the field forward in a coherent manner.

This ‘map’ shows the interrelations of the three systems that jointly determine the occurrence of creative idea, object, or action. The individual takes some information provided by the culture and transforms it, and if the change is deemed valuable by society, it will be included in the domain, thus providing a new starting point for the next generation of persons. The actions of all three systems are necessary for creativity to occur (Csikszentmihalyi et al 1994:21). The following is Csikszentmihalyi’s model of the Locus of Creativity:
Csikszentmihalyi's (1994:21) model places the creative process outside the person in interaction between three subsystems. These systems constitute three aspects of the creative person: personality and value system, the ability to discover and formulate new problems, and the intensity of interest and motivation in the chosen domain (person in all stages). He labelled them as a domain, a person, and a field (person & persuasion within all stages). The domain transmits information to the person, the person produces a variation, which may or may not be selected by the field while the field in turn passes the selected variation to the domain. These subsystems influence each other and he claims that no creative act or product can exist without input from each of these subsystems (Csikszentmihalyi in Runco & Albert 1990:200).
I came to the conclusion that in order to understand creativity one must enlarge the conception of what the process is, moving from an exclusive focus on the individual to a systemic perspective that includes the social and cultural context in which the "creative" person operates. Being trained as a psychologist, I came to this conclusion reluctantly: but now I am convinced that is not possible to even think about creativity, let alone measure it, without taking into account the parameters of the cultural symbol system (or domain) in which the creativity takes place, and the social rules and norms (or field) that regulate the given creative activity (italics mine). (Csikszentmihalyi in Runco & Albert 1990:190.)

Csikszentmihalyi (In Runco & Albert 1990:201) defines field as those individuals who know the domain's grammar of rules and are more or less loosely organised to act as gatekeepers to it. The field actually decides whether an individual's solution or product meets the criteria of the domain or, in the case of an individual whose solution departs from the standard rules should be added, ignored or censored. He resolved with the view that the social environment not only facilitates the expression of individual creativity but it often takes the initiative in, and it is always an essential component of, the creative process. The specific functions of the three elements in the creative process run parallel with the three aspects of all evolutionary processes: variation, selection, and transmission. When individuals produce variations in a domain (verification), the field selects one variation among many, and adds it to the domain. Finally the domain transmits the selected variant to a new generation of individuals. In this sense, creativity is a special case of cultural evolution (Csikszentmihalyi in Runco & Albert 1990:204).

The implications of the Systems Perspective holds meaning for the previous person-centred approach to creativity. It brings home that one must also consider the characteristics of domains and fields before one can predict what creative person will be like. 'The specific individual traits associated with creativity will depend on characteristics of the other two subsystems' (Csikszentmihalyi in Runco & Albert 1990:205). Csikszentmihalyi (1996:123) declared the more flow, the more 'happier' the creative individual. But, he warned, if a person experiences flow activities that are destructive or lack complexity, or if one becomes addicted to a single flow at the expense of a balanced life, it is bound to have negative consequences. Staying in this flow for long periods is, according to Csikszentmihalyi, almost impossible. Hunger
and fatigue follows from the extreme concentration of the flow experience (Csikszentmihalyi 1996:242).

His theory serves to bring into focus the importance of the evolutionary processes of variation, selection and transmission and the role they play with the person's interaction with the field and the domain. It would almost seem as if the actual point of evaluation lies outside individual's grasp (social creativity) and the researcher questions whether this theory is applicable to the notion of 'private creativity' as well. Another theorist Amabile's interest lies within the intrinsic motivational perspective.

3.3.2.3. AMABILE'S COMPONENTIAL MODEL OF INDIVIDUAL CREATIVITY

Amabile's (1996) research focused on 'identifying' social factors that could undermine any person's creativity. Her theory of creativity outlines three entirely new major components, contributing significantly to the total variance in creative behaviour (Amabile 1996:83). Her model clearly indicates that intrinsic task motivation is featured as a prominent component but so too are factors of talent, personality, and cognitive style, which have, been extensively investigated by numerous other researchers.

<table>
<thead>
<tr>
<th>Amabile's components of creative performance</th>
<th>(Amabile 1996:84)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOMAIN-RELEVANT SKILLS</td>
<td>CREATIVITY-RELEVANT SKILLS</td>
<td>TASK MOTIVATION</td>
</tr>
<tr>
<td>INCLUDED:</td>
<td>INCLUDED:</td>
<td>INCLUDED:</td>
</tr>
<tr>
<td>-KNOWLEDGE ABOUT DOMAIN</td>
<td>-APPROPRIATE COGNITIVE STYLE</td>
<td>-ATTITUDE TOWARD THE TASK</td>
</tr>
<tr>
<td>-TECHNICAL SKILLS REQUIRED</td>
<td>-IMPLICIT OR EXPLICIT</td>
<td>-PERCEPTIONS OF OWN MOTIVATION</td>
</tr>
<tr>
<td>-SPECIAL DOMAIN-RELEVANT TALENT</td>
<td>KNOWLEDGE OF HEURISTICS FOR GENERATING NOVEL IDEAS</td>
<td>FOR UNDERTAKING THE TASK</td>
</tr>
<tr>
<td>DEPENDS ON:</td>
<td>DEPENDS ON:</td>
<td>DEPENDS ON:</td>
</tr>
<tr>
<td>-INNATE COGNITIVE ABILITIES</td>
<td>-INITIAL LEVEL OF INTRINSIC MOTIVATION TOWARD THE TASK</td>
<td></td>
</tr>
<tr>
<td>-INNATE PERCEPTUAL AND MOTOR SKILLS</td>
<td>-PRESENSE OR ABSENCE OF SALIENT EXTRINSIC CONSTRAINTS</td>
<td></td>
</tr>
<tr>
<td>-FORMAL AND INFORMAL EDUCATION</td>
<td>-INDIVIDUAL ABILITY TO COGNITIVELY MINIMIZE EXTRINSIC CONSTRAINTS</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Amabile

There is a significant similarity to the model of Clark in which she distinguishes the creative personality of the gifted child (see Chapter 2:figure3).
Amabile's (1996:93) componential framework of creativity explains the creative process and seems to include all the Wallas stages as well as includes an additional pre-preparation step she labelled 'Problem or task Presentation'. Here the model describes the way in which an individual might assemble and use information in attempting to arrive at a solution:

![Diagram of Amabile's Model](image)

**Figure 5: Amabile's Model**

(Amabile 1996:113).

The three components of domain-relevant skills, and task motivation are the building blocks for the componential model of creativity. The model is, conceptually, a multiplicative one and translates that the higher the level of each of the three components, the higher the overall level of creativity should be. Amabile explains the stages of the creative process as follows:

The three components appear to operate at different levels of specificity. **Creativity-relevant skills** operate at the most general level; they may influence responses in any content domain. **Domain-relevant skills** operate an intermediate level of specificity...
motivation operates at the most specific level. In terms of impact on creativity, motivation may be very specific to particular tasks within domains, and may even vary over time for a particular task. ... In information-processing terms, task motivation is responsible for initiating and sustaining the process; it determines whether the artist even undertakes the task, and it also determines some aspects of her response generation. Domain-relevant skills are the raw materials that feed the process. (italics mine) (Amabile in Runco & Albert 1990:79 & 80.)

Amabile's model successfully takes into account the cognitive, personality, motivational, and social influences on the creative process. It focuses on the role of motivation and social-environmental influences of creativity. The psychosocial theorists main concern is the individual's social interaction and the influence it brings into the creative process. The behaviourists on the other hand, concern themselves with similar issues but focus on the behavioural aspects as they influence and relate to the creative individual.

3.3.3 Behavioural Process Theories

3.3.3.1 SKINNER'S BEHAVIORAL MODEL OF CREATION

Skinner's (1972:335) view of motivation lies within the relationship between behaviour and its consequences. He cites a natural selection within the creative process inferring that a creation results from chance events that survive by means of selection. His analysis presents a theoretical model of the act of creation according to strict behaviourist principles. To put it more broadly, a person does not act upon the environment, perceiving it and deciding what to do about it; the environment acts upon him, determining that he will perceive it and act in special ways (persuasion). He proposed that certain kinds of consequences 'reinforce' behaviour (Skinner in Rothenberg & Hausman 1976:267).

By analysing the genetic and individual histories responsible for our behaviour, we may learn how to be more original. The task is not to think of new forms of
Botha 76

behaviour but to create an environment in which they are likely to occur (Skinner 1972:355).

He concluded that random changes in structure are selected out because of their consequences and therefore make the creator only discursively responsible for a creative product. This concept was based on Darwin's theory of natural selection. In an attempt to be more original he proposes that the task was not to think of new forms of behaviour but to create an environment in which they were likely to occur (Skinner in Rothenberg & Hausman 1976:272).

Skinner advocates the importance of the environment and its influence on creative behaviour. It is this insight that needs to be remembered during the taking of a creativity assessment test and its importance for initiating the creative process. From the environment to a more psychological perspective, Epstein's definition closely follows particular behavioural characteristics of the creative process.

3.3.3.2 EPSTEIN'S GENERATIVITY THEORY

Epstein (1985:140) alleged that a generativity theory bent the idea that novel human behaviour could be predicted. His theory asserts that ongoing behaviour is generated as the probabilities of a large number of behaviours are continuously subjected to a number of simple transformation functions, which, he assumes, has physical reality in the nervous system. Behaviour is novel, fluid, and probabilistic rather than stereotypic or repetitious as learning-oriented theories of behaviour proclaim. His theory culminated from a series of studies in which novel, complex performances were constructed with pigeons. In analysing novel behaviour he proclaimed that in new situations, especially ones in which old behaviour is ineffective, dramatic new behaviour can occur—behaviour we label as creative. (Epstein 1985: 132 & 140; Epstein in Runco & Albert 1990:119.)

Epstein held that the three most obvious characteristics of interaction between subject's behaviour and their environment are its being continuous in time, novel or different, and probabilistic (all stages). He also defined another principle in creative behaviour and called it the principle of resurgence. Here he explains that in the course of its lifetime, an organism gathers multiple behaviour repertoires that become the bases of novelty when
systematically and appropriately aligned with one another according to contingencies. When faced with a problem in the immediate environment, it attempts to solve problems with part of the existing repertoires (incubation). In due course the old inappropriate responses are discarded and a continuous replacement of responses are formed, strongly influenced by the organism's history (Epstein in Runco & Albert 1990:265 & 266).

Both behaviourists seem to focus on reactional behaviour to a dynamic environment rather than on creative behaviour itself. Epstein adds a new perspective by concluding that all behaviours should be predictive according to the principles to which new behaviour are continuously generated under new circumstances. New behaviour infers uniqueness, which by implication suggests 'new circumstances' as a prerequisite for creative testing. Another entirely different approach is contemplated by the Antithetical theorist, who focus their efforts around the conflict laden creative process thinking phenomenon.

3.3.4 Antithetical Theories

3.3.4.1 ROTHENBERG'S "JANUSIAN THINKING"

Rothenberg's 'Janusian Thinking' (1976:313) is a specific form of cognition that usually appears early in diverse types of creative processes, such as in art as well as in science. The thought processes involved are based in part on the notion of structural...

... "oppositional thinking"—the capacity to conceive and utilize two or more opposite or contradictory ideas, concepts, or images simultaneously. I have substituted the term "Janusian" for "oppositional" because it more accurately conveys the simultaneity of opposition and because, as a metaphor, it embodies the process it denotes. (Rothenberg 1976:313.)

opposition and it involves simultaneity of opposition as well.
Janus refers to the Roman god of 'beginnings' (January) and promoter of all initiative, with two faces and who could look in opposite directions simultaneously. An example here is how the Janus metaphor is particularly relevant for the creative architect to conceptualise the inside and outside of a house simultaneously. Janusian thinking facilitates the unearthing of unconscious material through the use of ego defence of negation. Structural opposition then takes account of what is unconscious and repressed without removing repression or necessarily promoting acceptance of the repressed material.

More recently, Rothenberg (1976:311) defined another thought process called *Homospatial thinking*, which consists of actively conceiving two or more discrete entities occupying the same space, leading to new identities. Rothenberg's (1976:326) main claim to fame sprouts from the fact that Janusian thinking is the *first specific thought process in creativity to be defined*. He alludes to the other processes involved such as the psychological dynamisms, which integrate oppositions and, capacities and facilities with words, plastic materials and conceptual symbols. Herein, the researcher believes lies the core idea of the initial cognitive spark that ignites the creative thinking process and in so doing the whole creative episode. Mednick again, indicated that these two conceived entities were in fact associations.

### 3.3.4.2 MEDNICK'S ASSOCIATIVE BASIS OF THE CREATIVE PROCESS

Mednick (1962:221) asserted that the theory of creation was the bringing together of words and other entities that are remotely associated or connected with each other. He formulated a test, The Remote Association Test (RAT) that he derived from findings in word association studies (Mednick 1962:227). He thought that any condition or state of the organism, which will tend to bring the requisite associative elements into ideational contiguity, would increase the probability and speed of a creative solution. The following three ways of attaining creative solutions are all methods of bringing the requisite associative elements together:

- **Serendipity**: associative elements evoked contiguously by environmental stimuli.
- **Contiguous environmental appearances** (usually accidental contiguity), of stimuli which
elicit these associative elements. A way of looking for new and useful combinations from previous unrelated pairs of facts.

This is as a result of 'similarity' of the associative elements or the similarity of the stimuli eliciting these associative elements. Here it relies on a factor such as primary stimulus generalisation.

Through the mediation of common elements especially where the use of symbols (such as verbal, mathematical and chemical) is mandatory (Mednick 1962:221-222).

Mednick (1962:223) uses a hierarchy diagram to illustrate what an individual's associative response strength to the word 'table', would be.

Figure 6 : Mednick (Mednick 1962:223).

In this model the individual who tends to be restricted to the stereotyped answers, such as 'chair', may be characterised as having an associative hierarchy with a steep slope. That is, when you get past the first one or two conventional responses to the stimulus, the individual's associative strengths to other words or ideas (lower in the hierarchy) drops quickly. The second creative individual's strongest response is also along the beginning less dominant, but it is more likely that he will be able to get to the less probable, more remote associations.

It is among these more remote responses that the requisite elements and mediating terms for a creative solution will be lurking... It would be predicted ...[from figure 3:4] that the high creative subject (flat hierarchy) would respond relatively slowly and steadily and emit many responses while the low creative subject (steep hierarchy) would respond at a higher rate but emit fewer responses. (Mednick 1962:223.)
Unfortunately Mednick's RAT has not in the past proved a high validity rating but his theory still holds some value. He aptly points out that the originality of a response is 'simply inversely related to its probability in a given population' (Mednick 1962:221). Koestler's also perceives a 'duality' but unlike Mednick, highlights the difference between more common skills of thinking and that of creative biosociative thinking.

3.3.4.3 KOESTLER'S BIOSOCIATION

Koestler (1965:659) believes that the associative skill's biological equivalents are the activities of the organism while in a state of dynamic equilibrium with the environment. Here the skills of reasoning rely on habit, governed by well-established rules of the game: "...the 'reasonable person'-used as a standard norm in English common law - is level-headed instead of multi-level-headed; adaptive and not destructive; an enlightened conservative, not a revolutionary; willing to learn under proper guidance, but unable to be guided by his dreams (Koestler 1965:659).

Later studies reveal that Koestler (In Rothenberg & Hausman 1976:108) advocates the creative process as, the association of two self-consistent but habitually incompatible frames of reference in the physical, psychological, or social world. He clearly makes the distinction between the routine skills of thinking on a single plane and the creative act, which always operates on more than one plane. These he calls double-minded which is a transitory state of unstable equilibrium where the balance of both emotion and thought are disturbed (Koestler in Rothenberg & Hausman 1976:110).

His model is based on the perceiving of a situation or idea, L, in two self-consistent but habitually incompatible frames of reference, M_1 and M_2 (see diagram). The event L, in which the two intersect, is made to vibrate simultaneously on two different wavelengths. While this unique situation lasts, L is not merely linked to one associative context, but biosociated with two.
Koestler explains that the creative act involves several levels of consciousness. During problem solving, pre- and extra-conscious guidance makes their presence felt. The underground levels of hierarchy, which normally inhibit the waking state, now act out regeneration. 'The emotional manifestations of the Eureka act—sudden illumination followed by abreaction and catharsis—also testify to its subconscious origins...' (Koestler in Rothenberg & Hausman 1976: 113). Koestler aptly sums up the main distinguishing features of associative and biosociative thought as follows:

<table>
<thead>
<tr>
<th>Habit</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association within the confines of a given matrix</td>
<td>Biosociation of independent matrices</td>
</tr>
<tr>
<td>Guidance by pre-conscious or extra-conscious processes</td>
<td>Guidance by sub-conscious processes normally under restraint</td>
</tr>
<tr>
<td>Dynamic Equilibrium</td>
<td>Activation of regenerative potentials</td>
</tr>
<tr>
<td>Rigid to flexible variations on a theme</td>
<td>Super-flexibility</td>
</tr>
<tr>
<td>Repetitiveness</td>
<td>Novelty</td>
</tr>
<tr>
<td>Conservative</td>
<td>Destructive-Constructive</td>
</tr>
</tbody>
</table>

Table 4: Koestler
(Koestler 1965:659).

He lays emphasis on the fact that originality must be measured on subjective scales and that any self-taught novelty is a minor biosociative act. Koestler distinguishes biosociative originality from associative routine. The more far-fetched the mediating matrix
M₂—i.e. the more independent from M₁—the more 'unexpected and impressive' the achievement. Koestler affirmed that the creative act is the highest form of learning because of the high improbability (or anti-chance probability) of the solution.

His theory's intricate explanation culminates into a breakdown by the...

...amalgamation of two realms as wholes, and the integration of the laws of both realms into a unified code of greater universality. Multiple discoveries and priority disputes do not diminish the objective, historical novelty produced by these major biosociative events—they merely prove that the time was ripe for that particular synthesis.

Minor, subjective biosociative processes do occur on all levels, and are the main vehicle of untutored learning. But objective novelty comes into being only when subjective originality operates on the highest level of hierarchies of existing knowledge... (Koestler in Rothenberg & Hausman 1976:111-113).

Perhaps Koestler's significance lay in the fact that he makes it quite clear that all biological associative skills are not necessarily creative and, that there is a need to understand the clear distinction between what can be considered an act of habit and what is the creative act of originality. Gordon also embraces the antithetical perspectives in his theory of Synectics. His extensive research has been done based on our experiences of familiarity.

3.3.4.4 GORDON'S THEORY OF SYNECTICS

Gordon's (1961:3) term 'Synectics', is derived from a Greek word meaning the joining together of different and irrelevant elements. His study attempted to research the creative process 'in vivo', while it was going on. He argued that the only way to learn about the creative process was to try to gain insight into the underlying, non-rational, free-associative concepts, which flow under articulated surface phenomena. This would require problems to be solved and people to be observed. Synectics is the use of metaphorical modes of thinking in constructive and productive
Botha 83

ways (Gordon in Rothenberg & Hausman 1976:251)(Incubation). He contended that things are familiar because they have some connection to preceding factors however the experience of strangeness depends on dissimilarity with preceding factors and arise from discontinuous or undetermined processes. Our experience of familiarity is determined by factors of the past. Synectics draws the individual into the psychological states, which involve making the strange familiar and making the familiar strange.

Making the familiar strange. To make the familiar strange is to distort, invent, or transpose the everyday ways of looking and responding which render the world secure and familiar place (Gordon 1961:34).

![Learning Process](image)

Figure 8: Gordon
(Gordon & Poze 1972:5).

Gordon's (1961:36) main concern was that creative innovation depends on breaking metaphorical connections with 'old' facts and feelings and then inventing connections with 'new' facts and feelings. He theorised that 'metaphors' constituted the basis for new contexts. Synectics cite three metaphorical mechanisms that constitute the basis for creative innovation and learning. They are:

- Direct Analogy: Compares one thing with another. E.g. the telephone was invented from an analogue to the human ear.

- Personal Analogy: Empathic identification with something outside oneself. A General Electric scientist, Dr. Rich, imagined himself a light beam whose reflection was being measured.
Botha 84

- Symbolic Analogy: (Compressed conflict): Close-coupled phrases which are enemies or opposites. Pasteur's 'safe attack', Cajal's 'protoplasmic kiss' (Gordon in Rothenberg & Hausman 1976:254).


- Without these mechanisms no problem-stating, problem-solving attempt will be successful. Gordon's product, The Basic Course in Synectics (BCS), was used to change worker's attitude towards their jobs in which they were trained in the skill of seeing old things in new ways with the goal of inventing better ways to what they were doing before (Gordon in Rothenberg & Hausman 1976:255).

Gordon's dedication to the creative process 'in vivo' brings with it a fresh approach as well as to heed to the fact that the creative process not be halted for observation. This brings with it an awareness of the mechanisms that contribute to solutions of fundamental novelty. His metaphorical mechanism explanation spurs brainstorming and would benefit any individual embarking on a creativity test. Davis is essentially in agreement with both Gordon and Koestler. He explains his version of the antithetical traits of the creative process as analogical thinking.

3.3.4.5 DAVIS'S ANALOGICAL AND METAPHORICAL THINKING

Davis's (1992:90) Analogical or/and metaphorical thinking, which he believed to be exceedingly common in creative innovation, is the ability to borrow ideas from one context and utilize them in another, borrow a problem solution from a related problem or, see a connection between one situation and another. He quotes Koestler who speculated that the creative thinker finds such metaphoric and analogical connections while ordinary individuals do not (Davis 1992:120).

Davis (1992:124) insists that this phenomena not be seen as a theory but as a fact, and thought Gordon to be the 'champion of the analogical basis of creativity' (Davis 1992:132). Davis' two stage model of the creative process includes the Big Idea in stage 1 in which the main idea for the creation is found, while stage 2 covers the Elaboration and development of the idea in which the Big Idea is implemented.
Botha 85

Metaphoric and analogical connections take place during the Big Idea stage (Davis 1992:124). He quotes many examples of metaphoric thinking which played a role in the creation of music, cartoons, science and inventions, literature, movie-making, TV, acting, architecture and clothes design (Davis 1992:124-140). Davis illustrates how the CPS model (see end of chapter) can help clarify a problem by the asking of questions which elicit deliberate analogical thinking.

The word ‘Synectics’ comes from the Greek word syn, meaning together, along with -etics, which is arbitrarily selected. Therefore it is the joining together of different irrelevant things elements. ‘The Synectics methods are conscious, analogy-based and metaphor-based techniques for bringing together these different elements’ (Davis 1992:141). Gordon identified strategies that creative people use spontaneously and in making them conscious, made them teachable to make problem solving more effective. These procedures are said to make individuals think unhabitually. Davis concludes with the explanation of the various analogical thinking such as direct analogy (comparisons to previous successes), personal analogy (you are the product, empathetic identification), fantasy (far-fetched thinking), and symbolic analogy (close-coupled phrases, compressed conflict or book titles/ oxymorons) (Davis 1992:141-150).

Here it becomes clear that antithetical abilities can be taught by the using Synectics methods which also helps the learner understand and apply creative thinking techniques. It stands to reason that without the ability or knowledge of this skill, a creativity test taker cannot be ‘accurately’ assessed to determine their creative worth. Bergquist follows along a similar trail of thinking.

3.3.4.6 BERGQUIST’S SIMBIOTIC EXPLANATION OF THE CREATIVE PROCESS

Bergquist’s (On-line: 1998) definition sets out to explain the symbiotic nature of the creative process:
Beginnings, like births, are hard painful experiences... an understanding of the creative process as an inseparable duality. Creativity is a spiritual process that unfolds around us and requires our action and compels the participation of our audience [preparation]. It is the dual dance of the spirit in the creative process I wish to address in this writing. Creativity is ostensibly like a Mobius strip, the one-sided plane of Euclidean geometry that casts the illusion of duplicity, yet, is infinitely one. Accessing our inner creator is a sympathetic process with which we learn to resonate [incubation]. Thus it replicates itself, and beginnings beget beginnings.

Bergquist concurred with the research done by Rothenberg and Koestler, referring to the ability to conceive of antithetical ideas simultaneously [incubation], which she explained, was the bringing together habitually incompatible frames of reference. Creation, Bergquist stipulated, involves polarities and the emergence of form through their bisociation.

Figure 9: Bergquist


Taoism is in the formless and nameless Tao. From this Tao emerge first yin and yang, and then form. This alludes to a being from non-being. Tao can be thought of as the chaos of non-being but now the void is unitary. This author questions whether there can be chaos in unity? Bergquist testified that this Chinese metaphor proposed another role for chaos in the duality of the creative process. Yin (receptive quality) is the receptive principle and yang (projective quality) the creative principle. Their interaction produces form and order which is an intermediary step between non-being and being. Chaos emerges from the Tao as duality and from the interaction of duality comes order. Chaos, Bergquist elaborated, was fixation in either extreme of the yin-yang polarity.
Here Figure 3.8 illustrates these fixated positions. The experience at either extreme, being solely at either the yin or yang pole, is chaos.

If you fixate in yang, everything projects and moves away from you without constraint or return. It is like staring into the void. From the yin pole the opposite would be true. Everything is drawn in, introjected. It is an onslaught from which nothing escapes.

If chaos exists at both poles, then form and order must inhabit the territory between them; accordingly, form (whether a poem or universe), arises in the interactive tension between the two extremes.

Figure 10: Bergquist (YinYang)

(Bergquist On-line:1998).

Figure 11: Bergquist (Chaos Theory)

(Bergquist On-line:1998).
Figure 3.9 illustrates a region where order is created. The Chaos theory is a contemporary creation story and may explore this range of tension. It addresses the multi-dimensional aspect of creativity; (opposites) the receptive and projective duality. (Bergquist, C. 1996 On-line 1998). There is a remarkable resemblance between the Antithetical theories and those with a Psychoanalytic approach.

3.3.5 Psychoanalytic Approach

3.3.5.1 KUBIE'S THREEOFOLD EXPLANATION OF THE CREATIVE PROCESS

Kubie (1958:39) likewise explains the processes between the conscious and the subconscious and made it clear that creativity depends on the freedom of preconscious functioning. He testified that 'preconscious processes make free use of analogy (comparisons) and allegory (fable & metaphors), superimposing dissimilar ingredients into new perceptual and conceptual patterns, thus reshuffling experience to achieve that extraordinary degree of condensation without which creativity in any field would be impossible. (Kubie in Mooney & Razik 1967:38). He refers to three processes that all act concurrently (Incubation):

1. The conscious: Deals with subject in terms of communicable literal ideas and approximate realities (Kubie 1958:30).

2. The pre-conscious: Deals with swift condensation of their multiple allegorical (mythical) and emotional import (Kubie 1958:30) (Direct & indirect).

3. The unconscious: Uses special competence and knowledge to express the conflict laden, confused, and hidden levels, dominating and shaping outward projection of inward struggles (Kubie 1958:31).

The products of the preconscious thought are vulnerable to distortion from unconscious levels and should be protected from influences. Creativity depends on free flow. Some experiences indicate new syntheses when the preconscious can
operate without the restrictions of conscious processes and without interference from unconscious determinants. Kubie (1968:141-143) stipulated that the preconscious system is the essential implement of all creative activity. The preconscious processes never operate alone but are under the continuous and often conflicting, distorting or obstructing influence of the two other systems of symbolic functions. Together the three constitute a spectrum with certain continuities and at least one partial but crucial discontinuity (Kubie 1958:137). The researcher reasoned that Kubie's term pre-conscious could be referring to what is known as the subconscious. Kris too, used this term in reference to pre-conscious thinking which occurs on the fringes of consciousness.

3.3.5.2 KRIS EMPHASIZES PRECONSCIOUS AND CONSCIOUS MENTAL ACTIVITY

Greatly influenced by Freud, Kris (1975:230) sets out to investigate the psychology of preconscious mental processes such as the shift of cathexis between the ego function of perception and preconscious thought. He points out that the entry of awareness from the preconscious to the conscious, tend to be experienced as derived from the outside, passively received and not actively produced (Kris 1975:235). All manifestation of creative imagination is subjective experience infinitely differentiated and as an ingredient or accessory in many moods. Characteristics of this experience are:

- Subjects are aware of limitation of conscious effort.
- Subjects are aware of a specific feeling, never neutral, and often very high emotional charge involved.
- Even during excitement, the mind works with high precision and problems are easily solved.
- The establishment of a reaction of others to the subject, some distinction between the one and the many (Kris 1975:473).

Imagination tries to cope with threats and Kris (1975:491) explains that fantasy arises as a defence against danger and it is this interplay of libidinal and destructive impulses that play such an important role in creativity. He asserts that human
faculties emerge from conflict. 'It seems that in every process of creation the gradual emergence from conflict plays its part' (Kris 1975:492). This is in part due to the integrative, autonomous, powers of the ego.

Davis (1992:53) observed that Kris highlights two main distinctions:

- Creativity is motivated by two main instincts of the id, the libido (sex drive) and aggressive instincts.

- Instead of unconscious neurotic conflicts, they were preconscious and conscious mental activities. Fantasy and freely wandering thought processes occur in the preconscious and tend to discharge libido and aggression. These preconscious mental activities can be understood in terms of daydreaming which occur on the fringes of consciousness. The shift, which occurs when there's sudden insight [illumination], happens when creative ideas shift from the preconscious to the conscious, following the preconscious' incubation of the problem. Part of the preconscious activity is regression to more childlike thought processes—the primary process thinking. He urged that Kris firmly believes that creativity is in the service of the ego (not 'id' as Freud suggested) 'since the ego exercises some voluntary control over regression and over the shifting of preconscious ideas to the conscious mind' (Davis 1992:54).

It would seem clear to conclude that the creative process takes place between the conscious and the unconscious—in the preconscious. The preconscious is not tied to the everyday realities of the conscious mind or bound to fixed or rigid symbolic relationships of the unconscious. Rather it 'can engage in free play with ideas, meanings and relationships, thereby producing the new and unexpected connections, metaphorical relationships, overlapping meanings, puns, and allegories that we call creativity' (Italics mine) (Davis 1992:55).

Kubie and Kris referral to the 'preconscious' is essentially in agreement with Rugg who coined the phrase 'Off-conscious' mental activity.

3.3.5.3 RUGG'S THEORY OF THE 'OFF-CONSCIOUS' MENTAL ACTIVITY

Rugg (1963:213) suggests that the creative act lies in the threshold antechamber where the creative flash is censored. It depends on freedom and is blocked at both
Botha 91

rigid ends of the continuum. Similar to the other Psychoanalytics such as Kris, Rugg (Davis 1992:55), highlights the 'off-conscious' mental activity or thinking in the 'transliminal chamber' midway between the unconscious mind and conscious mental activity. This chamber was called the centre of creative energy where the mind is free to draw from the vast store of experience from the unconscious (Davis 1992:56). Life is possible only through the basic continuity of the tension-release-tension cycle where each phase passes from imbalance to balance (Rugg 1963:242). He advocates the East's Great Doctrine of body-mind liberation, which emphasise freedom from the censors of the conscious and unconscious mind. The Chinese Tao is the natural way of relaxed contemplation while the Japanese Zen and Indian Yoga provide techniques of body and mind liberation from the conscious mind. They lead to stage of concentrated, withdrawn meditation that produces creative abstraction (Rugg 1963:213). Rugg's main concern centred on the development of a theory of the creative imagination. For this purpose he set out to contemplate a set of criteria which had to provide a theory that had to fit the facts, be functional and spring from a plausible conceptual orientation (Rugg 1963:240). The creativity theory Rugg concluded, should account for the on-going, never-ceasing, accumulating structure-building with its foundation a conception of rhythmic pulsation as the basis of the autonomous forming process (Rugg 1963:243).

Rugg set out to examine imagination by the autonomous powers of picking up scattered fragments of fantasy imagery.

Two aspects of the dream give support to my thesis about the creativeness of the threshold mind. These are its distortional nature and its powers of condensation. The first (the quasi-hallucinatory, illogical jumps and jerks of dream behaviour, its denial of the normal categories of gravity and sensory expectations of location in time and space) can be used to document the autistic nature of the transliminal mind. The second is the dreams proved capacity to condense, to short-circuit the flash of insight and avoid the unsolved and baffling floundering of conscious effort. This latter point may provide a crucial clue to the nature of creative imagination. (Rugg 1963:212.)
Rugg's insight into the criteria for a sound and scientific theory, provides key issues which will be addressed in the conclusion of this chapter. Of importance to a creativity test is his notion that being off-balance as the key to the continuity of the life process: the basic notion of the incompletely act, which inevitably forms the key to the act of meaningful response (Rugg 1963:243). Theories closely associated with those of the psychoanalysts are those with the Humanistic approach. Here the inner conditions are more psychologically oriented and not necessarily aimed at cognitive thinking processes.

3.3.6 Humanistic Theories

3.3.6.1 ROGERS'S THEORY EMBRACES THE UNIQUENESS OF THE INDIVIDUAL

Rogers (1961:353 & 354) suggests three inner conditions that are most closely related to a potentially constructive creative act (All stages). They are:

- Openness to experience. Here each stimulus is freely relayed through the nervous system, without being distorted by any process of defensiveness. It also refers to lack of rigidity and permeability of boundaries in concepts, beliefs, perceptions, hypotheses, as well as a tolerance for ambiguity. Extensional orientation.

- An internal locus of evaluative judgement. The value of his creative act is personal.

- The ability to play spontaneously with elements and concepts. To juggle elements into impossible juxtapositions, to shape wild hypotheses, to make the given problematic, to express the ridiculous and to transform into improbable equivalents (Rogers 1961:353 & 354).
I am assuming that there is no fundamental difference in the creative process as it is evidenced in painting a picture, composing a symphony, devising new instruments of killing, developing a scientific theory, discovering new procedures in human relationships, or creating new formings of one's own personality as in psychotherapy. (Rogers in Rothenberg & Hausman 1976:297.)

Rogers confirms his sensitivity for the affective side of the creative process by stressing we first establish the external conditions such as that of psychological safety and freedom before the likelihood of any creative venture and suggests the following (preparation):

- Accepting the individual as of unconditional worth. The individual learns he can be whatever he is, without shame or facade. He can actualise himself in new, spontaneous ways without rejection.

- Providing a climate in which external evaluation is absent. When we cease to form judgements of the other individuals from our own locus of evaluation, we are fostering creativity. Evaluation is always a threat and the creator is denied the openness to experience.

- Understanding empathetically. The basic fostering of creativity unfolds itself when someone is understood empathetically— is seen, understood in terms of what is felt and meant, is still accepted after inner self, needs, being etc., has been revealed (Rogers in Rothenberg & Hausman 1976:303).

The creative act is considered to be healthy and this in turn is part of constituting a well-balanced lifestyle. Maslow explores the product of continuous creative expression—establishing selfactualization within the creative individual.

3.3.6.2 MASLOW'S SELFACTUALIZATION THEORY

Maslow's (1975:295) holistic approach centres on the belief that healthy, self-actualising people find life to be more richly meaningful because they live in the realm of Being. This refers to man's desire for self-fulfilment, which manifests as a result of his tendency to be actualised in what he is potentially (Maslow 1975:46).
The creativeness of the self-actualised man seems rather to be kin to the naive and universal creativeness of unspoiled children. It seems to be a more fundamental characteristic of common human nature—a potentiality given to all human beings at birth (Maslow 1975:170).

Most people lose this ability as they become 'enculturated' but some retain this fresh naivete and direct way of looking at life while others are able to recover it only later in life (Maslow 1975:171). Davis (1992:4-14) points out how Maslow distinguishes between self-actualised creativity, the mentally healthy tendency to approach all aspects of one's life in a creative way, and special talent creativity (actualising one's potential), having a prominent creative talent in some particular area with or without mental health and self-actualisation. He lists 15 Characteristics of Self-Actualised people. Research has reported a relationship between creativity and self-actualisation. Implications of this distinction infers that one needs to consider oneself creative and live a creative life and stresses the importance of affective and personality characteristics of creativity (Davis 1992:4-14).

Maslow (In Mooney & Razik 1967:47) also alludes to the creative process as coming from something other than the subconscious when he proclaimed that the ability to become 'lost in the present' seems to be a sine qua non for creativeness of any kind. As a prerequisite to creativity, it requires an ability to become timeless, selfless, outside of space, of society, and of history. It has been described as a loss of self or of ego or sometimes as transcendence of self. These experiences are quite naturalistic, easily investigated.

Maslow's theory manifests the essence of the psychology of being. His term creative self-actualisation (healthy, fully human, autonomous) is of value in its relation to special talent creativity. He affirms the view the creative personality culminates from a healthy psychological state. Stein on the other hand, embodies a more practical appeal.
3.3.6.3 STEIN'S THREE PHASE MODEL

Stein (1974:19-33) approaches the creative process from an entirely new perspective. He described the creative process as consisting of three major phases:

- **Hypothesis formation (preparation, incubation)**
- **Hypothesis testing (incubation, illumination or verification)**
- **Communication of results (immediately after illumination, verification)**

Stein (In Parnes & Harding 1962:85) explores the view that creativity results from both intra-personal and interpersonal processes. By examining creativity as inferred from behaviour, he quotes the psychoanalyst Kris who suggested that the creative process consisted out of two major phases, *inspiration* and *elaboration*. During the former, the individual is 'driven' and in an exceptional state. Unknown thoughts and images appear. Elaboration follows that are characterised by labour, concentration and endeavour.

Stein's (1974:50) interest in the creative process as criterion is of particularly concern. Here he focuses on the creative process itself based on the notion that novelty can be achieved in different ways. He points out that previous criteria focus on the number and quality of the product delivered while this method would be composed of scales representing process aspects. Experts would rate number of ideas, quality of ideas, capacity to test ideas, capacity to communicate ideas etc. They would even go as far as observing individuals while at work and rate their behaviour. This type of assessment has potential for *gathering data from an internal frame of reference*. This will lead to finding individuals who are creative from their internal frame of reference but who are not acknowledged as such by other persons.

Even though Stein's warned that this method held some difficulties, such as subjects objecting to being observed at work and it being an uneconomical method, his insight into aspects other than the creative product is noteworthy. Arnold again stresses the significance of 'determination' as an essential ingredient of the creative process.
3.3.6.4 ARNOLD HIGHLIGHTS ESSENTIALS

Arnold (In Parnes & Harding 1962:260) quotes a study done in which patent attorneys (176 people involved in study), research directors (78) and inventors (710) were asked to list the mental characteristics of a successful innovator. The first two listed originality and imagination, analytical ability and perseverance and in that order. The inventors listed perseverance as number one by a wide margin, and then originality and imagination and finally analytical ability. Arnold affirms that without *the drive to carry a project through to completion*, the idea has little or no value (Arnold in Parnes and Harding 1962:260). Endurance, perseverance, persistence, determination and *insight into understanding the creative goal or problem* (preparation), are common denominators found to be essential for the success of the creative process.

A much broader and substantial approach comes from Clark who consolidates various authors' theories within a holistic viewpoint.

3.3.6.5 CLARK'S HOLISTIC MODEL

Clark (1988:44) investigates creativity from a holistic point of view presenting the four human functions: *the rational, the emotional, talent, and higher consciousness*, as a base for synthesising important aspects of creative thinking (see section 2.2.12). She classes each function by recounting the research done by various advocates of her chosen concepts:

- Creativity as a Rational Thinking Function (*Mainly in the preparation and verification stages*):

She quotes Torrance who refers to a process of *sensing gaps or missing elements* (preparation), *forming new hypotheses* (preparation, illumination), *communicating the results* and possibly *modifying and retesting the hypotheses* (verification). She also cites William who expands on the fact that an act of creativity is considered to be an act of human intelligence including *knowledge*, mental processes based on *cognition* (all stages), *divergent productive and associative thinking* (incubation, illumination), *evaluative behaviours, and communicative skills* (verification) (Clark 1988:49). Williams believes that *all learning involves creative organisation of the culture's knowledge with the individual's experience*
This creativity will then produce new and unique perceptions of the culture (Clark 1988:55). Guilford, who classified a group of divergent thinking abilities such as fluency and flexibility, originality, sensitivity to problems, redefinition and elaboration (incubation), and, Taylor who was mostly interested in scientific creative ability, highlighting five levels of creativity: expressive, productive, inventive, innovative and emergenative (all) (Clark 1988:49). Torrance too, reported interesting results of the patterns of various cultural groups: Cultural factors strongly influence the course of creative development as well as the level and type of creative functioning; creative discontinuities occur whenever the children of that culture are confronted with new stresses and demands; general cultural rankings are predictable with advantage children showing a higher creativity index than those of less advantaged cultures (Clark 1988:58). Griffiths (Clark 1988:68) found that limited environments restrict the level of creative performance.

Clark (1988:50) concluded that researchers that adhere to the rational definition of creativity should also look out for the other contributing factors of creativity such as feeling, sensing and the intuitive functions of individuals that are far more important but much less easy to measure.

Creativity as a function of feeling (All stages):

Here the feeling perspective focuses on the emotional well-being and self-actualising qualities of the human being, a belief system that permeates all life choices and activities such as health, naturalness, 'intunedness', and the development of unique potentials (Clark 1988:59). Clark maintains that creativity cannot be taught or encouraged but is enhanced by the absence of trying.

Feelings of self-confidence, self-acceptance, and self-esteem provide the basis for growth in this area of creativity. Creativity as a feeling function interrelates and supports all the aspects. Rational functioning alone produces predictable associations. However, add emotions, and the original associations increase. Emotions are also inseparably involved in creative activity, inspiration, and intuition. [Italics mine](Clark 1988:62.)

She recognises the model that Fearn developed in which he suggests that creativity is the process of persons, limited and confined by what is known as their cultural space and time, reaching out beyond their limits to grasp ideas or concepts that already exist, but
Botha 98

that are not known (preparation, incubation). In his model, Individual Development, he accentuates the involvement with data and with the self. Awareness, fluency and flexibility depend on self-discipline, elaboration, complexity preferences as well as personal ability to risk, question, imagine and perform originally (all). He sums up his model by accentuating that the creative individual is sufficiently aware of the task and its parameters (preparation), has a willingness to risk by stepping beyond the established (preparation, incubation) and sufficiently disciplined to see a task through (verification) and who's creative behaviours increases consciousness to a total collection of possibilities (all) (Clark 1988:62).

Clark (Clark 1988:59) quotes many authors that are in agreement with her theory of creativity as a feeling, such as:

Moustakas she cites believes that in true experience every expression is creative, forming as it were, the criterion of the person one is and is becoming. It is only from the search into one's own resources, capacities and roots that the creative can emerge.

Krishnamurti who believes that creativeness has its roots in deep discontent and that this discontent is felt with joy, gaiety and love.

Taylor who recognises transactional motivation where the person shapes the environment rather than being shaped by it, and, environmental stimulation where behaviour is initiated toward unpredictable but creative outcomes that combine to form creative transactualization.

Hallman who stressed that creativity was defined as a way of conducting one's life rather than in terms of the number and kinds of objects one produces (Clark 1988:59).

Clark (1988:62) poignantly affirms that positive emotions, rationality, and intuition all lead to creative actions.

• Creativity as a talent aspect (Part of the biographical aspects within the preparation stage):

Talent aspect refers to the product or art form as well as the realm of the talented creator. The product is seen, as Simonov points out, as a model of the artist's attitude toward a phenomenon (Clark 1988:63). He also believes that the longer a work survives
(social consumption) (verification), the closer the creator has come to perceiving and presenting an essential truth of human existence. An entirely different perspective is shown by May who aptly notes that bringing something new into birth such as in the act of creativity, is the representation of the highest degree of emotional health (Clark 1988:63).

Clark alludes to emotional states during the illumination stage: “When one is involved in a creative act, there is likely to be first the ‘Aha!’ or ‘Eureka!’ feeling, then an anxiety of separateness, and finally a strong desire to communicate” (Illumination) (Italics mine) (Clark 1988:64).

- Creativity as a function of the higher levels of consciousness (Incubation, Illumination):

It is generally known that creativity has been associated with the right side of the human brain, which in turn reacts more non-verbal and uses more of a holistic synthesis in its operations than the left side. Clark hypothesises that research into the right hemisphere could lead us to find ways to understand the unconscious or preconscious states. She has explored the research done on altered states of consciousness such as the use of drugs, trances, hypnotism, meditation, chanting, dreams, fantasies and daydreams and concluded that ‘rational, verbal explanations dilute events, for the essence of the experience may be changed by its description’ (Clark 1988:65).

Clark (1988:65) points out the words of Krippner who insisted that without access to alternative levels of awareness, creative behaviour may be stifled or blocked and MacKinnon who advocated that being more intuitively perceptive (preparation) was a one of the major conditions for creativity. Koestler she explained, claimed that the creative act, in so far as it depends on unconscious resources, presuppose a relaxing of controls and a regression to modes of ideation which are indifferent to the rules of verbal logic. Here it is unperturbed by contradiction, untouched by the dogmas and taboos of so-called common sense. ‘At the decisive stage of discovery the codes of disciplined reasoning are suspended (incubation)...true creativity often starts where language ends (Italics mine)’ (Clark 1988:65). Another interesting standpoint has been brought to light by the work of Martindale who found that creative people show a certain pattern of brain wave production during creative activity: they produce fewer alpha waves when
relaxing and increase them when working with an imaginative problem (incubation). It would seem that these alpha waves have higher resting levels of brain wave activity, resulting in fewer alpha waves than average person. Creativity calls for low cortical arousal and the defusing of one’s powers of concentration while intellectual ability calls for low cortical arousal and focused attention. Clark indicated that the creative do not consciously control their alpha and, that the ability to relax and mastering the skills of imagery and imagination (incubation), were some of the first skills necessary to facilitate creativity and the development of higher levels of consciousness (Clark 1988:66).

Clark (1988:68) considered that the availability of the preconscious and unconscious to the creative person was important for the evaluation in creativity’s higher levels of consciousness. She points out Krippner who asserted that the ability to operate simultaneously at different levels of consciousness is characteristic of the creative individual in contrast with those who spend all their waking hours in rational, everyday consciousness functioning below their optimum level (Clark 1988:68).

Clark (Clark 1988:70) maintains her holistic approach and integrative theory and, cites studies done by Callaway, Gowan, Leonard, Ferguson, Towbridge, Harrington, Herrmann and Andrews who share her ultimate belief in studying creativity as the synthesis of all human functions. For an example Towbridge suggests that there is a dynamic balance between the processes associated with the three substrates of the brain: the primary reticular brain stem (action), the limbic system (affect), and the cortical areas (cognition). Clark comments that creativity is the balance between action, emotion, and cognition with the addition of insight and intuition, the ability to synthesise the components of a situation into a meaningful whole. She cites Ferguson who maintained that emotion and intellect, freedom and discipline, reason and intuition, the precise and the gossamer, primary and secondary processes and, chaos and order are all opposites that exist in the creative harmony of the brain (Incubation & Verification).

And, Harrington who argues for the inclusion of kinaesthetic and muscular modes of expression which facilitates creativity by encouraging the analogical and metaphorical transformation of information. (Clark 1988:70.) Because of the inevitable overlap with other aspects, Clark advises an integrative approach as the only way to utilise creative research data effectively.

Clark’s research and scope consolidates many factors that are of extreme importance in locating creative process components. The relevant criteria have been identified
3.3.7 Unique Theories of the Creative Process

3.3.7.1 YOUNG: CREATIVITY IS LOVING SOMETHING NEW AND VALUABLE INTO BEING

According to Young (1998: on line), the word 'creativity' derives from the Latin creare: to make and the Greek Krainein, meaning to fulfil. With this in mind, Young sets out to explain all the contradictions, assimilations and integrations in a most inclusive theory:

Creativity is the paradoxical integration of doing and being. Thus it is a flexible encounter with our world [preparation]—an active letting go [incubation], an aggressive receptivity [preparation & verification], a passive responding [illumination & verification]. It is the assimilation and integration of polarities to find new directions, new solutions, a fresh viewpoint [incubation & illumination]. It is the integration of our logical side with our intuitive side, our left brain with our right. It is all of these and more. (On-line: 1998.)

According to Young (1998), creativity is more than mere spontaneity and divergent thinking. It involves deliberation and converges on some solution: It generates possibilities [incubation & illumination], but also chooses among them [verification]. It is more than originality, for originality may only express the bizarre, the uncommon, or a purposeless reshuffling of combinations [incubation]. He points out that it is as much asking the right question [preparation] as finding the correct
answer [illumination]. More than play, it includes play; more than work, it involves letting go as well [incubation].

It can be as ordinary as unblocked growth or extraordinary as the peak achievements and experiences of humankind. It is more than conscious effort, though at times an active encounter with the world is an essential component [all stages]. It is more than revealing "archetypical symbols of a collective unconscious," for creativity is an advance and change as well as an expression of continuity with the past [verification] (On-line: 1998).

More than the result of past directions, something emerges as a consequence that was not present in the cause making the creative product more than the creator had envisioned. The creator becomes more by creating it [verification]. The creative process may involve techniques but, he warns, should not be equated with them. Methods can, when they become the rules for behaviour, stifle creativity [incubation & illumination]. He concluded that creative behaviour always goes beyond any codification of it. 'The rule makers are always a step behind the innovator. Thus creativity always goes beyond any definition of it. It is loving something new and valuable into being.' (On-line: 1998)

Young's approach gives sight to the possibility of the creative process being a phenomenon that cannot be closed for inspection. It must therefore be regarded within a philosophy that is all-inclusive. A theory that makes provision for all its contradictions, assimilations and integrations. His theory comes close to bordering on the antithetical traits’ category but like Guilford, deserves to be put within a unique category for analyses.

3.3.7.2 GUIFORD'S FACTORIAL APPROACH

Guilford's (1977:92) work has proved to be a key stimulus for initiating many creativity issues. His creativity research has been based on the approach known as
factor analysis where he searched for underlying factors in the ability to answer
questions with alternate solutions. He highlights the factor of divergent production in
creative thinking within his SOI (Structure of Intellect model) and identifies where
factors such as fluency, flexibility, originality and elaboration relate to larger categories of
function. Guilford (1950:452-453) in fact pointed out eight primary abilities that
underlay the creative process: sensitivity to problems, fluency, novel ideas, flexibility,
synthesising and analysing abilities, complexity and finally evaluation. He went on to
design a test for each of the first four abilities.

It is with his explanation of his SOI model that he pointed out how his six kinds of
products related to his operational category of divergent production.

- Units: Relate to fluency: Units refer to things, segregated wholes, figures on grounds, or
  'chunks', things to which nouns are normally applied (Guilford 1977:25).

- Classes: Relate to flexibility: Classes cite a type of product of information or a set of
  objects with one or more common properties: it refers to more than a set, as here we find what
  Guilford refers to as a class idea (Guilford 1977:26).

- Relations: Relate to fluency: Relations refer to some kind of connection between two
  things, a bridge or connection with its own character. Guilford uses prepositions as an
  example (Guilford 1977:28).

- Systems: Refer to fluency: Complexes, patterns, or organisations of interrelated,
  interacting or interdependent parts such as a verbal arithmetic problem, an outline, a plan or
  a program (Guilford 1977:32).

- Transformations- Flexibility and originality: Transformations are revisions or
  changes, redefinition, modifications, by which any product of information in one particular
  state goes into another. Even though there is an inference to process here, a transformation
  can be an object of cognition or of thought like any other product. The example used by
  Guilford is that of a participle such as 'inventing'. Transformation should not be treated as
  an operation category (Guilford 1977:37).

- Implications/ Elaboration. Implications allude to something expected, anticipated or
  predicted from given information. One idea suggests another, one set of information alludes to
  another but the two have some intimate way of being connected. Implication is NOT the
same as relation, for a relation is more specifiable and verbalisable. It is interesting to note that of all the six kinds of products, this factor is closest to the ancient concept of association (Guilford 1977:41).

![Diagram]

**Figure 12: Guilford**
(Guilford 1967:64).

Guilford (In Rothenberg & Hausman 1976:207) insisted that factors of fluency and flexibility have been found in both verbal and non-verbal tests. 'Search among non-verbal tests revealed the parallels essentially complete in figural and symbolic areas of information alongside those in the semantic category'. In his conclusion, Guilford admits that there are at times and in different ways, other abilities outside the divergent-production and the transformation categories that should be considered with the measurement of creative potential (Guilford in Rothenberg & Hausman 1976:208). It was interesting to note that Guilford did not share today's common theory of the creative thinking process proposing that the conscious and the subconscious are linked. This he said, was a charming but futile substitute for an explanation (Guilford in Mooney & Razik 1967:101).
Each one of the 180 cells of the Figure 13 represents a unique cognitive ability. The Monitor Test of Creative Potential (TCP) have three subtests that were designed to measure some of Guilford’s Structure of Intellect factors (Davis 1992:207).

Meeker (1988:148) cites the functions and conditions stemming from brain activity as important aspects for the contribution of individual differences. She recognised that whether research has been medical, educational or psychological, researchers have always used IQ tests to measure intelligence. Trust in its reliability and validity coefficients, IQ scores are easily manipulated statistically. Yet today we know that IQ tests are not based on a theory of intelligence. Meeker (1988) expressed her dismay at imagining that a number can express the complexity of human intelligence functions by comparing IQ scores analogous to one number of blood pressure or one count in a blood panel. She refers to Thurstone who found that intelligence consisted of at least seven different factors, which he named primary abilities. Guilford, who studied alongside Thurstone, discovered that intellectual abilities formed a pattern. One hundred and twenty kinds of intelligence emerged and since then, several confirmatory factor analyses have demonstrated the strengths of these
Botha 106

factors. Meeker (1988:149) supplies in part, an excellent chart explaining the 14 dimensions of the SOI Model in Table 5:

Guilford's 14 dimensions of the SOI model

<table>
<thead>
<tr>
<th>Operations:</th>
<th>Contents:</th>
<th>Products:</th>
<th>Measures:</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Cognition</td>
<td>FFigural (Right hemisphere functions)</td>
<td>U Units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spatial Figural intelligence</td>
<td>Classes</td>
</tr>
<tr>
<td>M</td>
<td>Memory</td>
<td>S Symbolic Intelligence is notation symbols, abstract numerals, codes. Connects F &amp; M</td>
<td>C Classified units</td>
</tr>
<tr>
<td>E</td>
<td>Evaluation</td>
<td>M Semantic Verbal-intelligence Separate (Left hemisphere)</td>
<td>R Relations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cause &amp; Effect</td>
</tr>
<tr>
<td>N</td>
<td>Convergent Production</td>
<td>B Behavioural Social Intelligence Behavioural cognition (Rothenberg 1976:203)</td>
<td>S Systems</td>
</tr>
<tr>
<td>D</td>
<td>Divergent Production</td>
<td></td>
<td>Transformation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Changing any of the above</td>
</tr>
</tbody>
</table>

Table 5: Guilford

Meeker (1988:148-154) concluded with the assurance that the SOI tests reflect the application of a theory of intelligence to reality programming. In contrast to Guilford's approach is that of Shallcross's contradictory Model, focusing on the state of
conflict and the need for change (creativity) in order to resolve the ambiguity it causes.

### 3.3.7.3 SHALLCROSS'S SENSATIONAL THINKING MODEL

Shallcross and O'Neill (1994) developed a Sensational Thinking Model which is based on the notion that perception is a occurring dynamic system and constitutes a creative process. This creative process contains characteristics of inclusion (the recognition of many and varied parts), feedback (the return of a portion of the output of a system to the input), and acknowledges the presence of paradox and the need for collaborative interaction. The underlying paradox exhibits contradictory aspects, which produce tension. Existing systems or processes are threatened and need change in order to resolve the state of conflict. Sensational Thinking can be described as movement and balance between ambiguity and boundaries (1994:77). Shallcross and O'Neill's (1994:75) research into the creative process served to highlight the following aspects:

- **Dynamic change is a creative process that is dynamic and complex.** It occurs naturally in physical, biological and social systems. We too inherently possess such change mechanisms that operate as a creative process.

- **Creativity refers to a natural process of growth and change whereby patterns emerge and evolve through a continuous process of combining acquired with existing information** (Shallcross & O'Neill 1994:75).

The process, by which we experience creativity and change, is through perception and, it is this information that becomes our tacit knowledge. This process of gathering information from multiple sources to build an integral whole is described as the essence of creative problem solving (Shallcross & O'Neill 1994:76). Their model (see Figure 14) details five stages and their relationship to one another in the creative/change process:
How then can the creative process be measured when according to Shallcross, most natural systems change in dynamic ways that appear chaotic, non-linear and unpredictable? Would it be possible to measure a process that contain underlying paradoxes that produce tension and need to resolve its state of conflict? The ambivalence regarding measurement does however not deter from the fact that their 'Challenges, Threats and Skills in the Sensational Thinking Model' does provide some insight for criteria (Shallcross & O'Neill 1994:80). It clearly regards issues (challenges, threats and skills) within all the creative process phases that should/could be addressed during assessment:
Table 6: Shallcross
(Shallcross & O'Neill 1994:80).

Their methods involved pretested boardgame called Idea Quest during which players had stop at 'sense station' where they were asked questions related to a sense. A design card asked them to use their five answers to make changes in a common object. A three categories representation, adding on and, integrating related to the stages of receptive awareness, reflective attention and revelation. Data on the scores in both pre- and post-test conditions were analysed and found that, instruction in skills and techniques gave subjects in the experimental group significant advantage, increasing their creativity scores. This makes it clear that pre-test instruction holds significant benefit to the individuals involved and should be a prerequisite to any creative assessment. Another benefit to creative assessment is the understanding of how creativity is indexed by certain cognitive styles. Eysenck focuses on these variables.

3.3.7.4 EYSENCK'S FOCUS ON COGNITIVE VARIABLES

Eysenck (1995:203) set out to prove the relationship between psychotics, psychopathy, and creativity. He hypothesised that the important cognitive variable involved is some loosening of associative thinking, some broadening of the associative horizon, a quality of over inclusiveness, a failure of inhibition that allows less relevant thoughts to intrude into the problem-solving process (Preparation &
Incubation). It is fluency that produces more associations—creativity enables one to retain only the most fruitful ideas. (Eysenck in Boden 1994:231.) He quotes Cameron’s notion of overinclusion and explains how schizophrenics’ concepts are overgeneralised. Overinclusive thinking may be the result of a disorder of the process whereby inhibition is built up to circumscribe and define the learned response. This could be an extreme degree of stimulus generalisation. (Eysenck 1995:246.)

Eysenck’s theory is based on his deduction that creativity is indexed by certain cognitive styles such as over inclusiveness, allusive thinking, looseness or slippage of ideation, which increases fluency and originality. This type of cognitive style is related to psychoticism (Eysenck 1995:248). The Freudian view is that mental illness and creativity have identical origins in that they both arise from conflict within the unconscious (Woodman 1980:45). Whatever the case may be, it has become evident that ‘logic’ or ‘conscious thought’ need to give way to the elaboration of freely rising fantasies and ideas related to daydreaming or childhood play. Some theorist such as Osborn and De Bono believe in the conscious abilities of artificially inducing the creative process.

3.3.7.5 Edward de Bono’s Lateral Thinking

De Bono’s (1973:55) definition of creativity ties in with his phrase ‘lateral thinking’ in which he artificially ignites the creativity process in a similar way such as Osborn’s brainstorming procedures:
With lateral thinking we move "sideways" to try different perceptions, different concepts, different points of entry. We can use various methods, including provocations, to get us out of the usual line of thought...

Lateral thinking has very much to do with perception. In lateral thinking we seek to put forward different views. All are correct and all can coexist. The different views are not derived each from the other but are independently produced. In this sense lateral thinking has to do with exploration just as perception has to do with exploration...

The term "lateral thinking" is very precise. Lateral thinking is concerned with changing concepts and perceptions. Lateral thinking is based on the behaviour of self-organising information systems. (Italics mine) (De Bono 1993:53-55.)

It would seem that the term 'lateral thinking' could be used in two senses, either specific or more general. By being specific a set of systematic techniques is used for changing concepts and perceptions and generating new ones. General sense explores multiple possibilities and approaches instead of pursuing a single approach. The former is similar to the conscious brainstorming techniques of Osborn and Parnes while the latter carries with it one of the fundamentals of the creative thinking process: the generation of numerous possibilities while quantity is a key issue.

Like Clark, Tannenbaum too investigates numerous researchers' theories pointing out similarities and reiterating factors he agrees with.

3.3.7.6 TANNENBAUM'S RESEARCHES THE CREATIVE PROCESS

Tannenbaum (1983) distinguishes between those who perceive creativity as a function of rational thinking and those who have an intuitive approach (all stages). He quotes Guilford, Torrance, Parnes and Williams who describe it as a separate entity from what is known as general intelligence. Parnes he noted, sees it as a function of knowledge and imagination, with the underlying processes involving the abilities to find facts, problems, ideas, solutions, and the acceptance of solutions while Williams gives emphasis to the importance of knowledge, along with mental processes based on cognition, divergent-productive and associative thinking, evaluative behaviours,
Botha 112

and communicative skills (all stages). The intuitive approach he believed highlighted irrationality and the mechanisms of exploring the unconscious and subconscious states of mind. Here he recognises the work of Krippner who viewed alternative levels of awareness as important to the release of creative behaviour and Koestler who suggested that conscious control over one's own thoughts and actions can obstruct creative spontaneity (incubation & illumination). 'Creativity at the highest levels can be accomplished only through a relaxing of controls exercised by verbal logic and by dogmas that are popularly known as common sense' (incubation & verification) (Tannebaum 1983:247). Taylor described the creative process as most likely preconscious, non-verbal or preverbal, and that it may involve a large sweeping, scanning, deep, diffused, free and powerful action of almost the whole mind (incubation & illumination) (Tannebaum 1983:247).

Tannebaum also notes the many pairs of antithetical (opposed) traits that feature in creativity such as cited by Bruner who recognised the reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral. Schachtel suggests the contrast between autocentrism, with the need to reduce tension against allocentrism, with the urge to sustain it. He describes Maslow's requirements which are a balance between defence and growth as well as safety and venturesomeness and Jung's reconciliation of opposites: conscious-unconscious, rational-irrational, sensation-intuition, thinking-feeling, extraversion-intraversion, and collectiveness-individualism (Tannebaum 1983:250).

Tannebaum manages to identify relevant criteria from numerous theories as well as consolidate many viewpoints to clarify the distinction of the creative episode. From a far more practical stance, Osborn and Parnes lends hope to many by suggesting that their CPS model can stimulate the creative juices.

3.3.7.7 OSBORN AND PARNES'S CREATIVE PROBLEM SOLVING (CPS) MODEL

Osborn (1963:124) claimed that you could deliberately increase the production of good ideas by applying two basic principles. They are deferment of judgement and the fact that quantity breeds quality. His practical approach to creative thinking uncovers a
portion of the mystery that surrounds the incubation phase. In his book ‘Applied Imagination’ he explains the creative and non-creative forms of imagination, highlights the factors that cramp creativity and discusses detailed procedures of group brainstorming. The Creative Problem Solving (CPS) model was originally formulated by Osborn (Davis 1992:103) considered the father of brainstorming, and developed by Parnes who followed Osborn as President of the Creative Educational Foundation (CEF). Davis recommended Parnes’ inspiring book, _The Magic of Your Mind_, which explains how using the CPS model can improve your life (Davis 1992:103).

Stripped to its essentials, the creative process involves two clear steps: the *big idea* (Illumination) stage and the *elaboration stage* (Verification). The former is a period of fantasy in which the creator looks for new, exciting idea/s, after which by means of perhaps using analogical thinking or some other creative thinking technique, the elaboration stage require idea development, elaboration, and implementation (Davis 1992:110). Two figures illustrate the theory of the CPS model. The first star-shaped model (Figure 15) enclosed in a circle emphasises that one may move directly from any one step to another.

![Figure 15: CPS Model](https://example.com/figure15)

The second (Figure 16) illustrates the five stages, which are fact-finding, problem-finding, idea-finding, solution finding (evaluation), and acceptance-finding (implementation). These steps guide the creative process. Davis remarked on the unique feature of each step involving a *divergent* thinking phase, (during which lots of ideas, facts, problem definitions, evaluation criteria or implementation strategies are
generated), and then a second *convergent* phase, in which only the 'prominent ideas' are selected for further exploration. (Davis 1992:104.) Parnes added a crucial *primary step*, which he believes, should happen before the five steps of CPS: *finding a problem*, opportunity or challenge to which to apply this model. He stressed that we need to take a more active, high-initiative approach to improving our lives by looking for nuisances, challenges or things one would like to see happen by posing a list of prodding questions. (Davis 1992:103 &104.)

- *The first or fact-finding stage* (Preparation) involves listing all you know about a problem; exploring information; impressions; observations; feelings; who, what, when, where, why and how questions to aid thinking. The list of ideas is then convergently narrowed down for further exploration. (Davis 1992:105.)

- *The second or problem-finding stage* (Preparation & incubation) involves listing alternative problem definitions. Davis reminds us that one principle of creative problem solving is that the definition of a problem will determine the nature of the solutions. Here it helps to begin each statement with "In what ways might we (or I)." (IWWMW).

- *The third or idea-finding stage* (Incubation) is linked to divergent thinking and can be called a brainstorming stage. Ideas are freely shared without criticism or evaluation.

- *The fourth or solution-finding stage* (Illumination & verification) has three related steps: criteria for evaluation are listed, ideas are evaluated, and one or more of the best ideas are selected. Davis also referred to this step as an idea evaluation step. Hereafter an evaluation matrix may be used.

- Acceptance finding or idea implementation (Verification) results in an action plan. Isaksen and Treffinger suggest itemising sources of assistance (people, things, activities, locations) and sources of resistance (people, things, activities, locations) (Davis 1992:105&106).
Both these steps are likewise described by the seven steps suggested by Von Oech (1998) (Motivation, search, manipulation, incubation, illumination, evaluation, action) and his Four Roles of the creative person in the creative process (The Explorer, the Artist, the Judge, the Warrior) (Von Oech 1986:11) as well as the model presented by Herrmann (1998) (see figure 17 below).

3.3.7.8 HERRMANN'S MODEL OF WHOLE BRAIN CREATIVITY

Both however, assert the fact that the first stage includes 'creative activity' (right brain-divergent thinking) such as fantasy, imagination, and synthetic and analogical
thinking. The second stage, after the idea is found, involves the activities of ‘logical’ thinking (left brain-convergent thinking) such as analysing, and sequential planning that are needed to develop and implement the idea. The researcher tends to agree with Davis who contends that continued creative thinking is needed in the elaboration and developmental stage as well as in the initial fantasy stage inferring that both sides of the brain are needed in certain stages of the creative thinking process. (Davis 1992:111). Feldman addresses a more individual-based approach, which emphasises specific thought processes.

3.3.7.9 FELDMAN'S THREE-PART MODEL

Feldman (Feldman, Csikszentmihalyi’s & Gardner 1994:29) endeavoured to explore the unconscious far more thoroughly and recognised three internal systems that are co-ordinated in their enterprise to form new ideas. The core of his hypotheses centres on his belief that ‘reflectiveness’ (consciousness) is clearly the hallmark of the human mind. Reflectiveness’ quality revolves around a individuals being capable of responding to their own thoughts and feelings with some kind of comprehension, in order to categorise, analyse and modify them. They also have the capacity to represent certain qualities of the external world around them in ways that lead their being represented and reflected upon in productive ways (Feldman et al 1994:29). His three processes are set out as following:
Reflective (or reflexive) abstraction is seen as the process through which all progress toward more powerful mental structures are achieved. 'Knowing levels' are repeatedly built from reflections of the mind on its own experience (Feldman et al 1994:32).

... first, that unconscious processing is fluid, continuous, active, and generative; second, that unconscious processing has contact with other sources of information going into the mind, particularly sense impressions, perceptions of humanly crafted ideas and things... and, representations that become what we refer to as rational consciousness: and, finally, that unconscious processes can to some degree be brought into harness to serve various purposes directed at least in part by conscious goals (Feldman et al 1994:34).

Feldman maintains that the key quality of the unconscious thought is that it seems to take liberties with whatever goes into and whatever comes out of it. Unconscious thought is motivated by a natural desire to transform, to change, to make things
different, to destabilise structures, to break them down and render them less organised.

- **Process 3: Changing the world**

  Somehow, the raucous disrespect for stability that seem to prevail in unconscious processes must be balanced against other tendencies to produce stable and predictable representations of the external world as well as the world of experience. It is in the interplay of processes of change and stability that innovative new ideas emerge. But in order for this to happen, there must be a special kind of awareness that is constructed (or is built) in the individual's mind. (Feldman et al 1994:35.)

Feldman highlights that we are unique in our ability to realise that we have the power to make the world into a different place than it is. Intentional effort can bring about change. (Feldman et al 1994:32). The interplay between the desire for preserving important features and qualities of experience and desire to transform experience makes creativity possible. The unconscious and conscious perceptions of change inform and shape each other. 'Representation, organisation of experience, skills, and analytic capabilities, including a sense of self, lie between the two (internal and external) kinds of change' (Feldman et al 1994:37). Here reflectiveness's main purpose is to organise, categorise and use the info that finds its way there.

Feldman (1994:39) concluded by referring to the already existing circumstances in which creativity takes place, which he believes controls the process. He grants culture itself a dynamic role, and the creative process results in a productive balance between individual's drives, desires, efforts and interpretations and the power of external forces that control the events.

Feldman makes it clear that for a comprehensive understanding of the creative process in its entirety, it is essential to gain insight into what's precedes it's onset and whether there is benefit to a post-stage in creative assessment. This leads the researcher to an investigation into relevant additions to Wallas' four stages of the creative process.
3.3.8 Additions to ‘Creative Process’

All research so far indicates that ‘successful illumination’ depends on an in-depth and thorough investigation during the preparation phase as well as an effective, but completed incubation period. To successfully ignite the creative process to the motivation level of such an in-depth investigation, the researcher presupposes an addition to the creative process: a ‘pre-process stage’ or awareness stage. This ‘awareness stage is a natural and important step in personal creative understanding and growth. This is essentially in agreement with that of Amabile’s (1990:65) componential model of creativity which also includes an additional pre-preparation step she labelled ‘Problem or task Presentation’, and Parnes’ (Davis 1992:103) primary step of finding a problem in which the individual lists all he knows about a problem.

Bloom’s (Davis & Sullivan 1980:149) taxonomy prescribes six steps: knowledge, comprehension, application, analysis, synthesis and evaluation. His cognitive domain model prescribes how hierarchically ordered objectives may be used to guide teaching practices and to serve educators to elicit higher levels of thinking skills. Davis & Sullivan (1980:149) refer to the affective domain where the hierarchical sequence of objectives are receiving, responding, valuing, organising, and characterising by means of a value complex. This hierarchy develops attitudes, willingness, commitment, and a particular value system. They created a taxonomy of creative objectives and development which they termed AUTA. It...
Botha 120

... describes the sequence of attitudes and skills through which a person would progress in becoming a more creative individual. As such the model also describes a reasonable sequence and content of a workshop or course designed to train creative thinking. The four levels were: (1) Awareness of creativity and its importance; (2) Understanding of creativity, including the topics of the creative person, the creative process, theories of creativity and tests of creativity; (3) Techniques for creative thinking, including basic cognitive abilities, personal creative thinking techniques, and deliberate creative thinking procedures; and (4) the Actualisation of one's capabilities. (Davis & Sullivan 1980:159.)

AUTA is not only beneficial for, but also integrally part of the 'essential quality' of creative assessment. Here, subjects not familiar with the essence of creativity will be ameliorated. After all, to examine and interact with content without intent is to miss the forest for the trees. This model would serve to be of extreme importance before any creative testing commences. It presents the individual with an understanding and insight into the creative perspective, explaining the fuzzy term creativity, the creative personality and what is meant by creative behaviour. This, as well as exposure to creative thinking techniques is highly appropriate to developing a positive attitude, a willingness to participate and to develop a creative value system that will (if applied), enhance any individual's lifestyle. This will undoubtedly add a more meaningful purpose, understanding and commitment, to any creative assessment program.

This raises the question whether there is a need for a 'post-process stage' or not. Research does addresses this issue very potently (e.g. Howieson 1980; Cropley 1972). There exists a considerable demand to justify the long-term predictability of creativity tests. Evidence of a test's predictive-validity cannot only benefit the research field, but also ad significance to the test's content value. Some even believe that divergent scores are related to real-life creative achievement and that the value of creative thinking tests lie in their ability to predict later real-life creative behaviour (Howieson 1980:117). Howieson proclaimed that the distinction between creative potential and its actualisation is the relationship between parental variables and creative ability. The major concern of his study was whether test-like analogues of creative ability (such as TTCT) could predict with significant accuracy, which subjects would have produced creative achievements ten years later. His research revealed a failure (of these tests) to predict non-academic talented achievement in
any of the expected areas. (Howieson 1980:132.) The only long-term predictions, which were successful, were for females in the area of drama and for verbal creative thinking music. But, as Howieson (1980:133) notes, it shows little linkage with ideation characteristics. There is however, predictive support for Torrance's pencil-and-paper test although the correlations are not high. On the other hand, Cropley (1972:119-124), in a similar study, compared six creativity tests over a period of 5 years and concluded that creativity tests can be said to possess reasonable and encouraging long-range predictive validity. Whatever the case may be, there remains no doubt that it can only benefit a creativity assessment program to initiate a 'post-process' evaluation in order to validate its relevance and significance to the creativity field, its longitudinal predictability, and, the aptness and accuracy of its content.

3.4 CONCLUSION

In conclusion it seems only appropriate to remember that theories of creativity are themselves creative products. They need to abide by the same laws as those that they are designed to unearth. This realisation should temper our zeal in advocating one single theory because the day we are certain how to construct a theory of creativity will also be the day we are certain about how to construct a poem (Bloomberg 1973:355).

...creations are undetermined, both genetically and teleologically, and sufficient conditions for their appearance cannot in principle be provided. Creativity, therefore, cannot be explained according to any traditional model of explanation by cause or prediction. We maintain, however, that it can be made intelligible and our principle for providing intelligibility to the phenomenon is a recognition of the irreducible paradox: Creativity is both determined and undetermined at the same time. (Rothenberg & Hausman 1976:23.)

The intent with chapter three is not to just present an exhaustive list of all possible theoretical conceptualisations of creativity but rather to compare and generalise their
particular features which need to be incorporated within the dimensions of the researcher's quest to capture relevant, and measurable creative-process-criteria. The creative process can be seen as a holistic state of awareness where there is instant antithetical communication amongst all its sectors. Whether it's measurable or not is not necessarily of concern here, but rather, whether or not creativity tests, test for all the significantly researched elements involved in making the creative process possible.

3.5 IN SUMMARY

General process variables within the creative process need to be identified. The term creative process refers to the whole episode as it is set out by the four stages of Wallas while the creative thinking process falls within the 'p' theory that refers to the creative components of creativity. The creative process involves many problems being solved simultaneously but each at different stages. While for e.g. in preparation for one issue, the individual will be incubating another. It seems that there need be an abstention of conscious attention during the second and third stage although brainstorming is a conscious process that artificially stimulates creative incubation. Illumination brings an instantaneous and unexpected new idea into conscious bearing.

The environmental and psychosocial approach identifies creativity within a social system with its system of values, priorities, reinforcements, resources, requirements and complexities. Here they focus on influences from intrinsic motivation as well as extrinsic environmental conditions and distal sources of motivation.

Harrington refers to social and private creativity while some personologists prefer to regard the intrapsychic conflict, identity formation, and interaction of self and significant relationship as important research areas. The same environments do have different effects on different people while social evaluations influence and motivate.

Epstein highlights creative being continuous in time, novel and probabilistic and, that it has predictiveness and can be influenced by contingencies. Runco's 'implicit theories' (prototypes of the subjective views in the mind's of individuals e.g. social validation) govern our expectation and guide certain behaviours while his second approach refers to a technology of ideational creativity (Isolating components &
constituents of the creative process through statistical manipulation) that suggest certain ideational abilities play an important role in some creative performances based on recent empirical research and theory.

Harrington refers to various psychological demands while Csiksentmihalyi’s System Perspective points out the interaction between the three subsystems; the domain (cultural symbol system), the field (social roles & norms that regulate) and the person. His DIFI Model is a map that determines the occurrence of a creative idea, object or action. Amabile’s Componetial Model sets out to explain the relevant issues relating to domain-relevant skills (intermediate level, raw materials that feed the process), creativity relevant skills (general level) and task motivation (most specific level, initiate, determines & sustains the process).

The Behaviourists’ such as Skinner suggest that the environment acts upon the creative individual himself determining that he will perceive it and act in special ways. Other dramatic new behaviour (creative) can occur.

The Antithetical theorists all agree that some form of conflicting mechanism is instantaneously set into motion which ignites the creative process. Rothenberg refers to it as Janusian thinking, Mednick the Associative basis of the creative process, Koestler’s Biosociation, Gordon’s theory of Synectics (metaphorical modes of thinking), Davis’s Analogical thinking and Bergquist’s Symbiotic explanation (Inseparable duality, Yin Yang), all set out to explain and analyse this popular notion.

Kubie explains that creativity depends on the freedom of preconscious and free flow, functioning which use analogy and allegory, superimposing dissimilar ingredients into new perceptual and conceptual patterns. Three processes that act concurrently are the conscious (communicable literal ideas and approximate realities); the pre-conscious: (swift condensation of allegorical & emotional import) and the unconscious (expresses conflict laden inward struggles).

Kris focussed on motivation by two main instincts of the id, (the libido and aggressive instincts) and that creativity was a preconscious and conscious mental activities. Fantasies occur in the preconscious and discharge libido and aggression and occur on the fringes of consciousness. The preconscious is not tied to the
everyday realities of the conscious or rigid symbolic relationships of the unconscious, but 'can engage in free play with ideas, meanings and relationships, producing new and unexpected connections.

Rugg's main concern was his theory of the creative imagination. He coined the phrase 'off-conscious’ mental activity where the mind is free to draw from the vast store of experience from the unconscious. Imagination has the self-governing powers of picking up scattered fragments of fantasy imagery. The Chinese Tao, the Japanese Zen and Indian Yoga all, are techniques of body and mind liberation from the conscious mind. Rugg insists on the basic notion that the incompletely act inevitably forms the key to the act of meaningful response.

Humanistic Theories: Rogers postulates three inner conditions: openness to experience, an internal locust of evaluative judgement and the ability to play spontaneously with elements and concepts. He reiterated the importance of the affective side of the creative process (need for psychological safety & freedom). He suggested psychological prerogative elements such as acceptance, an evaluation-free environment and the ability to understand empathetically.

Maslow focuses on self-actualised creativity and special talent creativity. He listed 15 Characteristics of Self-Actualised and advocated the creativity required the ability to become timeless, selfless, outside of space, of society, and of history. (Transcendence of self.)

Stein described the creative process as inferred from behaviour: hypothesis forming, hypothesis testing and the communication of results. Arnold warns that without the drive to carry a project through to completion, endurance, perseverance, persistence, determination and insight into understanding the creative goal or problem, was the most important ingredient of the creative process.

Clark's Holistic Model consolidates the four human functions: the rational, the emotional (emotional well-being & self-actualising qualities, transactional motivation), talent (artist's attitude toward a phenomenon, representation of the highest degree of emotional health), and higher consciousness (intuitively perceptive, a regression to modes of ideation which are indifferent to the rules of verbal logic. All learning involves creative organisation of the culture's knowledge.
with the individual’s experience, which in turn produces new and unique perceptions of the culture. Rational, verbal explanations dilute events. Research has been done that proved that creative individuals produce fewer alpha waves when relaxing and increase them when working with an imaginative problem. Here we find simultaneous operation at different levels of consciousness. Clark’s integrative theory insists on the synthesis of all human functions, which is a balance between action, emotion, and cognition with the addition of insight and intuition.

Young sets out to explain all the contradictions, assimilations and integrations of the creative process. Creativity is an advance and change as well as an expression of continuity with the past when something emerges as a consequence that was not present in the cause and the creator becomes more by creating it. He believes it is loving something new and valuable into being.

The functions and conditions from brain activity are a result of individual differences. Meeker reiterated the fact that intelligence consisted of at least seven different factors called the primary abilities. These intellectual abilities formed a pattern with which Guilford set out to analyse within 120 kinds of intelligence. His of the SOI Model consists out of 14 dimensions with six kinds of products that are related to the operational category of divergent production. Meeker assured that the SOI tests reflected the application of a theory of intelligence to reality programming. Guilford’s factor analysis highlights the factor of divergent production in creative thinking (fluency, flexibility, originality and elaboration). Six kinds of products form a hierarchical order: Units Classes, Relations, Systems, Transformations, and Implications. Factors of fluency and flexibility are found in both verbal and non-verbal tests.

Shallcross and O’Neill developed a Sensational Thinking Model relating to the fact that perception is a occurring dynamic system. This creative process characteristic’s are inclusion, feedback, and acknowledges paradox and collaborative interaction. Tension is produced, processes threatened and change is needed. Sensational Thinking is movement and balance between ambiguity and boundaries.

We posses change mechanisms that operate as a creative process.
Creativity refers to patterns that emerge through a process of combining acquired with existing information.

Their “Challenges, Threats and Skills in the Sensational Thinking Model” provides some insight for criteria.

To Eysenck the important cognitive variables involved is loosening of associative thinking, broadening of associations, over inclusiveness and a failure of inhibition that allows less relevant thoughts to intrude into the problem-solving process. Fluency produces more associations and creativity is indexed by cognitive styles (over inclusiveness, allusive thinking, looseness or slippage of ideation, increasing fluency & originality & related to psychoticism).

De Bono’s definition of ‘lateral thinking’ points out that we move “sideways” to try different perceptions that are all correct and can coexist. Lateral thinking is based on the behaviour of self-organising information systems that are independently produced and suggests a set of systematic techniques used for changing concepts and perceptions and generating new ones. Lateral thinking directs the individual into exploring multiple possibilities and approaches instead of pursuing one single idea or solution.

Tannenbaum quotes Guilford, Torrance, Parnes and Williams who describes the creative process as a separate entity from as general intelligence. In contrast he points out Krippner and Koestler who suggest that conscious control over one’s own thoughts can obstruct creative spontaneity. Taylor too, describes it as preconscious, non-verbal or preverbal, and that it may involve a large sweeping, scanning, deep, diffused, free and powerful action of the whole mind.

Antithetical traits are synonymous with the creative thinking process such as detachment and commitment, passion and decorum, immediacy and deferral, autocentrism and allocentrism, defence and growth, safety and venturesomeness, conscious-unconscious, rational-irrational, sensation-intuition, thinking-feeling, extraversion-intraversion, collectiveness-individualism, emotion and intellect, freedom and discipline, reason and intuition, the precise and the gossamer, primary and secondary processes, chaos and order.
Osborn's CPS model is explained with a star-shape and horizontal diagram explaining the movement of the creative process. It is similar to the seven steps of Von Oech and the model presented by Herrmann. Osborn's five stages are fact-finding, problem-finding, idea-finding, solution finding and acceptance finding which guide the creative process. Parnes added a primary step of finding a problem, opportunity or challenge to which to apply this model. The researcher agrees that continued creative thinking is needed in the elaboration, developmental stage and in the initial fantasy stage proving that both sides of the brain are needed in certain stages of the creative thinking process.

Feldman proposed three internal systems that are co-ordinated to form new ideas. 'Reflectiveness' is an individual being capable of responding to their own thoughts and feelings with some kind of comprehension, in order to categorise, analyse and modify as well as represent qualities of the external world that lead their being represented and reflected upon in productive ways. (Reflectiveness /Transformational impulses /Changing) Unconscious thought is motivated by a natural desire to transform and to change. The interplay between the desire for preserving and desire to transform experience makes creativity possible. Culture itself plays a dynamic role: a productive balance between individual's drives, desires, efforts and interpretations, and, the power of external forces that control the events.

Successful illumination depends on a thorough investigation (preparation) and a completed incubation to successfully motivate the creative process. A 'pre-process stage' or awareness stage would use six (cognitive domain) steps of thinking: knowledge, comprehension, application, analysis, and evaluation and utilize the affective domain where the hierarchical sequence of objectives are receiving, responding, valuing, organising, and characterising by means of a value complex. This taxonomy of creative objectives and development is called AUTA (Awareness, Understanding, Techniques and Actualisation) and it describes the sequence of attitudes and skills through which a person would progress in becoming a more creative individual.

There is a need to justify the long-term predictability of creativity tests, which add significance to the test's content value. For e.g. Cropley found that creativity tests can be said to possess reasonable and encouraging long-range predictive validity. It would benefit any creativity assessment program to initiate a 'post-process'
evaluation to validate its significance, its longitudinal predictability, and the accuracy of its content.

Theories of creativity are themselves creative products and we must therefore surrender our need to find one single explanation of creativity. Creativity is both determined and undetermined at the same time and can be seen as a holistic state of awareness where there is instant antithetical communication amongst all its sectors.
4.1 INTRODUCTION

It was Binet and Henri (Wakefield 1991:184) who, in 1896 were first to suggest techniques to assess creative imagination. Their suggestion centred on the interpretations of inkblots, to complete a theme or drawing, or the construction of sentences from given words. This marked the genesis of creative thinking tests that Guilford later termed 'divergent-thinking tests' as opposed to 'convergent thinking'. (Wakefield 1991:184.) Since then theoretical reformation has brought about mounting evidence that there was more involved in creative thinking than divergent thinking tests were able to measure. Davis (1992:184) fittingly quotes Torrance who said that creativity involves all the senses and perhaps even the extrasensory and, that much of it is unseen, non-verbal, and unconscious. How then can creativity be measured? The past century has ignited considerable research in this field and even though it still remains a cloudy area, many issues have surfaced that have grounded a creative platform from where empirically researched 'creativity-theorem', can prosper.

In the first half of chapter four, the researcher will attempt to establish a foundation of Assessment in general, focusing on procedures, guidelines and the essence of validity and reliability. A closer perspective will then reveal the core of Creative Assessment, sighting its 'blockers' and 'stimulators'. Here the Creative Process will eventually reveal assessment assumptions from previous research done, as well as new trends under investigation. The second half will explore the uses, types of, prerequisites and problems of Creativity Tests and Assessment. The researcher also intends pursuing criteria issues that have been explored in previous research.
4.2 ASSESSMENT

A standardised test is a task or a set of tasks given under standard conditions and designed to assess some aspect of a person's knowledge, skill, or personality. A test provides a scale of measurement for consistent individual differences regarding some psychological concept and serves to line up people according to that concept. Tests can be thought of as yardsticks, just as the concept of verbal reasoning ability is more complex and less well understood than the concept of length. A test yields one or more objectively obtained quantitative scores, so that, as nearly as possible, each person is assessed in the same way. The intent is to provide a fair and equitable comparison among test takers (Sattler 1988:4).

It is important to remember that psychological assessment is not synonymous with psychological testing. Testing produces findings, whereas assessment gives meaning to the findings within the context of the individual's life situation and clinical history (Sattler 1988:532).

4.2.1 Assessment procedures

4.2.1.1 GUIDELINES FOR ASSESSMENT

The four pillars of assessment are norm-referenced tests, interviews, observations and informal assessment. Norm-referenced tests are standardised on a clearly defined group, termed the norm group, and scaled so that each individual's score reflects a rank within the norm group and may at times need to be supplemented with criterion-referenced tests and 'teacher-made' tests. The latter needs to be used cautiously. (Sattler 1988:5.)
According to Sattler (1988:5), the assessment process should never focus exclusively on one test score but rather on a range of quantitative and qualitative evaluations. The following principles form the foundation for use of tests:

- Tests are samples of behaviour.
- Tests do not directly reveal traits or capacities, but may allow inferences to be made about the examinee.
- Tests should have adequate reliability and validity.
- Test scores and other test performances may be adversely affected by temporary states of fatigue, anxiety, or stress: disturbances in temperament or brain damage.
- Test results are to be interpreted in light of cultural background, primary language, and any handicapping conditions.
- Test results are dependent on co-operation and motivation.
- Test purporting to measure the same ability may produce different scores for that ability.
- Test results should be interpreted in relationship to other behavioural info and to case historical data and never in isolation (Sattler 1988:5).

There are many other considerations that need to be taken into account. Labels and classification are important but should not regiment or restrict the way an examiner works with, or observes each individual. We need to recognize cultural diversity and how it may affect tests in the interpretations of norms. The past two decades have seen many attacks on the use of tests. The very foundation of assessment practices, their tools and the situations in which they are administered have been put to question. Courts have issued decisions limiting the freedom of psychologists to use and select tests for evaluations. Sattler (1988:6) poignantly reminds us that as professionals, we must not ignore the many valid criticisms of tests and test practices but must
continue to develop procedures and instruments that must be adhered to scrupulously.

**c Seven basic test evaluation questions**

Sattler's (1988:8) basic guidelines for evaluating a test is of significant value:

- **Information about the test**

  Name? Author? Publisher? Date of issue? Alternatives available? Cost? Time-factor? Test manual available? Revisions been done? What was the standardised group?

- **Aids to interpreting test results**

  Does manual provide clear statement of the purpose and applications for which the test is intended and the qualifications needed to administer the test and interpret it properly?

  Do the test, manual, record forms, and accompanying materials guide users toward sound and correct interpretations of the test results?

  Are the statements in the manual that express relationships presented in quantitative terms, so that the reader can tell how much precision or confidence to attach to them?

- **Examinee considerations**

  What are the prerequisite skills? What language or modes of communication can the test be administered? Does it use the appropriate vocabulary? How are test items presented and responded to? What stated or unstated adaptations can be made in presentation and response modes? Sex and ethnic biases? Interesting test materials? Is test suitable for individual or group administration?

- **How is the test’s reliability and validity ranked?**

- **What is involved with its administration and scoring procedures?**

- **Are the directions and procedures clear and complete?**

- **What scales and norms are used for its evaluation?**
Are they clear and carefully described? Are norms reported in an appropriate form (usually standard scores or percentile ranks)? Populations clearly defined and described? If more than one form is available, are tables available showing equivalent scores on the different forms? Does the manual discuss the possible value of local norms and provide any help in preparing local norms?

**Test administrator**

A skilled clinician has to master various technical and clinical skills with a background in testing and measurement, statistics, child development, and child psychopathology. They need knowledge to assist in administering and interpreting tests, arriving at conclusions, and formulating recommendations. Sattler (1988:7) lists around eleven technical and clinical skills needed to be competent clinical assessor.

The rational of the test that is presented is of extreme importance as too are the general assessment considerations. Such as an ‘effective assessor’ must know a great deal about tests, people, capable of using creative skill, scientific rigor and be flexible enough to modify or reject hypotheses in the light of new data; know the situations about which inferences must be made and, be aware of one’s own characteristics as an interpreter of test performance and human behaviour. He needs a multimethod assessment approach:

A scorer needs to be able to:

- Synthesise information from the past records, evaluations and interviews.
- Make observations (especially within environmental settings and peergroup and family relationships).
- Find and compare the appropriate results of standardised tests (when comparing to some norm group).
- Perform informal tests for obtaining information about special abilities or skills (Sattler 1988:532).

Davis lists numerous creativity squelching comments which the researcher deems necessary all creativity test administrators should familiarise themselves with (Davis
Once the blockers of creativity have been identified it is necessary to understand what the stimulators and positive influences of the creative process are.

**Basic steps in the assessment process**

- Review referral information.
- Obtain information concerning medical, social, psychological, linguistic, educational, and physical development, including previous psychological evaluations.
- Assess behaviour of relevant people sources.
- Observe in various settings.
- Administer test selected on basis of referral question; age; physical capabilities, language proficiency, and prior test results and reports.
- Interpret data.
- Formulate hypothesis.
- Develop intervention strategies.
- Write report with recommendations.
- Meet all concerned individuals to discuss results and recommendations.
- Follow up recommendations and retest (Sattler 1988:533).
- Considerations need to be made regarding the individual's background & functioning. Somatic, psychological, social and interpersonal factors. Each subdivided into basic endowment, developmental processes and acute events or changes. See Figure 19 (Sattler 1988:541) below.
Sattler (1988:542) provides a structured list of variables to consider in a clinical and psycho-educational assessment such as age, sex, locale, race/ethnicity, family history, (SES) socio-economic status, visual perception, oral language, memory, gross and fine motor coordination, attention span, activity level, behavioural and emotional adjustment, arithmetic & reading achievement, intellectual ability, physical and health status, educational history & placement and language.

**Some general testing procedures**

These include those of Kirk (1974:5-7,13 & 14), who advises with a general outline, the procedures that must be followed when testing:

i General testing precautions such as to read and re-read instructions, always adhering to standardised procedures, following scoring instructions and not to entirely depend on printed directions but have them available for ready reference.

ii Staying objective in regards to giving no indication of correct or incorrect responses or verbal intonations or clues.

iii Being natural (warm, but impersonal, use standardised wording, take a listening attitude).
iv Prepare the environment by avoiding visual, auditory or emotional distractions.

v Providing optimal conditions for good performance (room and body comfort, avoidance of glaring reflections, speaking in a clear, moderate rate of speed, maintaining interest, encouraging general and not specific performance).

vi Administering and scoring efficiently by providing an efficient arrangement and method of manipulating materials. Making a smooth transition from item to item and not extending the test unnecessarily. Knowing the scoring standards.

vii Handling extraneous behaviour such as irrelevant remarks and rather developing interest, motivation, and task orientation. Developing the ability to foresee fatigue and distraction.

viii The examiner must know the scoring standards well. This requirement applies particularly to the understanding of the intent of each test.

ix Kirk warns that it is often necessary to evaluate equivalent responses in the light of the other responses listed in the scoring standards, since not all possible responses could be included.

x The scorer needs to verify any doubtful responses and every step in the scoring process should be rechecked including all figures and calculations.

xi Great care must be given to all test materials. Whenever materials presented become marked or defaced in any way that might influence a response, it should be replaced. Where the examiner needs to point to a query it needs to be done using the back end of a pen or pencil.

xii And, finally if any materials are lost or damaged, the should be replaced by objects identical to the original (Sattler 1982:89& 90).

There are many concerns about adequate procedures for administering and scoring creativity testing instruments. Treffinger, Torrance and Ball (1980:47) constructed a set of 19 guidelines and 22 training procedures for test administrators and scorers. As an extremely valuable study it suggests adhering to the following (condensed summary):
Guidelines: Pre-print all directions, test administrators should take the tests themselves, they also need to discuss the directions under supervision, conduct practice sessions, emphasise the importance of adhering to the instructions, a regular staff member (familiar) should remain present, keep record of any unusual events, equipment efficiency, an advance visit should be done by administrator, review necessary demographic data, prepare test booklets, test times must be monitored carefully, records of all data should be kept and monitored, correct procedure should be followed with all test materials upon completion, test booklets containing several tasks should be marked and easy to use, everyone involved should know exactly where and when all tests are to be administered, special appropriate measures “may be needed” to motivate the performance of some students.

Training: Suggestions as how to score, where to score, appropriate ways of ‘coding’ test booklets to maintain a degree of anonymity of the test takers, how to properly conduct a training session, scorer’s aptness to boredom, carelessness, impatience, arithmetic errors, comparing means and variables, a notation system for scoring, consistency among scorers, rescoring, as a group ‘talk through’ dummy tests, follow instructions precisely and developing a standard scoring-worksheet. (Treffinger, Torrance and Ball 1980:47-55)

Included in this research paper are examples of positive verbal reinforcements that might be useful for subtests in the Torrance Test of Creative Thinking.

4.2.1.2. VALIDITY AND RELIABILITY

There is considerable evidence of inconsistencies caused by discriminating various dimensions of creativity. Bachelor (1989:815-823) for example points out some research findings that the average value of the correlation of fluency, flexibility, and originality ratings in physical education, painting, model-making, writing, and drama was approximately .80. Peer nominations to measure fluency, flexibility, and inventive level produced intercorrelations ranging from .62 to .82. Several studies have collectively demonstrated that the dimension of divergent thinking tests typically show virtually no discriminant validity (Batchelor 1989:816-817).
Obviously, a considerable “halo effect” is present when creativity is based on subjective judgements. Judges seem to be able only to establish some overall opinion which influences all their judgements. Because of this global judgement they fail to discriminate creativity from other, related constructs. (Batchelor 1989:817.)

Other findings found that subjects can for e.g. make independent judgements regarding creativity and intelligence. A study by Harrington, Block and Block (Batchelor 1989:817) concluded that their creativity criterion demonstrated substantial discriminant validity while other research presented evidence that individuals can discriminate creativity from intelligence and wisdom. Similar studies pointed to the fact that creativity was distinguishable from both aesthetic value and technical competence in judgements of art quality (Batchelor 1989:817). Many debates are found in all the research done on the validity and reliability of various tests. In brief, the researcher will refer and discuss various matters as they relate to the testing methodology:

\subsection*{a Norm Referenced Tests}

Norm-referenced tests are standardised on a clearly defined group and called as their name suggests the norm group. It is scaled so that each individual score reflects a rank within the norm group. Interviews are considered to be more open and less structured and give interviewees an opportunity to convey information in their own words. Observations on the other hand concern themselves with information pertaining to aspects such as the individual in their natural surroundings and provide valuable assessment information. Standardised norm-reference tests may need to be augmented with informal assessment procedures. These could include criterion-reference tests, which may or may not be standardised. Some examples here are such as the need to obtain language samples from children, test children’s ability to profit from systematic cues, and evaluate children’s reading skills under various conditions (Sattler 1988:4). The only drawback here is that informal assessment often have unknown technical adequacy such as uninvestigated reliability and validity. Sattler’s focus on the child, stresses the need to consider the developmental
norms and processes. Standardised tests usually provide these norms, but informal assessment procedures should always be based on a developmental perspective.

**b Scoring**

The major types of derived scores used in norm-referenced tests are age (such as MA-mental age & CA-chronological age) and grade equivalents, ratio IQs (IQ=MA/CA multiplied with 100), percentiles (an individual's position relative to the standardised sample), standard scores (transformed raw scores), and stanines. Statistical significance is established at the .05 level as the minimum weight level (Sattler 1982:17-20).

**c Validity**

Validity of a test is the extent to which a test measures what it is supposed to measure, and also the appropriateness with which inferences can be made on the basis of the test results. There are five varieties of validity: content, criterion-related, and construct, concurrent, predictive validity and factor Analysis.

**i Content Validity**

This involves the systematic evaluation and examination of the content of the test to determine if the items are 'representative of the domain' that it is allegedly being measured. Issues such as appropriateness of questions, does the test measure the domain of interest, is enough information given and the level of mastery at which the content is being assessed (Sattler 82:23).

**ii Construct Validity**

Construct Validity measures a psychological construct or trait. This is evaluated by various procedures designed to determine how the items in the test relate to the theoretical
construct that the test purports to measure. *Factor analysis* permits such an investigation (Sattler 1982:24).

According to Davis (1989:258), divergent thinking tests and personality/biographical inventories both have a solid theoretical base and good supporting validation research. Both work reasonably well at age levels between preschool and adult. Both, he claims, have *strong construct validity* - persons who possess those divergent thinking abilities or those personality traits tend to show other characteristics of creative people, including a tendency to do creative things' (Davis 1989:259).

### iii Criterion Related Validity

This refers to the relationship between test scores and some type of criterion or outcome, such as ratings, classifications, or other test scores. It must be readily measurable, be free from bias and relevant to the test. This complementary relationship between test and criterion is an obvious necessity, as the test must measure the trait it was designed to measure. Two types of criterion-related validity are *concurrent* (or diagnostic) and *predictive* (or prognostic) (Sattler 1982:24).

Davis (1989:259) acknowledged that some tests have good criterion-related validity. This, he claims, is usually concurrent in the sense of establishing significant correlation’s between creativity test scores and some other current criteria of creativity such as other creativity test scores, rating of a creative product or ratings done by peers, teachers etc. He cautions the fact that only on rare occasions, the criterion-related validity is predictive- and that the test scores would correlate with future criteria of creativeness. The researcher contests this statement by contemplating whether the future would alter the concrete criteria of creativity or, whether Davis is referring to the implications that society’s aesthetic tastes, needs and judgements would dictate?

A significant amount of studies reported a median correlation between figural creativity scores and intelligence as .06 and between verbal creativity and intelligence as .21, which according to Davis (1989:263) is consistent with the assumption that *creative abilities and abilities measured by intelligence tests are not the same*. An interesting
comparison was done in Sattler (1982:60) between criterion-referenced and norm-referenced test:

<table>
<thead>
<tr>
<th><strong>Norm-Referenced Tests</strong></th>
<th><strong>Criterion-Referenced Tests</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpret test scores in relation to established norms.</td>
<td>1. Report which, or how many, of a set of specific achievement goals the individual has reached.</td>
</tr>
<tr>
<td>Sample the domain of a particular achievement area broadly.</td>
<td>2. Sample a limited number of specifically defined goals.</td>
</tr>
<tr>
<td>Provide a concise summary of less clearly defined areas of achievement.</td>
<td>3. Report specific and detailed information on pupil achievement.</td>
</tr>
<tr>
<td>Encourage and reward individual excellence in achievement.</td>
<td>4. Emphasize mastery of specific subject matter by all pupils.</td>
</tr>
<tr>
<td>Treat learning as consisting of building a structure of numerous relations between concepts.</td>
<td>5. Treat learning as if it were acquired by adding separate, discrete units to the collection of things learned.</td>
</tr>
</tbody>
</table>

Table 7: Sattler  
(Sattler 1982:60).

**iv Concurrent Validity**

Concurrent validity refers to whether or not test scores are related to some **currently available criterion measure**. If a test is highly correlated with a currently used procedure, it is taken to mean that the test may be used to replace the longer, more laborious procedure formerly used for a selection process (Sattler 1982:24).

**v Predictive Validity**

Predictive validity refers to the correlation between test scores and **performance on a relevant criterion, where there is a time interval between the test administration and performance on the criterion**. It can for e.g. determine whether a score on a test is an accurate predictor of future performance on the criterion.

There are many factors affecting validity. **Test-related factors** such as test-taking skills, anxiety, motivation, speed, understanding of test instructions, degree of item or format novelty, examiner-examinee rapport, physical handicaps, bilinguals, deficiencies in educational opportunities, unfamiliarity with test materials, and deviation in other ways from the norm of the standardised group. **Criterion-related**
factors such as school grades that are affected by motivation, classroom behaviour, personal appearance, and study habits. Intervening events and contingencies may also affect predictive validity. Acute states of disturbance often disrupt intellectual efficiency and therapeutic intervention is needed (Sattler 1882:24-25).

vt Factor Analysis

Factor Analysis is a mathematical procedure that is used to analyse a group of intercorrelations. Each factor is defined as a cluster of intercorrelated tasks. It reduces larger numbers of variables to a smaller more user-friendly number (Sattler 1882:25). It is a useful procedure for determining the underlying structure of a test and would be of value in utilising in the CPAM matrix.

4.2.1.3 CODE OF FAIR TESTING AND TEST EVALUATION GUIDES

Rudner, (1998) provides a thorough list of evaluative questions that could be of extreme value when evaluating a test. Of interest is the fact that his guidelines and summary identify the key standards from the Standards for Educational and Psychological Testing established by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education. He describes these standards concerning the following:

a Test Coverage and Use
b Appropriate Samples for Test Validation and Norming
c Reliability
d Predictive Validity
c Content Validity
f Construct Validity
g Test Administration
In addition to this valuable source of test evaluation, he suggests the following guidelines from the following sources: The Code of Fair Testing Practices (Available through his gopher site), the American Psychological Association (1986) Standards for Educational and Psychological Tests and Manuals and the Society for Industrial and Organisational Psychology (1987). Most important of all is the *Code of Fair Testing Practices in Education* prepared by the Joint Committee on Testing Practices which he explained affirms the major obligations to test takers of professionals, who develop or use educational tests. This Code also addresses the roles of test developers and test users. The Joint Committee was initiated by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education. The Code presents standards in the following four areas:

- Developing/selecting tests
- Interpreting scores
- Striving for fairness
- Informing test takers

### 4.2.2 Psychological aspects of creativity

Amabile (In Runco & Albert 1990:73) admitted that undermining creativity is much easier than stimulating it. She cites the overemphasis on the status quo and many other sensitive factors that somehow stops the flow. The following research on psychological issues validates her point.
4.2.2.1 BLOCKERS OF CREATIVITY

a Expectations, limited environments & conscious functioning

Clark (1988:67) notes expectations that stop creativity. Attitudes where everything is expected to be successful, useful, perfect, where everyone is supposed to ‘like you’ or where there are demands not to rock the cultural boat. ‘Limited Environments’ as well as individuals operating all their waking hours in rational, everyday consciousness are functioning below their optimal level (Clark 1988:68). Amabile (In Runco & Albert 1990:72) mentions that detailed content analysis of interviews revealed several environmental factors that inhibit creativity. Factors like constrained choice, an overemphasis on tangible reward, evaluation expectations and competition.

b Habit

Davis’s (1992:18-35) chapter on barriers, blocks, and squelchers provide valuable insight in locating criteria which all tests should allow for. He proposes that the most obvious barrier to creative thinking is habit, which includes learnt responses, routines and general patterns of behaviour. A question he asks is whether man’s old habits and expectations are interfering with new ideas and activities (Davis 1992:18). This has significant impact on all factors relating to creative testing (methods of testing, familiar stimuli, presentation and explanations, environment).

c Rules and traditions

Rules and traditions are also factors of habit but, add more dimension that guide (restrict, inhibit) personal, social, and institutional behaviour. Here thorns like the ‘status hierarchy’ and the ‘degree that rules and procedures are enforced’ (formalisation), prevent or curtail the generation of new, innovative proposals. On the other side of the coin is also true in that when an idea is accepted, ‘an efficient formal structure expedites its implementation’ (Davis 1992:19 & 20). Arnold (In Parnes & Harding1962: 266) points out that group members of a creativity session need to be given license to do as they wish, which indicates that their thoughts
should be unrestricted. The overemphasis on the status quo can also be detrimental to the creative process (Amabile in Runco & Albert 1990:72).

*d Procedural barriers*

Policies, rules, traditions and regulations that keep the system working but inevitable, also work against the creative spirit (Davis 1992:21). Arnold (In Parnes & Harding 1962:266) highlights a list of problems that may be encountered in creativity sessions such as within the business sector:

- Problem statements: Technical terms with the non-technical members should be avoided.
- Choice of Director: A director, able to exercise theatrical control, and allowing free exchange among members of the group is desired.
- Choice of group: Highly specialised groups, locked-into-themselves groups, groups with *limited emotional response* should be avoided.
- Unclear goals (Amabile in Runco & Albert 1990:72).

*e Perceptual barriers*

Based in learning and personal thinking barriers. New meanings, relationships, or new applications and uses are difficult to see. All of us possess a perceptual or mental set (called a functional fixity) that is rooted in unique interests, needs, biases, values, and past learning. These are tied to tendencies to make quick decisions, jump to conclusions and preventing man from getting a complete or accurate picture of the world around them (Davis 1992:21& 22). Amabile (In Runco & Alberts 1990:72) recognised that perceived apathy toward the target project were also inhibiting but said that they needed further investigation.
### Cultural blocks

Found in social influence, expectations, and conforming pressures based on social/institutional norms and values and, leading to the loss of individuality and creativity. Davis alludes to the research done by Torrance on the slump of creativity scores of children entering kindergarten as well as the famous fourth-grade slump (Davis 1992:23). Conformity pressures work in subtle ways: pressures to be practical, economical, amiable, competitive, to have faith in reason and logic and that fantasy is just a waste of time. Davis cautions that as a general guideline, there is a time to conform, and a time to think independently and creatively (Davis 1992:23&24).

### Emotional blocks

According to Davis, emotional distractions (fear, anger, anxiety, hate, health and love) can 'freeze' our thinking. They are sources of insecurity and are often brought on by fear of being different, of criticism, of failure or rejection. Individual/attitudinal barriers are linked to the fear of taking risks, fear of uncertainty and ambiguity, differences in values and needs, and, personal characteristics that produce conflict. Davis did however point out the fact that moderate amounts of tension and anxiety are normal, particularly a state of ambiguity, during the creative process (Davis 1992:24-26).

Kirkland (1971:318-319) too, pursues the issue of the research done on the effects of anxiety on test performances and their results. His results indicated both positive and negative effects. This in some way supports Davis's theory that anxiety is a normal state during the creative process and should therefore not necessarily be ruled out as a creativity squelcher. Kirkland's negative effects include:

- Impaired performance, reduced functioning, poorer (level of ability) students tend to be the most anxious when facing a test, extreme degrees of anxiety are likely to interfere with test performance while mild degrees facilitate test performance, test anxiety increases with grade level and appears to be long-range rather than transitory, personality variables indicate that aggression is
negatively related and a negative concept of self and general behaviour constriction are positively related.

Of interest to this paper are Kirkland's positive correlation's:

- Occasionally anxiety causes improved performance and mental alertness while there seemed to be a positive correlation between the level of anxiety and the level of aspiration. Those who are least anxious tend to be those who have least need or desire to do well on it. Mild degrees of anxiety facilitate test performance. The more familiar a student is with tests of a particular type, the less likely he is to suffer extreme anxiety. Interesting was his findings that a high level of anxiety tends to be positively correlated with rural children, children with emotional problems, unpopularity with peers and a low socio-economic level. Both active and passive forms of dependency are positively related to anxiety (Kirkland 1971:318).

Arnold (In Parnes & Harding 1962:266) likewise emphasises emotional blockers within a creativity session:

- Guilt: Are they being paid for fantasy or something they enjoy?
- Inhibition: Fear of being too impractical. The need for facts limits thought processes and impracticality needs to be 'encouraged'.
- Fatigue: prolonged sessions produce the fear of mental fatigue. Some relief, not too much is essential (Arnold in Parnes & Harding 1962:266).

**h The resource barrier**

The resources barrier focuses on an organisational block to creative innovation - a shortage of people, money, time, supplies, or information (Davis 1992:26, Amabile in Runco & Albert 1990:72). Knowledge regarding the stimulators of the creative process within the dimensions of assessment should be regarded with the same rate of importance as that of the obstacles.
Recent experimental research has moved beyond the assumption that there was a hydraulic relationship between intrinsic and extrinsic motivation. It is believed that as extrinsic motivation increases, intrinsic motivation (and creativity) must decrease. It was however, found that for some people, there seems to be an additive component that kept their intrinsic motivation high and actually enhanced their creativity (Amabile in Runco & Albert 1990:73).

It appears, then, that the intrinsic motivation principle of creativity, in its simple form, is incomplete. It implies that extrinsic constraints will always undermine creativity. But both observational evidence and experimental evidence suggest that this isn’t so. Individual differences in people’s interpretation of the constraints can significantly affect the outcomes on creativity, whether those individual differences arise through explicit training (as in our study) or occur naturally as personality characteristics. (Amabile in Runco & Albert 1990:75.)

Explicit instructions

Bachelor (1989:817) notes that research was done that contrasted the performance of gifted, talented, and non-gifted children under standard and explicit instructions. The results indicated that explicit instructions enhanced the originality scores of all groups. Here statistically infrequency distinguished between unusual and unique responses. They found that scores on originality measure were adequately reliable when variance in fluency scores was partialled out in tests of divergent thinking. Further research done concerning the construct validity on the Unusual Uses Test under standard and vague instruction proved that test-taking instructions as well as stimuli, may have substantial impacts on creative responses. Instructions to ‘be original’ increased unique and originality whereas to ‘be wild’ yielded the greatest number of responses.
b A good rapport, in a playful context and no time limits

Hattie (1980:97) also recognised that creativity tests administered under different conditions lead to differences in performance. He quotes Wallach and Kogan who prescribed that their creativity tests be administered 'in a relatively playful context' with no time limits or restrictions. Hattie cautions that it is by no means experimentally clear that gamelike conditions do provide the only means of reducing stress and anxiety and enhancing creative performance. A good rapport was also a test condition which was to elicit subject's co-operation, to ensure that subjects follow test instructions and reduce the threat to the individual's self-worth. Minimal cues that suggest to the child or individual that he is in a situation of danger, that he is being evaluated by an authority figure whose response to his failure will reduce the responsibility of need gratification, all play an important psychological part in creativity assessment.

c Problem discovery

The notion of discovering problems and challenges have been clearly defined by Parnes (Davis 1992:104) who itemised a list of prodding questions to help discover opportunities and increase problem sensitivity. All creativity tests should address this sensitive issue of finding problems by creating opportunities that demand creative solutions. These questions could serve as an important guide in which a test could address the Preparation phase. Parnes (Davis 1992:105) insisted on listing all that is known about the problem during fact finding with the use of who, what, why, when, where and how questions.

d Initiating an awareness in creativity

Hattie (1980:88) explains how Wallach and Kogan had found that training techniques such as repeated presentations of a list of stimulus words in a free-association, produced a significant increase in originality which lasted for at least 2 days. They hypothesised that responses to tests under a second formal testing might be more original than those done with the first without training. 'One way of
achieving this awareness in creativity testing would be to give subjects a chance to perform the tasks as part of the instructions and to take subsequent performance as the estimate of creative ability' (italics mine) (Hattie 1980:88). Although their studies were not conclusive, they stipulated a clear finding that creativity tests administered under different conditions lead to differences in performance (Hattie 1980:97).

**e Stimulation of four main factors responsible for creativity**

Bull and Davis (1982:1) proposed four factors as responsible for creativity to occur. They pursued the suggestion that creativity is the ability and motivation to look into oneself and to mentally examine and play with ideas and images. New products are built upon other products or ideas, but differ in having some new twist or some new application. These twists or applications are first 'seen' in the mind of the individual. The first factor is a precondition for creativity and called 'internal sensation seeking.' The second supports the acquisition of knowledge, which as Bull and Davis (1982:1) and numerous supporting authors suppose, may be characterised by curiosity. Third is the 'need to produce,' which separates issues, pursued after the flash of insights that occur, and those that are not. This drive to actually produce may differentiate the dreamer from the productive creator' (Bull and Davis 1982:2). They deemed the factor of originality, as a necessary but not sufficient condition for the production of creative products (Bull and Davis 1982:2).

**f Stimulation of five personal factors responsible for arousing new ideas**

Vaughan (1987:306) proposes five conditions central to the state of mind in which new ideas are likely to occur:

i Dedicated determination to avoid drifting with circumstance and developing a unique personal orientation.

ii Learn how to 'Search the scriptures' implying reading not for knowledge, but for insight, i.e., for sparking new ideas and the creative re-association of old ones.
iii Continuous Association with personal interactions such as with a small group or access to a supporting team. Others often enhance the evolution of a creative lead. Some need the stimulus of a supportive group to evolve the idea further.

iv The need to Keep Record of all new, strange, or even ‘disturbing’ ideas and search through it regularly.

v To Live Symbolically. It involves personal search, over an extended period of detachment from one’s normal working life, where one can experiment in a social environment that accepts and supports such experiments. It is important to remember that we live in a world where established values are continually being questioned amid cultural change (Vaughan 1987:307-308).

\[ g \textbf{Creative climate: attitudes, instructions and procedures} \]

Runco and Albert (1985:498) too believe that DT tests are sensitive to the conditions under which they are administered such as the level of permissiveness, or game-like versus test-like atmosphere, the instructions given to the subject, the homogeneity of tests employed, and the procedures for scoring unusual ideas. The results from the DT in one condition or population are not necessarily indicative of DT test results in another condition or population.

Wallach and Kogan (Hattie 1980:87) claimed that it was necessary to allow the subject as much time on a creativity test as the subject desired and to provide an atmosphere of playfulness (gamelike) rather than of evaluation.

\[ h \textbf{Allowance for special aptitudes} \]

The needs of the individual that has a special aptitude in a particular field need also be considered when taking a test. Here a particular modality such as from the senses (visual, auditory, cutaneous, kinesthetic, gustatory, olfactory, and organic) where creative imagination imagery and the function of the several sense modalities in the production of original images are produced, need to be addressed, or if possible measured.
Culture-sensitivity

Jellen (1989:78) points out that one of the most important pre-conditions required for creativity to be unleashed is the adequate identification of high, average or low creative potentials so parental, educational, and/or political intervention can reinforce, redirect, revise or enhance creativity. He set out to design a more culture-sensitive instrument and that was easy to administer, economical in time and cost, with a set of eleven evaluation criteria requiring minimal training. In order to maintain culture-fairness, he avoided verbal clues by choosing a drawing task with certain figural stimuli (Jellen 1989:79). He devised the Test for Creative Thinking-Drawing Production also known as TCT-DP. Jellen suggested that in order to maintain a qualitative analysis, variables such as ‘humour’ had to be evaluated by utilising native assistance in order to ‘catch’ the humouristic nuances of certain themes, Gestalten, and/or elements on the testing sheet (Jellen 1989:86).

Issues regarding the general assessment procedures as well as the psychological aspects of creativity have been investigated. The researcher now intends focusing on the assessment of precarious nature of the creative process.

4.2.3 Assessment of the ‘Creative Process’

Here researcher intends proving that assessing the creative process is not all that abstruse, as it seems. The fact that there remains some degree of ambivalence concerning certain factors does not necessarily deflect from the fact that much can be explained, understood and tested for. Some pointers that have surfaced are the following:

4.2.3.1 SCORING

Sattler (1988:8) reminds that to score tests accurately, you need to be aware of the research findings concerning scoring bias, "halo" effects which is the tendency in making judgement about one characteristic of a person to be influenced by another characteristic or general impression of that person.
Hennessey and Amabile (88:237) also point out standard creativity's test is narrower in its exclusion of appropriateness, except in the general sense that scorekeepers are instructed to discount clearly bizarre responses. And, it is narrower in its identification of originality with the statistical infrequency of responses' (Hennessey & Amabile 1988:237). They suggest that it may be wise to rely on explicitly subjective judgements of creativity by observers familiar with the domain in question.

Davis (1992:185) refers to Callahan who recently itemised test condition that can influence creativity test scores (decrease their reliability):

- Removing the time limits
- Changing the time limits
- Interrupting children from the uninteresting to the interesting for testing
- Administering creativity tests in the same room as where intelligence tests were administered
- Administering test in barren settings
- Warm-up exercises preceding the testing
- Making innocuous changes in the test-taking instructions (Davis 1992:185).

4.2.3.2 AUTHOR

Parke and Byrnes (1984:217) believe that psychometrics should be attuned to the nuances of creativity and proposed a set of seven basic guidelines for objective creativity assessment. They are summarized as follows:

- Determine the factors associated with creativity that you wish to address.
- Employ multiple measure to assess the creativity factors chosen.
Botha 154

- Must include performance measures in the assessment package implying it includes methods for assessing student performance or products (Auditions, portfolios, displays & designs).

- Provide opportunity for students to display potential as well as performance.

- Consider your assessment schema to determine the 'types' of creative talent it will identify and that which it will not.

- Remember that assessment must be ongoing.

- The persons developing the instrument must be willing to experiment, evaluate, and revise the processes in order to assemble a collection of measures which are sensitive to the subtleties of creativity (Parke & Byrnes 1984:217).

Another consideration is an understanding of the Laws and Government Regulations. Psychologists should become thoroughly familiar with the relevant state and federal regulations that cover such areas as non biased assessment, classification of handicapping conditions, rights of parents and confidentiality of record (Sattler 1988:10).

4.2.3.3. PREPARATION STAGE

In measuring the preparation phase, a creativity test should preferably address problem defining. If a problem has been identified, important aspects of the problem isolated, if sub problems have been identified and/or alternative problem definitions have been proposed, Davis (1992:90) advised that both sensitivity to problems and problem defining require a certain perceptiveness and intuitiveness. During the preparation phase these abilities as well as the ability to visualise, are put to the test. The notion of discovering problems and challenges has been clearly defined by Parnes (Davis 1992:104) who itemised a list of prodding questions to help discover opportunities and increase problem sensitivity. All creativity tests should address these sensitive issues regarding the finding of problems by creating opportunities that demand creative solutions. These questions could serve as an important guide in which a test could approach the preparation phase.
4.2.3.4 INCUBATION STAGE

Here visualisation, imagination, transformation, ability to regress, metaphorical/analogical thinking, Bloom’s analysis of synthesis and evaluation, intuition, resisting premature closure, even convergent thinking such as concentration and logical thinking come into play and need to be assessed, monitored or identified. Davis describes this stage as a period of preconscious, fringe-conscious, off-conscious or even perhaps unconscious mental activity that takes place when the individual is in a relaxed state or during conscious work on other problems (Davis 1992:101). Parnes (Davis 1992:105) insisted on listing all that is known about the problem during fact finding with the use of who, what, why, when, where and how questions. Problem finding involves listing alternative problem definitions as the definition of a problem determines the nature of the solution. He suggests to begin each statement with ‘In what ways might we (or I)…’ (Davis 1992:106). Also Osborn’s 73 Idea-Spurring Questions, Arnold’s checklist and Small’s product-development checklist are but a few examples that push the imagination into new idea combinations and new analytical problem solutions (Davis 1992:176-178). All these suggestions should be considered in a creativity test seeing as they should contribute significantly to igniting the creative process within the boundaries of assessment.

Creative thinking during the incubation phase involves fluency, flexibility, originality, elaboration, transformation, sensitivity to problems and defining them, visualisation, analogical/metaphorical thinking (to see the connection or borrow ideas from one context and use them in another), the ability to predict outcomes or consequences (related to evaluation), analysis (separate details, break down a whole into parts), evaluate (think critically and evaluate appropriateness), synthesis (see relationships, to combine parts into a workable whole), logical thinking (deduce reasonable conclusions), ability to regress (uninhibited by habits, traditions, rules, conforming pressures, playfulness, humour), intuition (related to perceptiveness, to read between the lines) and finally concentration (ability to focus, task-orientation & driving absorption) (Davis 1992:90-91). Patterns of information processing include: using existing knowledge as a basis for new ideas, avoidance of perceptual sets, questioning norms, rule and assumptions, using wide categories, being alert to novelty and gaps in information, coping well with novelty or change, finding order in chaos using internal visualisation and the skill to make decisions (Davis 1992:94).
4.2.3.5 ILLUMINATION STAGE

During a brainstorming session's idea finding period, solutions are freely listed without criticism or evaluation (Davis 1992:106). These factors are extremely important for the successful completion of the creative process. Individually, this rush of insight often occurs within the confines of a relaxing activity, or during the preoccupation of another problem. It is a rather precarious endeavor to ascertain whether or not an illumination has occurred or if the individual is utilizing some previous solutions he remembers from another source. However, illumination does not necessarily take place on demand and needs time to surface. A test should allow for this phenomenon but it carries with it a ambiguous time factor.

4.2.3.6 VERIFICATION

Once an idea is pursued, it is put to the test, evaluated and brought into verification. This step is one of the most important steps in the creative process. Many have the illumination but neglect to put it into action, to communicate its' significance or to do the necessary action to bring it into realization. But before this realization can take place there is a need for a convergent justification of the proposed product. Davis (1992:106) stipulates three solution-finding requirements: listing evaluation criteria; evaluating ideas and then selecting the best idea. Acceptance finding results in an action plan. Isaksen and Treffinger (Davis 1992:106) suggest finding sources of assistance (peoples, things, activities, locations). It is important to keep track of whether the initial goal or problem has been solved in order to determine whether the creative person possesses the important characteristic of 'determination' or not. But, so too is its importance that the creative product is unpredictable and could often lead to the discovery of an entirely different problem. Vaughan (1987:300) recalls Sir Alexander Fleming's case where the best known instance of an unpredicted creative outcome was his discovery of penicillin while engaged in other research.
4.2.4 New trends and research implications

There have been some special trends in creativity research that need to be considered:

4.2.4.1 MOTIVATION PRINCIPLE OF CREATIVITY

Amabile’s (Runco & Albert 1990:67) experimental proof brought about a term she now refers to as the motivation principle of creativity and her results reveal consistent patterns in strong support of her intrinsic motivation hypothesis:

- **Evaluation:** Expected, prior and positive evaluation have a detrimental effect on creativity
- **Surveillance:** Being watched while working can also be damaging
- **Reward:** Contracted-for reward too, can be harmful however ‘bonus’ reward has a positive effect on creativity.
- **Competition:** Competing for prizes has a detrimental effect on creativity
- **Restricted choice:** too kills creativity.
- **An overemphasis on tangible rewards**

Other inhibiting factors that remain to be investigated include: perceived apathy toward the target project, unclear goals, distraction, insufficient resources and overemphasising the status quo. All of the above can be justified with the scrutiny of numerous researchers. (Amabile in Runco & Albert 1990:67-68.) Amabile’s (In Runco & Albert 1990:86) quest to find the Role of the Affect made her predict a link between intrinsic motivation, positive affect, and high creativity. By recognising the significant roles of situation-induced and chronic affective states, Amabile realised that intrinsic/extrinsic motivational orientation is not only a state that can be influenced by the presence or absence of extrinsic social constraints. It is ‘a trait, an enduring attitude that an individual has toward tasks within a domain’ (Amabile in Runco & Albert 1990:87).
4.2.4.2 PRE-SCHOOL RESEARCH FINDINGS

Moran III, Sawyers, Fu and Milgram (1988:254) cites the Wallach and Kogan model which proposes that:

- Creativity should be assessed in a non evaluative atmosphere
- Creativity and intelligence are distinct
- Ideational fluency serves as the best single measure of divergent responding
- The quantity of ideational output is related to its quality (original responses / fit / cleverness)
- Popular responses are usually given early in the response sequence whereas original responses occur only later in the response hierarchy

In similar studies on instructional variables, it was found that the use of reward for encouragement delivered lower and poorer task performance and may alter the evaluation-free atmosphere that is recommended. (Moran III et al 1988:260). Moran III et al also recounts that pre-schoolers generate a larger percentage (60.1%) of original responses than do children who are older. It is interesting to note that only in young adults do the percentages of original responses approach that of pre-schoolers. Their explanation was that this trend was due to the fact that socialisation processes had lead to more cautious responding throughout middle childhood. For the sake of this research paper, Moran III et al considers the attention that must be paid to situational factors which may affect scores. Issues such as task setting, examiner characteristics, instructions, and age effects.

Hennessey and Amabile (1988:235) identify assessment needs for the gifted and creative child.
...we also need methods which can be useful in revealing the creative performance of all children. Not only should assessment methods be straightforward and reliably scorable, but they should also allow for considerable flexibility in children's responses (Hennessey and Amabile 1988:235).

Hennessey and Amabile (1988:237) urged that to assess the impact of social/environmental factors, it was desirable to reduce the role of special domain-relevant skills as much as possible. Their "Story Telling Model" presents children with open-ended tasks and relies upon the direct subjective judgement of independent raters familiar with the product domain (Hennessey and Amabile 1988:245).

4.2.4.3 PERCEPT-GENESIS

Smith and Carlson (1987:7) have designed a new creativity test called the Percept-genesis or PG test. It presumes that percepts are built-up by ultra-short, mostly preconscious processes which can be reconstructed (Kris's regression in the service of the ego) with special experimental techniques. It uses a still-life with two main structures, a bottle and a bowl which is presented tachistoscopically on a screen and observed at very brief intervals (0.01-.02 seconds). The individual then subjectively interprets his impressions verbally and a creative 'protocol' is put together according to the straight PG and the inverted PG time series (Smith & Carlson 1987:8). In conclusion Smith and Carlson reported that the PG test had a high validity and, that a 'rich straight PG' (including human themes) 'attests to emotional involvement in creative activities, while the return to subjective themes in the inverted PG correlates with creativity defined as richness in ideas, originality, an urge to create, or creative interest' (Smith & Carlson 1987:12). This technique is unique in the sense that it makes use of visual stimuli (subliminations) in order to motivate an emotionally laden original response.

4.2.4.4 BIOLOGICAL

Bogen and Bogen (In Rothenberg & Hausman 1976:239) directed their focus on the so-called 'split' or 'bisected' brain. This is produced by the removal or severance of the fibers of the structure connecting the two halves or hemispheres of the
mammalian brain called the corpus callosum (in particular the posterior section). Following such a removal, each hemisphere functions independently and each seems to be responsible for different types of human behaviour. They emphasised the duality of the mind and coined the phrase 'appositional mind' (primarily responsible for nonrational and visiospatial functions) and 'propositional mind' (primarily responsible for linguistic functions), which both have connections with the view that there are two forms of knowledge: logic and intuition. (Rothenberg & Hausman 1976:13, 239, 240). Another literature search conducted by Leiguarda (1993) at Indiana University, Indiana, pointed at the significance of what has been termed 'Alien Hand Syndrome'. Persons from all over the world with injuries to the brain, especially the corpus callosum, sometimes report that one of their limbs, typically an arm, acts as though it belongs to somebody else. These patients had brief episodes of abnormal motor behaviour of the contralateral arm that featured groping, grasping, and apparently purposeful but preservative movements. This leads us to believe that the brain, apart from being split by the corpus callosum, is in fact two separate entities, each with an ability and 'mind' of its own.

4.2.4.5 ALPHA

Focus on the altered states of consciousness has brought about another trend called 'alpha conditioning' (Rothenberg & Hausman 1976:241). It is a method of the artificial control of certain types of electrical waves emitted from the brain during a relaxed state. These slow electrical waves called alpha waves, are ordinarily emitted spontaneously and are identified by means of an electro-encephalographic device. It would seem that creative thinking seems to be connected to these particular states of mind.

Clark (1988:36) too, alludes to how different brain wave frequencies can have important implications for learning. The ability to focus energy from the entire brain is seen to result in accelerated learning, healing, and higher levels of consciousness... the alpha state is not a single phenomenon, but a conglomerate of perhaps some 600 phenomena, with equally numerous correlated characteristics that are dependent on the location, form, appearance, movement pattern of the alpha wave' Clark (1988:36). She mentions the interesting research done by the British
physicist Maxwell Cade, but concluded that inadequate data made this type of research less easily validated. Since then numerous studies have surfaced and shared their results on the World Wide Web:

Biocybernaut Institute (On-line:1998) have launched a product said to stimulate creative thinking skills. They explain that alpha is one of four basic brain waves (delta, theta, alpha, and beta), which make up the EEG (electroencephalogram). The brain's waves are very tiny electrical voltages, just a few millionths of a volt. The most rapid brain wave pattern is that of beta, from about 14 Hz to more than 100 Hz. This is the pattern of normal waking consciousness, and is associated with concentration, arousal, alertness, and cognition, while at higher levels, beta is associated with anxiety. Alpha waves oscillate about 10 times per second (range between 7-12 Hz) which is a place of deep relaxation, but not quite meditation. Alpha is also the home of the window frequency known as the Schuman Resonance, which is the resonant frequency of the earth's electromagnetic field. It is during alpha that we begin to access the wealth of creativity that lies just below our conscious awareness. This leads into deeper states of consciousness. The next level is called Theta which are a much slower and smaller amplitude (range between 4-7 Hz), also known as the twilight state which we normally only experience fleetingly as we rise up out of the depths of delta upon waking, or drifting off to sleep. Here we are in a waking dream, vivid imagery flashes before the mind's eye and we are receptive to information beyond our normal conscious awareness. Theta meditation is said to increase creativity, enhance learning, reduce stress and awaken intuition and other extrasensory perception skills. This state or hypnagogia (Neuro-Technology Research. On-line:1996) is quite common occurring in 72 to 77 percent of the population. Unfortunately on the average, only 5 to 10 minutes is spent in hypnagogia as one passes from a relaxed alpha brainwave state on into the first stages of sleep. Four main features of hypnagogic images: vividness, originality, changefulness, and independence of conscious control Most, if not all, of the conditions of creativity are present in hypnagogia (Neuro-Technology Research. On-line: 1996).
4.2.4.6 BINAURAL BEATS

Hutchison (1994:33) testified that theta waves not only increased creativity, but also brought about superlearning, integrative experiences, and increased memory. In delta that our brains are triggered to release large quantities of healing growth hormone. Slowing down the brain wave patterns from beta to alpha to theta to delta, there is a corresponding increase in balance between the two hemispheres of the brain. This more balanced brain state is called brain synchrony, or brain synchronisation.

During deep meditative states, waves shift from the usual asymmetrical patterns, with one hemisphere dominant over the other, to a balanced state of whole-brain integration, with the same brain wave frequency throughout. Inducing brain wave patterns through the creation of binaural beats in the brain had a wide range of effects. It is said that instead of feeling separate and narrow-focused, you tend to feel more into it, unified with the experience. You are the experience and that the scope of your awareness is widened a great deal, so that you're including many more experiences at the same time. This has extreme significance for an individual being tested for creativity. In order to test at optimum level, whole-brain sensory integration is needed and in Theta State the individual becomes less self-conscious and can function more intuitively.

Bulgarian psychiatrist Lozanov (On-line: 1998) used deep relaxation combined with synchronised rhythms in the brain to cause students to produce alpha waves. In this state, he found that students learned over five times as much information in less time per day, with greater retention. In some cases, as much as thirty times as much was learned. Theta signals in the learning environment allow for a broader processing of information increasing the focus of attention and creating a mental set of open receptivity.
Botha 163

(Binaural beat) signals, however, can facilitate a prolonged state of theta to produce a relaxed receptivity for learning. [These signals] create a state of coherence in the brain. Right and left hemispheres as well as subcortical areas become activated in harmony, reflected by equal frequency and amplitude of EEG patterns from both hemispheres. This creates an internal physiological environment for learning which involves the whole brain (On-line: 1998 http://www.centerpointe.com/research2.html).

With the use of such binaural beat signals in a classroom setting, children exhibited improved focus of attention and a greater openness and enthusiasm for learning. Whole brain implementation allows the learner to have greater access to internal and external knowledge. Hemispheric synchronisation appears to promote a highly focused state of attention as well as the ability to reduce 'mind chatter'. It is therefore imperative that the authors of test take into consideration that behaviour modification is enhanced when the subject can be placed in slower, more receptive brain wave patterns which may facilitate the individuals' ability to allow more variations in their functioning through breaking up patterns at the neural level. It may help them develop the ability to shift gears and move them away from old habit patterns of behaviour to become and perform more flexible and creative.

In their seminal book Beyond Biofeedback, the Greens (On-line: 1998) discussed many remarkable effects of the theta brain wave state. They found that those producing theta waves became highly creative. They had life-altering insights, what the Greens called 'integrative experiences leading to feelings of psychological well-being'. On psychological tests, subjects scored as being 'psychologically healthier, had more social poise, were less rigid and conforming, and were more self-accepting and creative'. Another remarkable effect was that these subjects became very healthy. Emotionally, these people had 'improved relationships with other people as well as greater tolerance, understanding, and love of oneself and of one's world' (On-line: 1998).

And finally, the binaural beat can be induced when pure, precise audio signals of different frequencies are delivered to the brain through stereo headphones. The two hemispheres of the brain function together to 'hear' not the actual external sound signals, but a phantom third signal called the binaural beat. 'Brain cells sympathetically
resonate and vibrate in response to the binaural beat, in the same way a crystal goblet resonates and vibrates in response to a pure musical tone. Brain Sync tapes effortlessly guide brain activity into highly specific, organised, and coherent patterns that allow rapid access to remarkable states of expanded awareness’. (Brain Sync Corporation: 1998. On-line.) By utilising these tools within an assessment procedure will ensure that creativity (as it is perceived by Clark [holistically] and other researchers) can be utilised within a most significant setting that will enhance states of expanded awareness. This will optimise the individual’s participation and put him to the test ensuring an environment with unparalleled stimulus.

4.2.4.7 MEYERS BRIGGS TYPE INDICATOR (MBTI)

Research done by Fleenor and Taylor (1994:464) to establish the relationship among two measures of creativity, put focus on three Creativity tests: The CPI Creativity Scale (CPI-CT), the MBTI Creativity Index (MBTI-CI) and a measure of creativity style (adaptive or innovative), the Kirton Adaption-Innovation Inventory (KAI). Significant intercorrelations were found among these measures.

A closer look at the MBTI Creativity Index revealed a self-report inventory designed to measure personality preferences based on Jung’s theory of the psychological type. This instrument classifies individuals as being introverted (IE), sensing versus intuitive (SN), thinking versus feeling (TF), and judging versus perceiving (JP), based on the individual’s preferences for these processes. The MBTI-CI represents the level of creative potential that an individual possesses and is based on the research conducted by Gough at the Institute for Personality Assessment and Research. Previous research has reported that individuals noted to be creative, did have a higher score on the MBTI-CI than did the general population. The equation for this index is as follows:

\[ \text{MBTI-CI} = 3SN + JP - EI - 5TF \]

A score of 350 or higher indicate creative potential (Fleenor and Taylor 1994:466). Development of the MBTI by Katharine Briggs and her daughter Isabel Briggs Myers started in the 1940s and has been improved and refined ever since and proved beyond doubt to be reliable and have scientific validation. It asserts that there are sixteen different personality types, and that every person fits into one of them. Identifying an
Botha 165

Botha 165

individual's type immediately places him/her within a commonality of features and personality traits (Tieger & Barron-Tieger 1995:11). This can be of extreme value to help discover what best motivates and energises each individual which will in turn empower authors of creativity tests to utilize elements in such a way that each personality type can be addressed separately. It is the researcher's opinion that once an individual has been typed, he is assured of being categorised into 'motivating' commonalities that is crucial in sparking the creative thinking process.

4.3 CREATIVITY TESTS

4.3.1 The uses of creativity tests

This research paper has mirrored that creative people can be identified and that creativity can be systematically related to particular characteristics and behaviours. Most of these have been identified and put within a test form for the purpose of identification. The most common use for creativity test has been for identifying creatively gifted children in order to put them in appropriate programs which should nurture and guide their unique potential. Creativity tests are also used for research purposes to evaluate other tests or to determine the capability of creativity training programs. They provide insight and information to parents, teachers, counsellors, and employers and, can serve to enlighten the creative individual himself as to what degree of creative potential the person has. It has become evident that no test thus far, can stand alone but, needs to be taken into consideration along with as many different sources, be it teacher's or peer group ratings and/or other assessment resources.

4.3.2 Types of creativity tests

Davis (1989:258) cites two main categories of creativity tests: divergent thinking tests that measure cognitive ability and personality/biographical inventories that
measure an individual's affective predisposition to think creatively. Ripple (1989:193) however, systematises in a more elaborate approach by referring to eight categories of Creativity measurement which was put together by Hovecar and Batchelor in their comprehensive taxonomy of 100 examples. They are:

**4.3.2.1 TESTS OF DIVERGENT THINKING**

Davis (1992:42 & 91) refers to DT tests as those that test Cognitive style & Information Processing. He quotes Sternberg's intellectual abilities which are: *Verbal ability, fluent thought, knowledge base, planning, problem-defining, strategy formation, decision skills, mental representation, intellectual integration and balance...*while Davis himself refers to versatility, aesthetic ability (taste), decision making, independence of judgement, coping with novelty, ability to escape, perceptual sets, ability to find order in chaos. He also mentions Taylor's logical thinking factors which involve: *productive thinking, communication, forecasting, decision-making and planning* (Davis 1992:307). According to Hovecar and Batchelor (In Glover, Ronning & Reynolds 1989:54), these tests require a multitude of responses rather than a single correct answer. Some examples of Divergent Thinking Tests are: Divergent thinking Open-ended Tests: T.T.C.T., Guilford test, Monitor Test of Creative potential, William's CAP, Wallace & Kogan, Getzels & Jackson, TCAM (Pre-school), and TCSW (Sounds & images, Onomatopoeia & Images) (Davis 192-216).

**4.3.2.2 ATTITUDE AND INTEREST INVENTORIES**

Probably one of the most popular types, the attitude and interest surveys or inventories are most useful in creative assessment. A fine example is the HDYT or How Do You Think Test (Davis 1992:218) which is a five-point rating high school and adult test, that measures *self evaluations of creativeness, self-confidence, risk-taking, energy etc.* Its reliability rating has been around 0.91-0.95. It has a concurrent validity, which correlates at 0.41 and a construct validity that showed a correlation of 0.51 with the intuition scores of the Myers-Briggs Type Indicator. The HDYT creativity test comes strongly recommended and seems to successfully measure the tendency to think and act in creative ways (Davis 1992:219). Hovecar and Batchelor (In Glover et al 1989:55) assumed that a creative person will express attitudes and
interests favouring creative activities. Other examples include: Khatena and Torrance's Creative Perception Inventory (Something About Myself & What Kind Of Person Are You?), Basadur and Finkbeiner's measure of preference for ideation, Creative Behaviour Disposition Scale, Preference Inventory Scale and many more (Hovecar & Batchelor in Glover et al 1989:55).

4.3.2.3 PERSONALITY INVENTORIES

Similar to the Attitude and Interest Inventories, the Personality Inventories assess affective, motivational and personality characteristics such as attitude, awareness, motivation, values and interests. Davis (1992:70) mentions motivation, tolerance for ambiguity, drive, perseverance, risk and many more.

The affective side of the creative process has proved to be of extreme importance and here the Sensation Seeking (or thrill seeking) test by Zuckerman (Davis 1992:74) seems to address this complexity. It measures high energy, adventurousness & risk taking while others like the Kogan and Wallach's Choice Dilemma Questionnaire from Glover (Kaltsounis & Honeywell 1980:61), measure such issues as preference for high or low risk behaviour.

Creativity Traits (Davis1992:65-84) such as confidence, independence, curiosity, wide interests, humour, playfulness, artistic interests, attraction to the complex and novelty, background info such as in theatre, art, science, photography and an imaginary playmate. The best item has been proven to be... “Are you creative?”(See 4.3.3.2). Other examples include Gough and Heilbrun's Adjective checklist and the more popular Gough's Creative Personality Scale. It sets out to measure cleverness, individualistic traits, insightful, original, self-confidence, and unconventional (Hovecar & Batchelor in Glover et al 1989:55).

4.3.2.4 BIOGRAPHICAL INVENTORIES

This category is based on an individual's present behaviour, which is determined by past experience (Hovecar & Batchelor in Glover et al 1989:55). Biographical
Inventories histories of creative abilities and hobbies, experiential factors as well as abilities and taught skills such as implementing (Getting an idea & putting it into action), discerning opportunities (Davis 1992:88). This as well as abilities such as those of Taylor's multiple-talent totem pole creative thinking talents of productive thinking, communication, forecasting, decision making, planning, getting-ideas-into-action talents of implementing, human relationships and discerning opportunities which is thought can be taught (Davis 1992:307).

Examples of Personality & Biographical Inventories: GIFF I, GIFF II (Davis & Rimm), GIFT, PRIDE (Pre-school & Kindergarten Interest), William's Scale (Third Test of CAP), Schaefer: Creativity Attitude Survey (CAS for Grades 4-6), Renzulli-Hartman Rating Scale, Adjective Check List (ACL-Gough) George Domino, Barron-Welsch Art Scale, HDYT (How do you think? From Davis & Subkoviak) (Davis 1992:219-230).

Of interest is Schaefer's Biographical Inventory, which is grouped into five sections: physical characteristics, family history, educational history, leisure-time activities, and a miscellaneous category (Hovecar & Batchelor in Glover et al 1989:55).

4.3.2.5 RATINGS BY TEACHERS, PEERS, AND SUPERVISORS

This method of measurement, Hovecar & Batchelor (In Glover et al 1989:55) warns, is more consistent methodologically than conceptually. They include teacher nominations, peer nominations and supervisor ratings. Here a test like the Ideal Pupil Checklist by Torrance (Kaltsounis & Honeywell 1980:61) will assess children, teachers, and parents against the ideal child criterion. Tests such as these help gain valuable information from peers, group members and various sources, as to creative achievements that do not always show up during the assessment process.

4.3.2.6 JUDGEMENT OF PRODUCTS

There are many authors that are of the opinion that the judgement of Creative Products is the best predictors of different criterion measures. The objectively
scored Statement of Past Creative Activities (SPCA) (Bull & Davis 1980:249), rate past creative activities within the previous 2-3 years within seven categories: artistic, literary, performing arts, inventions, design, crafts, and managerial/teaching (Bull & Davis 1982:3). There are many other tests such as the Inventory of Creative Activities and Accomplishments from Hovecar (Kaltsounis & Honeywell 1980:61). The latter is proposed to be a criterion measure of creativity and, Judging Criteria Instrument by Eichenberger (Kaltsounis & Honeywell 1980:61), was developed to assess the creativity of a student through the products he/she creates.

Hovecar and Batchelor (In Glover et al 1989:55) mention examples that incorporate art, literature and science, all involving experts as well as non-experts. The criteria may vary from diverse definitions of creativity to social recognition. It is for this reason that the researcher believes that Hovecar and Batchelor confided that products are sometimes defined less concretely as ideas and generally represent somewhat limited samples of behaviour.

4.3.2.7 EMINENCE (PROMINENCE)

Society has the final say concerning the validity of a creative product and it is from this source that the eminence of certain individual's can be estimated. Hovecar and Batchelor (In Glover et al 1989:55) considers this an impractical, but valuable approach. Prominent awards that have been won, works that have been published, successful exhibitions that have been held or any reported activity that attained recognition needs to be taken into consideration. The researcher would like to point out that the flaw within this category is that it is limited to a very small segment of the population and does not address 'normal' or potential creativity traits.

4.3.2.8 SELF-REPORTED CREATIVE ACTIVITIES AND ACHIEVEMENTS

Ripple (1989:194) refers to measurements of creativity that are tailor-made for specific purposes but that are resistant to categorisation. Hovecar and Bachelor's conclusion was that creativity measurement researchers should focus on categories
such as those from categories 4.2.3.6-4.2.3.8, although categories 4.2.3.1-4.2.3.3 are not to be discounted as they are intrinsically interesting constructs that are potential causes of real-life creativity (Ripple 1989:194; Hovecar & Batchelor in Glover et al 1989:63).

4.3.3 Prerequisites of creativity tests

4.3.3.1 AUTA MODEL OF CREATIVE OBJECTIVES

Davis & Sullivan's (1980:159) is a fairly clear recommendation for an organised strategy for teaching 'creativity' and preparing creativity test subjects' for 'successful' assessment (See chapter three). According to Davis & Sullivan, the first problem in becoming a more creative person is simply increasing one's awareness of the topic. This awareness includes aligning one's attitudes and even personal commitment in a more creative direction, and should serve to convince that with effort they can become more independent and original (Davis & Sullivan 1980:152 &153).

...the present creativity taxonomy traces the development of ones personal growth through the four major stages of Awareness (A) of creativity and its importance for society and for personal development; a deeper Understanding (U) of the nature of creativity, especially the creative person, the creative process, theories of creativity; the development of Techniques (T) for creative thinking, including personally effective skills, abilities, and techniques and well-known "forced" creative thinking strategies; and finally, an increase in one's self Actualisation (A), the humanistic goal of personal fulfilment and increased mental health through the fully-functioning use of all of one's capabilities. (Davis & O'Sullivan 1980:152.)
4.3.3.2 "ARE YOU CREATIVE?"

Davis (1989:258) claimed that the best single item on creative personality inventories is the straightforward question: "Are you creative?" Davis also highlights the need for tests that include testing for additional creative abilities that are not included in the Divergent Production categories such as problem defining, visualisation, imagination, transformation, ability to regress, metaphorical/ analogical thinking, Bloom’s analysis, synthesis, and evaluation, intuition, resisting premature closure, concentration, and logical thinking (Davis 1989:261).

4.3.3.3 THRESHOLD THEORY

No studies have indicated or shed light on the comparative influence upon creativity of heredity vs. environment while the ‘threshold notion’ assumes that above an IQ score of 120 the moderate correlation between creativity and intelligence disappears. The threshold theory has however, not been favourably supported by various research done. Given an adequate base of intelligence (about IQ 120), affective and motivational factors, creative abilities, and perhaps training and opportunity will determine who is a creative (Davis 1989:270). There has been evidence that socio-economic levels do influence creativity test scores. But, Davis argued, when intelligence or achievement scores were partialled out, differences in creativity between the groups was not significant.

4.3.3.4 FIGURAL TESTS YIELD MORE RELIABLY ORIGINAL RESPONSES

Runco and Albert’s (1985:484) research took into consideration numerous issues regarding the taking of DP tests. They were: age of the subjects, time constraints in test administration, the instructions given to subjects, the particular type of test administered, the number of subjects and the scoring techniques (Runco & Albert 1985:484).
The figural tests, due to their unfamiliarity, may be more challenging tasks and perhaps more “game-like” than the verbal tests. The result of this is that the figural test might stimulate effortful ideational strategies while the verbal stimulate rote ideation. Hence, the figural tests elicit more reliably original responses than the verbal tests. (Runco 1985:497.)

4.3.3.5 OPEN-ENDED PROBLEM SOLVING

Binet and Henri (Wakefield 1991:184) who were the fathers of creative thinking tests, suggested that imagination be measured by means of open-ended problem solving. Wakefield however, points out the degree of constraint on the problem itself by offering the individual an additional opportunity to find the problem themselves. To him problem finding was a skill that is contrasted with problem solving while both processes are seen as necessary to discovery in science or creative achievement in art. (Wakefield 1991:185.) Closed-problems call for evaluative or convergent thinking in contrast to open-problems that call for creative thinking, combining problem invention as well as insightful and expressive problem solving skills (Wakefield 1991:187).

4.3.3.6 DIMENSION OF ORIGINALITY IS KEY ESSENCE

Cooper's (1991:194) 'Critique of Six Measures for Assessing Creativity' highlights weaknesses and strengths in six recommended tests of creativity. Her insight is commendable and her suggestions invaluable to future test designers. In her conclusion she stresses that there has been insufficient attention given to the dimension of originality which she feels is the key essence which determines a person's potential to be creative. She commends Amabile's research in this field in her recommendation that examinees be given more complex and naturalistic assignments such a creating poetry of thematic artistic designs. These works are then to be evaluated by judges of differing backgrounds to determine originality. Her main criticism of the Torrance tests' (Example: The Search for Satori), is that the most influence is of analytic ability and critical thinking rather than spatial creativity or more complex verbal assessments and scoring procedures. She goes on to suggest that that the
Botha 173

TTCT needs upgrading to find *academically talented critical thinkers with a capacity for divergent production* rather than the most original spatial and verbal creative thinkers in the nation. (Cooper. 1991:203-204.)

4.3.3.7 TESTS MUST MEET THE STANDARDS

Rimm (1984:182) sets out principles for guiding identification of gifted children. She explains that creativity in children exhibits itself in subtle ways and that creativity tests are more reliable than the teacher selection procedures. She stresses that a test must meet the standards of valid educational measurement: it must be reliable, easy to administer to groups and not take a long period of time to complete; there must be culture fairness or the indication that the test predicts validity for both minority and majority groups within a population is a consideration within most school districts; results from the test should be used for purposes beyond identification. She aptly quotes Treffinger who urged that identification was not worth anything unless it has an impact on programming. (Rimm 1984:182.)

4.3.3.8 FAKABILITY

Another important factor in any creativity test, is the issue of whether it is fakable or not. Ironson and Davis (1979:139-141) studied four different tests only to confirm that there was no doubt that subjects could in fact easily fake either a high or low creativity score. The main reason was thought that the individual would be faking according to an ideal-self, which was in standing with good traits associated with a positive trait such as 'creativity'. Tests should therefore have lie scales or social desirability keys to help locate fibbers who wish to look good. (Ironson & Davis 1979:140). Their conclusion highlighted that favourable creative adjectives such as active, ambitious, were generally easier to fake than unfavourable ones such as egotistical, sarcastic. It is the researcher's opinion that if the individuals tested were to know that creativity had negative traits, the results could have differed somewhat. Other factors such as whether the addition of more positive characteristics that were not creative attributes together with an equal amount of randomly selected negative traits, leaves one to consider whether it would have brought about the same conclusion or not.
Davis (1989:270), notes that two studies have been done that investigates the fakability of higher creativity scores. The Adjective Check List's unfavourable creative adjectives such as argumentative, careless, disorderly, moody, egotistical, cynical and tactless were however, less obvious items. Other more ambivalent results show that college seniors that have been trained in creativity as freshmen scored no better on creativity tests than untrained peers. Davis (1989:271) questions whether better criterion such as a measure of creative activities, creative pre-dispositions, or success in business would have produced more favourable results. The researcher likewise queries whether it would have made a difference if the subjects had been asked whether they had applied their trained creativity skills or would continue applying their creativity enhancing skills during the taking of the test or not, before they were tested.

4.3.3.9 REAL-TIME AND MULTISTAGE CREATIVITY

Cave (1998: On-line) has an extensive 'creativity web site' with numerous creativity related antidotes. He refers for example, to the mode of activity one is in when being creative, as differing. There is, he believes, a distinction between real-time creativity and multistage creativity where the former is 'spur-of-the-moment, improvisational, and demands output in a short interval of time; whereas in multistage creativity, sufficient time is allowed for the generation and selection of ideas'. This brings a new dimension to the taking of creativity test. There is no fixed time limit to which the Illumination stage adheres to and its onset differs within each individual. Allowance should therefore be made to accommodate a time factor variance.

4.3.3.10 SOME UNANSWERED QUESTIONS

Youtz's (Parnes 1962:199) indicates some unanswered questions and the importance of information by means of the results from experimental findings with reference to:
Past experience

Whether or not new solutions usually appear whole

If anyone can be creative

If previous habits hinder present problem solving

Whether certain factors can increase ‘functional fixedness’ and ‘rigidity’

If ample time and lack of fear producing stress aids creativity and, if moderate motivation is best

And, finally whether emotion reduces reasoning effectiveness

In his study concerning ‘new solutions usually appearing whole’, he summarised the conclusions, making it clear that the four stages of creative thought brought about much overlapping. With this in mind the researcher intends emphasising that the criteria selected will be placed within the most logical stage, but will from time to time overlap the other stages, which do not necessarily follow in sequence.

The primary of the whole over the parts is apparent, particularly in the last two stages. When the idea first becomes definite, in the illumination stage, it is a general one. Details are added and changed during revision. In the preparation and incubation stages, either the general or the detail may come first, although the general is more prevalent, but the idea first written or drawn is a general one.” (Youtz in Parnes 1962:199.)

4.3.4 Problems with creativity tests

Ripple (1989:193) points out some of the problems of assessment and adds that creativity is a measurement-driven phenomenon that seems to be going through reconceptualisation phase. He refers to the criterion issues, reliability, discriminate and predictive validity, and practicality or usability. Many researchers have likewise warned
against the many sensitive issues that are disregarded in the taking and judging of tests. Some obstacles that have surfaced are:

4.3.4.1 ADDRESS SOCIAL ISSUES WITH OPEN-ENDED CREATIVITY TASKS

Hennessey and Amabile (88:237) regard social issues as a complication and add that standard creativity tests may not be adequate to assess more situationally induced differences in creative performance, such as those brought about by the imposition of social constraints.

To assess differences in creativity arising from sources other than particular skills, it is desirable to use tasks which rely less heavily on those skills. These should yield measures of creativity not strongly associated with such skill-related variables as age (Hennessey & Amabile 1988:237).

They also point out standard creativity's tests definitional approach that is both broader in its inclusion of concepts such as fluency, flexibility, originality, and elaboration. They suggest that it may be wise to rely on explicitly subjective judgements of creativity by observers familiar with the domain in question. They developed 'Story-telling' as a method to identify children's verbal creativity which rely on the subjective judgement of appropriate observers. This method has a practical advantage over previously used subjective-assessment methods. They concluded:
...for researching basic processes of children's creativity and the social/environmental factors affecting their creativity, and for comparing a sample of children only with each other (or with themselves at different points in time), this more open-ended subjectively-assessed creativity task appears desirable (Hennessey & Amabile 1988:245).

4.3.4.2 CRITERION PROBLEM

Davis (1989:259) reiterated the observation of the classic criterion problem. He asks how you decide who is creative or what products are creative in order to validate a creativity test? Problems have arisen where teacher or scorers have believed that creativity means neatness, high grades, and pleasing the teacher—so the correlation's between test and criterion cannot be high. It is the researcher's opinion that creativity tests all be criterion referenced, and on this bedrock, locate ways which tests how information is processed, what sensory modalities are used and how much initiative is individually utilised to bring the creative act into being. A fixed (but growing) set-of-criteria would anchor the ambivalent creativity snafu and give direction to many already proven theories, definitions and unmistakable certainties that decades of research have already uncovered and established.

4.3.4.3 CREATIVITY IN YOUNG CHILDREN

Moran III, Sawyer, Fu and Milgram (1988:254) have recognised that the measurement of creativity in young children has been especially problematic and cautions against interpreting creativity in children and adults as the same construct. This is held true by the suggestion of the creative product being 'socially useful' which is not always a prerogative of a young child. This as well as the fact that creativity declines with age, and that young children have not yet been exposed to the dogmas and common sense of society, makes it clear that early identification of creativity has extreme benefits but also need to take into consideration, specific guidelines from experts in the field, as to what methods of scoring and judging are necessary.
4.3.4.4 TESTLIKE OR GAMELIKE CONDITIONS

Hattie (1980:87,88) pointed out the difficulties that arise when attempting to replicate Wallach and Kogan’s game-like conditions when undertaking a creativity test as follows: lack of clear specifications as to what constitutes a test condition, a problem of standardising when unlimited time is allowed, uncertainty as to the part played by various response sets, a lack to employ a control group, and the ethical considerations involved in deceiving children to obtain test scores. Hattie (1980:97) remarked that the testlike conditions (as opposed to gamelike) must be more efficient in terms of cost when he compares the 90 hours of administration for the gamelike condition to the one and a half hours for the testlike condition.

4.3.4.5 LONGITUDINAL VALIDITY

Chapter three points out the longitudinal validity of creativity tests. Howieson (1980) and Cropley (1972) highlighted the significance of a creativity test’s predictive validity. Howieson (1980:133) did however express general optimism for Torrance’s pencil-and-paper test but concluded that the still inconclusive nature of available data made it essential that continued efforts be made in this regard in view of identifying creative potential early in life.

Obviously such factors as motivation and opportunity are powerful influences which facilitate or prevent potentially creative people achieving this potential, so that we do not know that the tests themselves failed in their differentiation of early creative talent. Howieson (1980:133.)

It is the researcher’s recommendation that all creativity tests adhere to the need for a ‘post-process’ longitudinal evaluation in order to validate its significance.
4.3.4.6 CULTURAL DRAWBACKS

During the administration of the TCT-DP test, Wallace (Jellen 1989:86) noted that Jellen’s test requiring the testers to draw carried some cultural drawbacks such as the Zulu-sample from South Africa. Here Wallace observed ‘avoidance’ of the respondents due to the unfamiliarity of using paper-and-pencil. This is but one example of many cultural obstacles that interfere with the undertaking of tests. A thorough investigation into the issues such as those indicated in the Persuasion Matrix below, will add dimension to and provide information that can only be complimentary to any test or assessment procedure:

**Persuasion Matrix**

<table>
<thead>
<tr>
<th>Values</th>
<th>Eco</th>
<th>Hea</th>
<th>Inst</th>
<th>Fam</th>
<th>Inter</th>
<th>Pol</th>
<th>Tec</th>
<th>Ind</th>
<th>Rel</th>
<th>Med</th>
<th>His</th>
<th>Edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priorities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customs/Styles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetics &amp; Canalizers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status/Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 8: Persuasion Matrix**

Abbreviations were used to accommodate the narrow vertical columns:

- Eco: Economy
- Hea: Health factors (personal & within cultural setting)
- Inst: Institutional
- Fam: Family
- Inter: International
- Pol: Political
- Tec: Technological
- Ind: Industrial
- Rel: Religious
4.3.4.7 ADDITIONAL PROBLEMS

Creative Tests are still going through multiple teething problems due, not only to the lack of a universal definition, but as a result of a pressing shortage of a firm set of creativity criteria as well as a complete set of standards and scoring procedures. Authors such as Cooper avowed her dismay at many of the items she encountered when investigating some tests. In her critique of the CAP Creativity Test (developed from the William's Model), Cooper (1991:194) points out the following problems:

- **Speed**: Directed to 'work fast' appeals to the aggressive, assertive, energetic, and industrious (as recalled by Lingeman's 55 personality characteristics' related to creativity) but not the playful, reflective, thorough, or having preference for complexity creative personalities.

- **Commands**: 'Not skip around', 'stay within the frames of the figural drawings' do not encourage the types of processes being assessed.

- **Visual layout of assessment page**: Here 8 dark lined squares present an 'unexpressed rule' that shapes or lines within each square are not to be seen in relationship to other shapes or lines. The directions and visual aspects of this test predicates cognitive information on a restrictive note.

- **Fluency score**: Not given the weight it needs and is determined by a simple count of items attempted.

- **Flexibility**: Judged according to shifts in categories attempted. This scoring procedure does not take into account the individual who might decide to work thematically, or see the 8 boxes as a whole rather than fragmented parts. The category of 'living' can be too inclusive and Cooper suggests William's own definition that advocates 'to take different approaches instead of the ability to shift categories.
• *Scoring elaboration and originality*: 'Where details are added producing asymmetry', does not necessarily accurately measure elaboration. In CAP the scoring definition for originality depends not so much on uniqueness, non-conformity in thought and action but, on where the person works within the frame. Drawings can be done within shapes or outside while both draws the highest score even though combining boxes or drawing outside their areas is discouraged (Cooper 1991:195 & 196).

Cooper (1991:194-204) did not recommend the CAP test or the SOI-LA (Structure of the Intellect Learning Abilities Test). She also investigated the TTCT (Torrance Test for Creative Thinking), the TCWSW (Thinking Creatively With Sounds and Words), TCAM (Thinking Creatively in Action and Movement) and the Khatena-Torrance Creative Perception Inventory; What kind of person are you (WKOPAY) and Something About Myself (SAM). Her criticism is precise and she questions many relevant aspects related to the undertaking of a test, the scoring methods and the initial intention of the test.

4.3.5 Creativity Tests Research-findings

4.3.5.1 IDEATIONAL ORIGINALITY

Ideational originality was adequately reliable after fluency was controlled only in the figural (non-verbal) DT tests (Runco 1985:483). Original individuals seem to have a different pattern of ‘concatenating’ (connecting) ideas, and unusual ideas may not follow common ideas as they seem to in unoriginal individuals (Runco 1985:485). Ideational originality is determined to a large degree by the cognitive ability of the subjects involved. There were significant differences between the figural DT tests and the verbal DT tests. (Runco 1985:495)
4.3.5.2 IDEATIONAL FLUENCY MAY BE A DOMINANT

A study conducted by Borland (1986:249), suggests that despite the certainty with which many educators speak about fluency, flexibility, and originality, this is still a murky area. There is sharp disagreement as to the nature and the very existence of certain factors although the case is strongest for a factor of ideational fluency.

Not only is this [ideational fluency] a valid factor, but it may be a dominant one as well, since the production of many types of ideas (traditionally called flexibility) and the production of unique ideas (traditionally called originality) are both strongly related to the ability to produce many ideas. In fact, one is not going out on too fragile a limb to advance the suggestion that the other presumed abilities are dependent upon, not only related to, ideational fluency. (Borland 1986:249.)

Borland (1986:250) concluded that in the light of his researched evidence, the traditional constructs of spontaneous flexibility and originality are of 'dubious' validity meaning that there is no reason to doubt their existence as dimensions of human cognition.

...at present one can state with confidence only that ideational fluency is a factor of consequence in the structure of divergent-production abilities. Any remaining divergent-production variance will require one or more constructs to be accounted for satisfactorily. (Italics mine) (Borland 1986:250.)

4.3.5.3 TESTLIKE CONDITIONS

Hattie (1980:88) investigated studies that were performed on assessment where 2 tests were given to subjects. There was evidence for considerable stability in the measures of creative ability from the second testing onward. His findings suggested that it may be fruitful to investigate the technique of administering creativity tests
under testlike conditions on 2 adjacent days, using the results of the second testing as a predictor of creative thinking ability (Hattie 1980:88). His subsequent research ruled that the Test 2 condition fails to satisfy specifications although he did find that the unique responses did come only later in the sequence (Hattie 1980:96). This leaves enough reason to believe it may be beneficial for an individual to be pre-tested so that he/she can familiarise themselves as to what is expected, being assessed and what mindset is expected from them. This whole process would be unnecessary if some program such as the AUTA (see chapter three) were to precede the tests.

4.3.5.4 THREE-DIMENSIONAL TASKS HAVE BETTER CONSTRUCT VALIDITY

Recent studies support the theory that the Guilford-Mednick (Moran III et al 1988:255) conceptualisation of original thinking is applicable to children as young as four years of age. Of interest is the fact that their research held that the three-dimensional tasks had better construct validity ('pattern meanings' and 'uses'; tasks using visual and haptic [tactile] exploration) based on the Wallach & Kogan model than the traditional mode of assessment via two-dimensional representation (Moran III et al 1988: 256). ‘Hands on’ familiarity with the stimuli elicited more responses although research appeared to show that popular responses are related to intelligence but original responses were not (Moran III et al 1988: 256-257). In conclusion it was pointed out that most available measures focus on a single aspect of the creative process, typically ‘ideational fluency’ which is prone to leaning on language proficiency. This is not sufficient and it was suggested that Torrance’s Thinking Creatively in Action and Movement (measures imagination) should accompany traditional measures of ideational fluency. More recent studies highlighted the fact that ideational fluency and fantasy predisposition are indeed related to each other: they both predict imaginative, playful behaviour. (Moran III et al 1988: 261).

4.3.5.5 ORIGINAL RESPONSES NEED A NORM OF SOME KIND

Another fascinating research study was done by Wakefield (1986:127), reasoning why the Thematic Apperception Test’s blank card (used to evoke creative
responses), had not been used over the past forty years. Questions such as 'see what you can see on the blank card and imagine some picture and describe it or tell a story about it' made Wakefield speculate whether without a norm of some kind, originality seems to become problematic (Wakefield 1986:127). He concluded that evidence clearly indicated that 'problem finding' and 'open structure' are among the conditions to which creative individuals are said to respond. It is therefore safe to say that a response to the blank card is an indication of creativity, the longer the response the more creative (Wakefield 1986:132). Wakefield concluded that still more research would have to reveal whether the order of presentation, the blank card alone or among ambiguous stimuli and even to what extent fantasy was involved in the responses to blank cards before any final judgement can be made. The researcher believes that there could be merit involved with Wakefield's initial assumption that 'without a norm of some kind, originality seems to become problematic'.

(To what extent does a blank card pose to be a part of problem-discovery?)

4.3.5.6 CULTURAL ASPECTS

The TCT-DP test (Jellen 1989:84) based on 569 cases (eleven cultural examples), brought about some interesting points of discussion:

- Cultures linked to societies with democratic values (self-reliance, tolerance for diversity, & socio-economic independence) had the largest number of students receiving high scores of general creativity.

- Cultures with autocratic values and socio-economic dependence had the largest number of students receiving low scores.

- However, countries wrestling with change(s) due to their strive for independence or democracy, scored particularly high on the two different variables both assessing risk-taking and self-actualising potentials.

- Samples from communist, socialist and/or developing nations scored lowest on 'Unconventionality' variable, which is one of the TCT DP's most important predictors of creative potential. the TCT-DP test (Jellen 1989:85).
4.3.5.7 FLUENCY, ORIGINALITY AND ELABORATION MAKE PREDICTIVE VALIDITY MOST RELIABLE

In a study done to measure the predictive validity over a 22-year range of the (Torrance Test of Creative Thinking) TTCT's Just Suppose Test, Torrance and Safter (1989:222) concluded that the correlation coefficients were statistically significant in 27 of the 35 cells. It measured fluency, originality, emotional expression, fantasy, elaboration, analogies and an overall Creativity Index. Although the latter seemed to be the most predictive of creative achievement across the categories, measures of fluency, originality and elaboration seemed to be the best individual predictors of young adult creative achievement (Torrance & Safter 1989:219-223).

4.3.5.8 VALIDITY OF IDEATIONAL ORIGINALITY VERSUS IDEATIONAL FLUENCY

Runco and Albert's (1985:483) research on the reliability and validity of ideational originality in the divergent thinking of academically gifted and nongifted children brought about rather significant results. Their initial assumptions are also of interest. They quote Mednick's view that the responses on open-ended tests reflect an order-effect in which common ideas are generated first and unusual ideas later. This presumes that the associative strength of common ideas is professedly stronger than the associative strength of unusual ideas. It was also Mednick's belief that unoriginal individuals will generate only a few unusual ideas while individuals that produce quantitatively more original ideas supposedly generate only a moderate number of common ideas, and once these are expended, will supply numerous unusual ideas (Runco & Albert 1985:485).

The results of this investigation support the basic premise that the psychometric adequacy of ideational originality is determined to a large degree by the cognitive ability of the subjects involved. The primary hypothesis, that the psychometric adequacy of ideational originality is a function of the level of achievement and ideational productivity, was clearly supported. The second hypothesis was also
clearly supported that there were significant differences between the figural DT tests and the verbal DT tests (Runco and Albert 1985:495).

Their first result reflects a problem with the threshold hypothesis in the sense that their DT tests did have discriminant validity, but only at certain levels of achievement (Runco & Albert 1985:496). The second refers to the fact that of the two test types, the figural tests, Pattern meanings and Line Meanings, were psychometrically adequate after ideational fluency was partialed out (Runco & Albert 1985:497).

Our findings that the figural tests were more reliable and valid than the verbal tests suggest that an individual has the greatest chance of generating consistently more original responses when the situation or stimuli are unfamiliar. The figural DT tests are abstract drawings, none of which represent any one referent, while the verbal stimuli all have some familiar meaning. As Mednick (1962) states: The greater the number of instances in which an individual has solved problems with given materials in a certain manner, the less is the likelihood of his attaining a creative solution using these materials. (Italics mine) (Runco & Albert 1985:497.)

Runco and Albert reasoned that the figural tests may be more challenging and more game-like than the verbal tests which in turn might stimulate 'effortful ideational strategies' while the verbal stimulate rote ideation. Their conclusion urged that figural tests elicit more reliably original responses than their verbal counterparts (Runco & Albert 1985:497).

In yet another research study done by Runco (1986:81) on the discriminant validity of gifted children divergent thinking scores, he concluded that fluency alone was probably sufficient to index divergent thinking ability. He added that divergent thinking tests have predictive validity and are independent of other forms of intelligence.

4.3.5.9 ENVIRONMENTAL INFLUENCES

Smith and Bistocchi (1983:286) reported that the environment did not greatly influence the overall index of an individual's creativity in a study done on environmental influences on creativity measurement. Their comment's however stressed that their subscores support the utility of the multidimensional conceptualisation of creativity. They
argued that creativity is comprised of several abilities, which are reciprocal to one another, and do not all flourish in a single set of environmental stimuli. Some interesting results with procedures such as guided fantasy (relaxation exercises and being led into fantasy), creative movement (like fantasy except that the group had to act out their fantasy) and testlike conditions were:

- Apart from elaboration, the testlike conditions produced the highest fluency and originality scores.

- Guided fantasy produced the highest elaboration scores while creative movement caused fluency and originality to drop significantly. (Smith & Bistocchi 1983:281-286.)

### 4.3.6 How To Measure Supreme Creativity

The researcher has not yet found conclusive steps to analyse, determine or give definition to the manner in which 'supreme creativity' is measured. What makes one individual's creativity achievement, score or index, better than that of another? A Creative Evolution Time Theory could prove to be an effective visual tool in order determine the ultimate value of a creative endeavour.

![Theory of Creative Evolution](image)

Figure 20: Theory of Creative Evolution
Research seems to indicate that the more effort and input within the preparation & incubation phase, the more 'insightful and rewarding' the illumination. This is the action-start-up phase that determines in part, the quality of what is to follow. Illumination's sudden insight and the subsequent joy is the first tangible sign of a successful creative solution. This has aptly been coined 'private creativity' (See centre of Figure 20) because of the fact that it has meaning, use and significance to the individual alone. It is only after it has been communicated to others or brought into being via the Verification Stage that the solution's (or outcome) creative weight, potentially starts maturing. (See Peers, Family & Friends in Figure 20) This momentum carries more weight as it ripples out to meet the needs of others and could, at first be realised on a local scale (Community, Business Sector & Environment), then mushrooms into a National and finally a Global phenomenon. With today's advanced web of electronic communication, it carries with it a speed potential like no other century has allowed. Still, if a creative solution, outcome or product can aptly meet the needs of a small group, it potentially carries with it the possibility of going national then global. Its life- and Timespan will finally be its ultimate determinator.

Figure 20 above explains how the further the creative product's life span spirals outward, the broader its significance. Once it has reached global recognition, it is only a question of 'time' that will inevitable determine its creative supremacy. The invention of the wheel an example of Creative Supremacy.

4.4 CONCLUSION

This chapter has undoubtedly proved that there are many components that constitute concern regarding the procedures, prerequisites and problems of Creative Assessment. Hundreds of so-called-Creativity Tests have sprung into existence long before any foundations or ground rules were established. Consequently it is to no surprise that much has been either over or under estimated. Chapter four has also testified that Creative Assessment research needs to be stepped up in order to substantiate some of the ambivalence that is so prevalent. A foundation of general
creativity norms and prerequisites needs to provide a platform from which all creativity tests could be measured.

A certainty that still holds is that a test should yield more than one objectively obtained quantitative score based on communal judgement and experts within a particular domain. To successfully assess the Creative Process, a test needs to cover all the bases laid down by the four stages of Wallas. In Chapter five the CPAP models intend to collectively capture infinite elements that will give way to categorising particular criteria, establishing an instrument that will provide a fundamental anchor for the creative process assessment.

4.5 IN SUMMARY

Since the interpretations of inkblots creative assessment has come a long way striving to be fair and equitable. Psychological assessment gives meaning to the findings within the context of the individual's life situation and clinical history. Guidelines for assessment include the four pillars of assessment: norm-referenced tests, interviews, observations and informal assessment. Psycho-educational Use of Tests are samples of behaviour which allow inferences to be made about the examinee. Evaluation should include cultural background, primary language, any handicapping conditions. Test results should be interpreted in relationship to other behavioural info and to case historical data and never in isolation.

Six Basic Test Evaluation Questions provide Information about the test; Aids to Interpreting Test Results; Examinee Considerations; Reliability and Validity; Administration and Scoring; Directions; Procedures; Scales and Norms.

A Test administrator should have mastered various technical and clinical skills with a background in testing and measurement, statistics, knowledge to assist in administering and interpreting tests, be able to arrive at conclusions, and formulate recommendations, be flexible enough to modify or reject hypotheses in the light of new data; and be aware of one's own characteristics as an interpreter of test performance and human behaviour. It is important they have a multimethod
assessment approach and they should avoid the use of creativity squelching comments.

A Scorer must be able to synthesise information from the past records, be extremely observant, and create informal tests for obtaining information about special abilities.

The Basics steps in the assessment process are to review all referrals, to assess behaviour, observe in various settings, administer test and interpret data, formulate hypothesis, develop intervention strategies, write a report with recommendations and finally follow up and retest. Kirk suggests Some General Testing procedures. Treffinger, Torrance and Ball too constructed a set of 19 guidelines and 22 training procedures for test administrators and scorers.

There is many debates found in all the research done on the validity and reliability of various tests. Norm-referenced tests are standardised on a clearly defined group, scaled so that each individual’s score reflects a rank within the norm group. Standardised norm-reference tests can be augmented with informal assessment procedures, which include criterion-reference tests. Validity of a test is the extent to which a test measures what it is supposed to measure, and also the appropriateness with which inferences can be made as a result of the test results. Validity can be classified as content, criterion-related, construct, concurrent, and predictive validity. Factor Analysis is used to analyse a group of intercorrelations, determining the underlying structure of a test.

Psychological aspects of Creativity such as Blockers include expectations, limited environments, an overemphasis on tangible reward, evaluation expectations and competition, habits that include learnt responses, routines, rules and traditions that restrict behaviour, procedural barriers such as policies, rules, traditions and regulations, perceptual barriers caused by functional fixity rooted in needs, biases, values, and past learning, . cultural blocks, resource barrier meaning a shortage of people, money, time, supplies, or information, emotional distractions (fear, anger anxiety, hate, health and love) that can ‘freeze’ our thinking.

Stimulators include explicit instructions which is said to enhance originality scores, a good rapport, in a playful context and no time limits, problem discovery, initiating an awareness in creativity, Bull and Davis agreed on the stimulation of four main
factors responsible for creativity., Vaughan also suggests the stimulation of five personal factors responsible for arousing new ideas

Assessment of the 'Creative Process' involves important aspects about scoring procedures ("halo" effects as well as test conditions) while psychometrics should adhere to the Parke and Byrnes's seven basic guidelines for objective creativity assessment. Other consideration is a understanding of the Laws and Government Regulations.

During the Preparation stage a creativity test should address problem defining. Has a problem has been identified, important aspects of the problem isolated, have sub problems have been identified and/or alternative problem definitions been proposed? Is there sensitivity to problems and problem defining, perceptiveness and intuitiveness, ability to visualise?

The Incubation stage calls for test to analyse visualisation, imagination, transformation, ability to regress, metaphorical/ analogical thinking, Bloom's analysis of synthesis and evaluation, intuition, resisting premature closure, convergent thinking (concentration and logical thinking), the individual needs to listing all that is known about the problem with the use of who, what, why, when, where and how questions as well as list alternative problem definitions. This stage also involves fluency, flexibility, originality, elaboration, transformation, sensitivity to problems and defining them, visualisation, analogical/metaphorical thinking, the ability to predict outcomes or consequences, analysis, evaluate, synthesis, logical thinking, ability to regress, intuition and finally concentration. Information processing include: using existing knowledge as a basis for new ideas, avoidance of perceptual sets, questioning norms, rule and assumptions, using wide categories, being alert to novelty and gaps in information, coping well with novelty or change, finding order in chaos using internal visualisation and the skill to make decisions

The Illumination stage occurs within the confines of a relaxing activity or during the preoccupation of another problem. The rush of insight needs time to surface.

Verification is where the idea is put to the test. Now there is an action plan, which could be via sources of assistance. A test should determine whether the initial goal
or problem has been solved or, if not, possibly lead to the discovery of an entirely different problem.

New trends include Amabile's *motivation principle of creativity* where she focuses on evaluation, surveillance, reward, competition, restricted choice or an overemphasis on tangible rewards. *Pre-school Research Findings* found that the use of rewards for encouragement delivered lower and poorer task performance, pre-schoolers generate a larger percentage of original responses than do children who are older, attention must be paid to situational factors which may affect scores. Issues such as task setting, examiner characteristics, instructions, and age effects are important. Designed by Smith and Carlson, the *Percept-genesis* is a unique Creativity test which makes use of visual stimuli (subliminations) in order to motivate an emotionally laden original response and attests to emotional involvement in creative activities. From a more *Biological* perspective, Bogen and Bogen emphasised the duality of the mind and coined the phrase 'appositional mind' and 'propositional mind', which both have connections with the view that there are two forms of knowledge: logic and intuition. 'Alien Hand Syndrome' is a condition that has led man to believe that the brain, apart from being split by the corpus callosum, is in fact two separate entities, each with an ability and 'mind' of its' own. Focus on the altered states of consciousness has brought 'Alpha conditioning' which is a method of the artificial control of certain types of electrical waves emitted from the brain during a relaxed state. Clark informed that the ability to focus energy from the entire brain is seen to result in accelerated learning, healing, and higher levels of consciousness. A product has been now been launched that is said to stimulate creative thinking skills. *Theta meditation* is said to increase creativity, enhance learning, reduce stress and awaken intuition and other extrasensory perception skills also referred to as hypnagogia. It is during alpha that we begin to access the wealth of creativity that lies just below our conscious awareness. Unfortunately on the average, only 5 to 10 minutes is spent in hypnagogia as one passes from a relaxed alpha brainwave state on into the first stages of sleep. Most, if not all, of the conditions of creativity are present in hypnagogia. *Binaural Beats* can bring about an increase in balance between the two hemispheres of the brain. Inducing brain wave patterns through the creation of binaural beats in the brain widens the scope of your awareness. Whole-brain sensory integration can then take place. Utilising these tools will ensure that creativity be activated within a perfect setting, making it possible to optimise the individual's
participation. The MBTI Creativity Index MBTICI = 3SN + JP - EI - .5TF, must provide a score of 350 or higher, indicating creative potential. This can be of extreme value not only as an creative measure but as well as a way in which to discover what best motivates and energises an individual, so as to address each personality type separately. It is the researcher's opinion that once an individual has been typed, he is assured of being categorised into 'motivating' commonalties that is crucial in sparking the creative thinking process.

CREATIVITY TESTS

The most common use for Creativity Tests has been for identifying creatively gifted children in order to put them in appropriate programs, for research purposes to evaluate other tests to determine the capability of creativity training programs and to provide general info. Types of Creativity tests are: Tests of Divergent Thinking, Attitude and Interest Inventories, Personality Inventories, Biographical Inventories, Ratings by teachers, peers, and supervisors, Judgement of products, Eminence (prominence), Self-reported creative activities and achievements. Pre-requisites of Creativity Tests such as the AUTA model of creative objectives is an organised strategy for teaching 'creativity' and preparing creativity test subjects' for 'successful' assessment. Davis claimed that the best single item on creative personality inventories is the straightforward question: "Are you creative?" The Threshold Theory assumes that above an IQ score of 120 the moderate correlation between creativity and intelligence disappears. It has not been favourably supported by various research done. Given an adequate base of intelligence (about IQ 120), affective and motivational factors, creative abilities, and perhaps training and opportunity will determine who is a creative. Figural tests yield more reliably original responses. It has been said that figural test might stimulate effortful ideational strategies while the verbal stimulate rote ideation. The figural tests, due to their unfamiliarity, may be more challenging tasks and perhaps more "game-like" than the verbal tests. Binet and Henri's suggestion that imagination be measured by means of open-ended problem solving was complimented by Wakefield who added that the individual be given an additional opportunity to find the problem. Closed-problems call for evaluative or convergent thinking. Cooper's stresses that the dimension of originality is key dimension of originality, which she feels, is the key essence of creative measurement. Rimm ruled that a tests must meet the
standards of valid educational measurement: it must be reliable, easy to administer to
groups and not take a long period of time to complete; a culture fairness and results
from the test should be used for purposes beyond identification. Certain studied
confirmed that there was no doubt that subjects could in fact easily fake either a high
or low creativity score. Tests should therefor have lie scales or social desirability
keys to help locate fibbers. There is a distinction between real-time and multistage
Creativity where the former is ‘spur-of-the-moment (short interval of time), and
multistage creativity (sufficient time is allowed for the generation and selection of
ideas).

Problems with Creativity Tests are as follows: Addressing social issues with open-ended creativity
tasks; the Criterion problem; Creativity in young children where the interpretation of
creativity in children and adults are treated as the same construct; Testlike or Game-like
Conditions (lack of clear specifications, unlimited time, control group, deceiving
children to obtain test scores); Longitudinal predictive validity. Validity; Cultural
drawbacks; Additional problems: Authors such as Cooper discuss speed, commands,
visual layout of assessment page, problems with Fluency score & Flexibility and, the
scoring of Elaboration and Originality.

Creativity Tests’ Research-findings

Ideational Originality was adequately reliable after fluency was controlled only in the
figural (non-verbal) DT tests. Some suggest that ideational fluency may be a dominant.
Testlike Conditions (e.g. researchers found that the unique responses did come only
later in the sequence, during testing on 2 adjacent days it was pointed out that using
the results of the second testing was a more reliable predictor of creative thinking
ability). Three-dimensional tasks have better construct validity. Original Responses need a norm of
some kind. Cultural Aspects (democratic values received high scores, autocratic values
and socio-economic dependence received low scores, wrestling with change(s) due
to their strive for independence or democracy scored particularly high in risk-taking
and self-actualising potentials, communistic, socialist and/or developing nations
scored lowest on ‘Unconventionality’ variable). Fluency, Originality and Elaboration
make predictive validity most reliable. Validity of ideational originality versus ideational fluency.
Here unoriginal individuals will generate only a few unusual ideas while individuals
that produce quantitatively more original ideas, generate only a moderate number of common ideas, and once these are expended, will supply numerous unusual ideas. Figural tests elicit more reliably original responses than their verbal counterparts. Some believe fluency alone is sufficient to index divergent thinking ability. Research has shown that Environmental Influences did not greatly influence the overall index of an individual's creativity. Apart from elaboration, the testlike conditions produced highest fluency and originality scores while guided fantasy produced the highest elaboration scores and creative movement caused fluency and originality to drop.

The invention of the wheel an example of Creative Supremacy. A visual diagram explains how, the further a creative endeavour’s meaning and usefulness spirals outward, the broader its significance. Time is the ultimate evaluator that will inevitable determine it's creative supremacy.

To successfully assess the Creative Process, a test needs to cover all the bases laid down by the four stages of Wallas. The CPAP models will collectively provide criteria to establishing an instrument that will provide a fundamental anchor for the creative process assessment.
CHAPTER 5 CREATIVE PROCESS ASSESSMENT PARAMETERS

5.1 INTRODUCTION

Research has unquestionably proved that an investigation into the mechanics of creativity calls for a holistic approach. It is a titanic concept that cannot stand alone. Bound to a kaleidoscope of events, circumstances, characteristics, motivations and social evaluations, it is a phenomenon that is almost impossible to isolate in its entirety. In order to bring definitiveness to the assessment of creativity, the rudiments of the 'Creative Process' collectively, need to be contained in such a way, that its sensitive nature be addressed. This approach needs to be 'inclusive' of all that it confesses to encompass.

Chapter Five sets out to consolidate the enriched research of many pioneers that have shed light on the creative enigma. Lists will follow indicating the criteria that has been synthesised. The carefully selected criteria from the definitions, theories and assessment research (Chapter 2, 3 & 4) will set the stage for further investigation. Analysis of the similarities and differences will endeavour to give content to a Creative Process Assessment Matrix (CPAM). This approach intends to succeed in an attempt to be 'inclusive' of all that the creative process could encompass. The unique nature of this instrument sprouts from its flexibility to incorporate any additional criteria that has been omitted or that still needs discovery through future research. The researcher intends using this instrument as the springboard for assessing Creativity Tests that profess to measure the creative process.

The researcher's original problem was what type of criteria do creativity tests base their evaluation on? There exists a need to index creativity. Credible resources now serve to identify relevant components, which now serve as a yardstick for the researcher's meaningful criteria selection. The investigation evolved around the following hypotheses:
Botha 197

- A set of criteria exist by which the creative process can be measured, and that;

- existing tests for measuring the creative process do succeed, if to limited degree, in identifying useful assessment criteria.

A Creative Process Assessment Matrix (CPAM) will finally serve to evaluate existing creativity tests.

5.2 CREATIVE PROCESS COMPONENTS OF THE P THEORY

The researcher aims to use the P theory within the four stages set out by Wallas. The P theory proposes four components of creativity: the creative person, the creative thinking process, creative persuasion (press, environmental, social) and the creative product. Inherent understanding arises from a grasp of the entirety of the creative episode and this is not possible when each creative element is individually focused upon and examined in particular. However, a list of indexed criteria is imminent and there are many discreet illustrations that could easily be congruous to all of the stages. If not, possibly conformant to some or all of the creative components from the P Theory of creativity.

Chapter two focussed on multiple and reputable definitions of the creative process. Chapter three investigated the theories and chapter four reviewed the prerequisites necessary for its assessment. The researcher was able to explore each chapter in search for prominent and relevant componential and criterial contributions. To optimise this pending organisation of research done so far, the researcher intends grouping the various creative process criteria as set out in the Introduction of Chapter three. Before such a process is possible, it is necessary to subcategorise all the main factors of the P theory.

What follows is a brief summary of the P theory's creative components that have now been reviewed, analysed and subdivided to allow further classification within the creative process. Chapters 2-4 have highlighted significant areas of research that have enabled the researcher to construct the following summary:
The Creative Person

Two main categories summarise the many characteristics associated with the typical creative personality:

- Personality and biographical traits
- Affective sphere

The Creative Thinking Process

Chapter three clearly distinguished and defined the 'creative process' versus the 'creative thinking process' and how it would be approached in this research paper. The cognitive 'process component' of the p-theory is therefore referred to as the 'creative thinking process' and involves the following components:

- Conscious (Beta)
- Extraconscious/Preconsciously/Subconscious (Theta)
- Unconscious (Delta)
- Cognitive Style
- Information processing styles (See chapter 1)

Creative Persuasion

Persuasion encompasses an entire spectrum of events, places and people that are relevant to, have influence upon or are directly related to the creative person and his/her environment. It is a fine network of inter linked contingencies that play an important and sensitive role during the creative process. Creative persuasion involve matters such as focal relationships, the creative climate (positive or negative), distal commitment and culture as well as the proximal (historical) environment, family and workplace:
Botha 199

- Focal Relationships

These focuses on support, encouragement, influence, significant others, the ambivalence between distal cultures, educational opportunities and content and the formative pushes and pulls of the proximal family. (Simonton in Runco & Albert 1990:261; Runco & Albert 1990:257.)

- Creative Climate

Settings, sensory input and stimulation:
Visual, auditory, kinesthetic and gustatory (all evoke creativity).

- Distal Commitments and Culture

Distal, historical and ecological conditions are extra-individual reinforcements. Distal conditions & reinforcements have an existence of their own. They function as social prescriptions and canalisers. Here stability & continuity is important: often institutionalised. The hidden hand of culture can be detected when a new product/style appears, the (creative) individual is in part the environment's creative product, surroundings have functions such as social prescriptions & canalises as in:
Religion
Education
Socio-economic status
Race
Ethnicity
Family
Civilisation
Customs

- Proximal (Historical) Environment, Family and Workplace

Formative years, historical processors, location and influence from the distal to the social systems of the present (such as work, family, environment). Here the dynamics of acceptance, encouragement and identity formation come in to play.
Creative Persuasion definitions all apply to the following genera:
Opportunities, values, priorities, reinforcements, resources, educational opportunities and content, training, the dynamics of acceptance, encouragement and identity formation, civilisation, customs, religion, socio-economic status, race and ethnicity (Runco & Albert 1990:255-260).

Creative persuasion can be aptly addressed by examining the issues of networked contingencies within the Persuasion Matrix. This concept has been previously discussed in cultural drawbacks in Chapter 4.3.4.6 but will be briefly recounted with the summary of Table 9:

<table>
<thead>
<tr>
<th>Persuasion Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
</tr>
<tr>
<td>Opportunities</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Priorities</td>
</tr>
<tr>
<td>Reinforcements</td>
</tr>
<tr>
<td>Resources</td>
</tr>
<tr>
<td>Customs/Styles</td>
</tr>
<tr>
<td>Aesthetics &amp; Canalizers</td>
</tr>
<tr>
<td>Status/Race/Ethnicity</td>
</tr>
<tr>
<td>Commitments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eco</th>
<th>Hea</th>
<th>Inst</th>
<th>Fam</th>
<th>Inter</th>
<th>Pol</th>
<th>Tec</th>
<th>Ind</th>
<th>Rel</th>
<th>Med</th>
<th>His</th>
<th>Edu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Persuasion Matrix

Abbreviations were used to accommodate the narrow vertical columns:

Eco: Economy
Hea: Health factors (personal & within cultural setting)
Inst: Institutional
Fam: Family
Inter: International
Pol: Political
Tec: Technological
Ind: Industrial
The Creative Product

Three areas of concern were chosen to subcategorise all selected criteria:

- The Product in general
- Public Creativity
- Private Creativity

A product is creative behaviour based on historical and contemporary forces of several different motivating factors that are socially situated but individually felt (curiosity, ambition, separation, individuation, pride) (Runco & Albert 1990:261). The product anticipates a play between the overbearing civilisation with its customs and resources and the irresistible instinct of the creator (motivation) with a few individuals that are individually chosen or are self selected.

5.2.1 Summary: Components of the Creative Process

The diagram below explains the P Theory’s sub-categorisation, which will serve as the horizontal axis of the Creative Process Assessment Matrix. For practical reasons the researcher chose different colours which visually separate the categories:

- Yellow was chosen to indicate the ‘sunny, sparkling or golden’ creative personality.
- Grey to compliment the ‘grey matter’ (brain) involved in thinking.
- Blue symbolic for the blue sky and sea in our environment (people, events & places).
Red for the ‘cherry’ indicative of a successful creative product.

CPAM’s vertical dimensions: Components of creativity.

The above diagram shows how CPAM’s colour-coded separation makes it user friendly and promises to be a useful visual aid to accommodate the flood of criteria it needs to house. Before synthesising of criteria commences, it only seems appropriate that the fundamentals as laid out by some of the creativity pioneers, be investigated.
5.3 FUNDAMENTALS FROM RESEARCHED CRITERIA

5.3.1 Lowenfeld

Lowenfeld (In Parnes & Harding 1962:12-13) launched a large scale co-operative research project at Penn State and Ohio State to find out whether creative performances in the arts are based on the same characteristics of creativity as in the sciences. He used his own tests and some others from Guilford but, even more important, were the eight sets of criteria he used to evaluate these tests. They were:

- Sensitivity to problems
- Fluency
- Flexibility
- Originality
- Ability to redefine and rearrange (Here he refers to the fact that a creative person tends to change the function of materials he uses).
- Analysis (Person’s ability to arrive at details after studying a unified whole. The capacity to ‘analyse’ finer points, details and intricacies). He explains that creative people learn readily to analyse differences in people as well as in insensate objects. He concludes that it is this attention to detail, which enriches any experience and makes it meaningful.
- Synthesis: The principle of synthesis refers to the meaningful combination of several elements to make something new.
- Coherence of organisation: It encompasses a principle of organisational competency. His example is that of an “elegant solution to a math problem”. This would mean he has found a neat, concise, economical solution in which each step follows logically. He implies to a solution to be coherence in action and in ultimate harmony (Lowenfeld in Parnes & Harding 1962:12-13).
Some of Lowenfeld's fundamental issues can be compared to those from Guilford.

### 5.3.2 Guilford

Guilford's (1977:25) factor analytic statistical procedure suggests that the variety of structures that information takes on, are called 'products', as they are constructs of our brains. His focus on D.P. (Divergent Production) and his model clearly distinguishes his creativity criteria (based on his definition: the general ability to find new/original, unfamiliar, unconventional, innovative) solutions) or, determine new courses of action using previously understood material (Meeker 1988:151). For more detail on Guilford's theory refer to Chapter 3.3.7.2. Below is an explanation of Guilford's factorial elements of D.P. within his SOI (Structure of Intellect) Model. The symbol D refers to 'divergent' while the explanation for the vertical columns F, S, M, and horizontal rows U, C, R, T and I are indicated on Table 10:

<table>
<thead>
<tr>
<th>Figural Content: F</th>
<th>Symbolic Content: S</th>
<th>Semantic Content: M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFU</strong></td>
<td><strong>DSU</strong></td>
<td><strong>DMU</strong></td>
</tr>
<tr>
<td><strong>Figural Fluency</strong></td>
<td><strong>Symbolic Fluency</strong></td>
<td><strong>Verbal Fluency</strong></td>
</tr>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
<tr>
<td>Ability to produce many and unique varieties of figures within structure (art)</td>
<td>Ability to produce many symbolic units which conform to simple specifications</td>
<td>Ability to create many ideas spontaneously (brainstorming)</td>
</tr>
<tr>
<td><strong>DFC</strong></td>
<td><strong>DSC</strong></td>
<td><strong>DMC</strong></td>
</tr>
<tr>
<td><strong>Figural Conceptualisation</strong></td>
<td><strong>Symbolic Conceptualisation</strong></td>
<td><strong>Verbal Conceptualisation</strong></td>
</tr>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>MATH/LOGIC PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
<tr>
<td>Ability to reclassify perceived objects in unique ways</td>
<td>Ability to group items of symbolic information in different ways</td>
<td>Ability to produce new ideas appropriate in meaning to given categories</td>
</tr>
<tr>
<td><strong>DFR</strong></td>
<td><strong>DSR</strong></td>
<td><strong>DMR</strong></td>
</tr>
<tr>
<td><strong>Figural Associations</strong></td>
<td><strong>Symbolic Association</strong></td>
<td><strong>Semantic Association</strong></td>
</tr>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figural Fluency</th>
<th>Symbolic Fluency</th>
<th>Verbal Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
<tr>
<td>Ability to produce many and unique varieties of figures within structure (art)</td>
<td>Ability to produce many symbolic units which conform to simple specifications</td>
<td>Ability to create many ideas spontaneously (brainstorming)</td>
</tr>
<tr>
<td><strong>DFC</strong></td>
<td><strong>DSC</strong></td>
<td><strong>DMC</strong></td>
</tr>
<tr>
<td><strong>Figural Conceptualisation</strong></td>
<td><strong>Symbolic Conceptualisation</strong></td>
<td><strong>Verbal Conceptualisation</strong></td>
</tr>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>MATH/LOGIC PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
<tr>
<td>Ability to reclassify perceived objects in unique ways</td>
<td>Ability to group items of symbolic information in different ways</td>
<td>Ability to produce new ideas appropriate in meaning to given categories</td>
</tr>
<tr>
<td><strong>DFR</strong></td>
<td><strong>DSR</strong></td>
<td><strong>DMR</strong></td>
</tr>
<tr>
<td><strong>Figural Associations</strong></td>
<td><strong>Symbolic Association</strong></td>
<td><strong>Semantic Association</strong></td>
</tr>
<tr>
<td><strong>VISUAL ARTS</strong></td>
<td><strong>PROGRAMMING</strong></td>
<td><strong>LANGUAGE ARTS</strong></td>
</tr>
<tr>
<td>Systemization: S</td>
<td>Ability to generate new and constructive relations between figural items</td>
<td>Ability to generate a variety of relations between numbers or letters</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>DFS</td>
<td>Figural Systemization</td>
<td>Symbolic Systemization</td>
</tr>
<tr>
<td>GEOMETRY/MATH</td>
<td>Ability to produce composites of figural information in new systems</td>
<td>Ability to produce symbolic systems in unique ways</td>
</tr>
<tr>
<td>Transformation: T</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>DFT</td>
<td>Figural Transformation</td>
<td>Symbolic Transformation</td>
</tr>
<tr>
<td>VISUAL ARTS</td>
<td>Ability to devise figural information</td>
<td>Ability to transform symbolic material</td>
</tr>
<tr>
<td>GEOMETRY/MATH</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Inferences: I</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>DFI</td>
<td>Figural Inferences</td>
<td>Symbolic Inferences</td>
</tr>
<tr>
<td>VISUAL ARTS</td>
<td>Ability to elaborate on figural information in unexpected forms</td>
<td>Ability to produce varied implications from given symbolic information</td>
</tr>
<tr>
<td>GEOMETRY/MATH</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

Table 10: Guilford’s Factorial Elements of D.P.

Guilford’s SOI contains a treasure chest of criteria that all relate to the creative process but are not necessarily part of his D.P. distinction. The creative process involves multiple factors that form part of left and right hemispheric functioning, convergent and divergent production, comprehension, memory, and evaluation. Still, his crystal insight into the detailed account of divergent production during the creative thinking process is worth noting and taking into account for the construction of the CPAM (Creative Process Assessment Matrix). Runco however places more emphasis on the persuasional issues related to the creative process.
5.3.3 Runco

Runco and Albert (1990:255) comment on themes presented through the papers presented at the Pitzer conference (Claremont, California: 1988) and agree that many slippery issues of creativity were now made more manageable and operational. These themes add a new insight and perspective, giving form to a unique set of criteria such as:

- Extrinsic environmental conditions and distal sources of motivation
- Influences on intrinsic motivation
- The creative ecosystem and the hidden hand of culture (Runco & Albert 1990:258-259)
- Organisation of creativity categories: persuasion, person, place, process and product
- Length of time and depth of application, degree to which interventions need to be tailored to the particular person or problem. (Runco & Albert 1990:264)
- Effects of social evaluation on individual efforts
- Implicit theories and ideational creativity
- According to Runco (1985:234), the technology of ideational creativity has brought about important ideational abilities. These abilities are worth comparing to those from the other creativity criteria pioneers. They are:
  - Problem finding
  - Evaluative and metacognition components
  - Ideagenerating (Fluency)

All the above mentioned components and criteria provide some form of outline but now need to be compared to other sources. It must however be kept in mind that all
criteria need to be grouped within the relevant component of the P Theory as well as within the stage during which the particular criteria takes place. Some of the criteria that have surfaced will now be discussed.

5.4 SOME IDENTIFIED CRITERIA WITHIN THE FOUR STAGES OF THE CREATIVE PROCESS

What follows is a brief summary of the vertical components of the creative process. Extensive additional research has brought about various identifiable criteria that the researcher categorised according to the four stages of Wallas. Each proposed criterion will be carefully investigated, compared to those suggested within Creative Assessment Parameters (CPAP) from chapters 1-4 and, finally sorted to align with the P Theory’s components.

5.4.1 Summary: Vertical Components of the Creative Process

**Preparation**

- Personality
- Affective and extrinsic factors such as blockers
- Openness (to new experience) and ‘Extensionality’
- Non conformity
- Intuition and knowledge (sudden insight)
- Information seeking
- Concentration
- Sensitivity to problems and problem finding
- Questioning and problem sensitivity
- Imagination
- Motivation and environmental
- Memories and previous experience
- Personality and motivation for originality
- Curiosity (questioning)
- Visualisation (Predicting outcomes and consequences, evaluating, forming hypothesis)
- Persuasion: opportunity variables
- Questioning / brainstorming

**Incubation**

- Ability to regress
- Resistance (Resistance to premature closure)
- Tolerance
- Divergent thinking
- Ideational fluency / ideagenerating / memories
- Flexibility
- Metaphorical production / thinking / mapping
- Creative Eco-system
- Freeplay or playful state (Ego-controlled Regression / Link between conscious and subconscious)
- Original thinking / unique ideas
- Associations, remote associations
- Form hypotheses

**Illumination**

- Actual moment of conception and sudden insight

**Verification**

- Novel, new, unique
- Acceptable / appropriate / correct
- Social versus individual value or usefulness
- Elaboration / Adaptiveness / realization
- Evaluative
- Personal evaluation
- Societal evaluation (originality)

Table 11 below contains the first seeds of criteria that the researcher intends using as the vertical backbone from which the eventual CPAM assessment instrument will emerge. For the construction of the Creative Process Assessment Matrix (CPAM), they will be organised horizontally in accordance to the P Theory’s relevant components.

Wallas’s four stages of the Creative Process:

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality:</td>
<td>Ability to regress</td>
<td>Resistance (Resistance to premature closure)</td>
<td>Actual moment of conception &amp; Sudden Insight</td>
</tr>
<tr>
<td>Affective &amp; Extrinsic factors:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blockers</td>
<td></td>
<td>Ability to regress</td>
<td></td>
</tr>
<tr>
<td>Openness (to new experience)</td>
<td>Tolerance</td>
<td>Acceptable/Corrections/Correct</td>
<td></td>
</tr>
<tr>
<td>Extensionality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non conformity</td>
<td>Divergent thinking</td>
<td>Social vs. Individual: Value or Usefulness</td>
<td></td>
</tr>
<tr>
<td>Intuition &amp; Knowledge</td>
<td>Ideational fluency</td>
<td>Elaboration / Adaptiveness / Realization</td>
<td></td>
</tr>
<tr>
<td>Information seeking:</td>
<td>Flexibility</td>
<td>Evaluative</td>
<td></td>
</tr>
<tr>
<td>Concentration:</td>
<td>Metaphorical thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity to problems and Problem finding:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questioning &amp; Problem sensitivity</td>
<td>Freestyle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagination</td>
<td>Originality/ Unique ideas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation &amp; Environmental</td>
<td>Associations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memories &amp; previous experience</td>
<td>Form Hypotheses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curiosity (Questioning)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persuasion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11: Wallas’ 4 Stages of Creative Process
Most of the above construct was prepared in conjunction with the CPAP #2-4 (Creative Process Assessment Parameters) which were assembled to serve as a summary of Chapters 2-4.

5.5 CREATIVE PROCESS ASSESSMENT PARAMETERS (CPAP)

It is relatively apparent that one of the most critical problems facing creative assessment is that it is too often measured in terms of one or a few selected components or criteria. It stands to reason that because the creative episode holds such diverse and multi-dimensional perspectives, a more holistic investigation into its process components could serve to bring about a broader and more fruitful evaluation. Moreover the past three decades of extensive research mirrors a challenge to the assessors to investigate and explore their definitions, to analyse and inspect their theories. The creative process needs to be addressed as inclusively as research allows. This would in turn make more valid creative assessment possible.

The instrument referred to as CPAP’s have been compiled in order to bring more clarity and provide structure to an extensive accumulation of researched data of the creative process. Its main function is to systematically address this vast input by summarising data for further analysis. Here the information serves simply as a summary of the existing research as presented within chapters one to four. Their criterion content has been arranged according to their specific functions within the P Theory as well as according to the four stages of the creative process in which they occur.
5.5.1 CPAP#1

CPAP#1 is based on all criteria related data as researched in chapter one. These concepts will be compared and to those in all the other CPAPs'. Once comparisons have been found, all similar concepts will been categorised within the Creative Process Assessment Matrix (CPAM). The criteria from CPAP#1 will henceforth be referred to as #1. Relevant authors where necessary, will be indicated.

<table>
<thead>
<tr>
<th>4 Stages of Wallas:</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personality Traits</strong></td>
<td>Tolerance for ambiguity and failure (Youtz)</td>
<td>Alternative activity such as sleep or relaxing (recreational)</td>
<td>Uniqueness of individual</td>
<td>Communication</td>
</tr>
<tr>
<td>Personality (Davis 1992:69)</td>
<td>All is satiated to the point of compression</td>
<td>&quot;black box&quot; stage</td>
<td>glamorous, appearing easy, as if the creative product springs forth effortlessly</td>
<td>Determination needed</td>
</tr>
<tr>
<td>1. Aware of own creativity.</td>
<td></td>
<td></td>
<td>A sense of certainty when illumination occurs</td>
<td>Creative Actualisation</td>
</tr>
<tr>
<td>2. Original</td>
<td></td>
<td></td>
<td>Emotional intensity (Dabrowski)</td>
<td></td>
</tr>
<tr>
<td>3. Independent</td>
<td></td>
<td></td>
<td>Can be incoherent</td>
<td></td>
</tr>
<tr>
<td>4. Risk taking</td>
<td>Complete 'break-away' from conscious problem</td>
<td>Emotional intensity</td>
<td>Normally good feeling</td>
<td></td>
</tr>
<tr>
<td>5. Energetic</td>
<td></td>
<td></td>
<td>Excitement and an urge to communicate the insight</td>
<td></td>
</tr>
<tr>
<td>6. Curious/inquisitive</td>
<td></td>
<td></td>
<td>Only stage where significant others are not included</td>
<td></td>
</tr>
<tr>
<td>7. Sense of humour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Attracted to complexity &amp; novelty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Artistic &amp; Aesthetic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Open-minded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Need for alone time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Perceptive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive To difficulties, gaps &amp; problems (Torrance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>formulate an idea, equip yourself</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>try combinations of the collected parts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(See Davis's sub-categories p.70 - 72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative personality traits:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(See Davis 1992:79 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.G. of Personality Tests:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMPI: Minnesota Multiphasic Personality Inventory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Psychological Inventory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Style</td>
<td>Affective Domain</td>
<td>Biographical Traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Recognizing patterns</td>
<td>1. High school pupils often have older or younger or imaginary friends (Davis, 1992:84)</td>
<td>Early age assessment is important for more original responses (Moran)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Challenging assumptions</td>
<td>4. High school pupils often have older or younger or imaginary friends (Davis, 1992:84)</td>
<td>Barron's six affective &amp; cognitive traits: (Davis, 1992:88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Taking advantage of chance</td>
<td>5. High school pupils often have older or younger or imaginary friends (Davis, 1992:84)</td>
<td>Barron's six affective &amp; cognitive traits: (Davis, 1992:88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Seeing in new ways</td>
<td>6. High school pupils often have older or younger or imaginary friends (Davis, 1992:84)</td>
<td>Barron's six affective &amp; cognitive traits: (Davis, 1992:88)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Davis's mental self-government:**
-Natural Abilities
-Related to age (Simonton)
-Early age assessment is important for more original responses (Moran)

**Hereditary & Genetic Factors**

**Biographical Traits**
-History of creative activities
-Risk taking
-Sustained attention

**Problem solving**

**Affective Domain**

**Psychological Wholesomeness** (See Davis, 1992:83)

**Taylor's Alpha Biographical Inventory (ABI)** (Davis, 1992:83)

**Preparation, Incubation, Illumination, Verification**

**Myers-Briggs Type Indicator:**
-E or I
-NFP

**Adjective Check List**

**Intuition, feeling, Perceptive (Piirto)**

**E or I**

**NFP**

**Participation (Piirto)**

**Inquisitive**

**sensitive**

**Problem driven**

**Sustained attention**

**High school pupils often have older or younger or imaginary friends (Davis, 1992:84)**

**Talents in specific fields**

**Davis's mental self-government:**

**Creativity**

**Natural Abilities**

**Related to age (Simonton)**

**Early age assessment is important for more original responses (Moran)**

**Barron's six affective & cognitive traits: (Davis, 1992:88)**

**1. Recognizing patterns**

**2. Making connections**

**3. Taking risks**

**4. Challenging assumptions**

**5. Taking advantage of chance**

**6. Seeing in new ways**

**Davis's mental self-government:**

**Ability to know (Yield)**

**Determination needed**

**Creative Actualization**
### Creative thinking process:

**Preparation**
- 5. Has Anarchic form of mental government: has many needs & goals (often unclear), a random approach to problems, fuzzy motivation, tends to simplify, inability to set priorities
- Getting acquainted with the innuendo’s and implications of unsuccessful solutions
- Sustained attention

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Has Anarchic form of mental government: has many needs &amp; goals (often unclear), a random approach to problems, fuzzy motivation, tends to simplify, inability to set priorities</td>
<td>Getting acquainted with the innuendo’s and implications of unsuccessful solutions</td>
<td>Accumulated info is thrust into a ‘life of its own’</td>
<td>Must sustain original insight &amp; development to the full (Adaptiveness &amp; realization) (Harrington)</td>
</tr>
<tr>
<td>Sustained attention</td>
<td></td>
<td></td>
<td>Reviews, refines, and adjusts the product of illumination to the realities of reason</td>
</tr>
</tbody>
</table>

#### Davis’s Creative Abilities (1992:88):
- Fluency, flexibility, Elaboration, Originality, Transformation, Sensitivity to problems, Able to define problems, Visualisation & Imagination, Analogical & Metaphorical Thinking
- Able to regress, intuition, concentration.

- Threshold Theory: Average to above average intelligence (Runco)
- Threshold theory is incorrect (Piirto)

- Muti-directed investigation:
  - Problem finding
  - Difficulties identified
  - Previous methods & successes investigated
  - Clark’s 2 modes of thinking (p.586):
    - Psychometric i. (posterior) & Biological i. (frontal)

#### Creative thinking process:

<table>
<thead>
<tr>
<th>Info gathered integrated with previous experiences</th>
<th>Info gathering</th>
<th>Accumulated info is thrust into a ‘life of its own’</th>
<th>Convergent thinking:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selecting and redefining to find meaning</td>
<td>Person does not report much conscious activity (Youtz)</td>
<td>Aggregate gestates and concludes with sudden illumination or output</td>
<td>Evaluative, elaboration, fine tuning &amp; Empirical testing</td>
</tr>
<tr>
<td>Getting acquainted with the innuendo’s and implications of unsuccessful solutions</td>
<td></td>
<td>Sudden change in perception</td>
<td></td>
</tr>
<tr>
<td>Disequilibrium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freestyle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Processing Traits:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Verification
- Must sustain original insight & development to the full (Adaptiveness & realization) (Harrington)
- Reviews, refines, and adjusts the product of illumination to the realities of reason
- Revision, elaboration and modification (Youtz)
### Preparation

1. Uses previous knowledge as basis
2. Avoids perceptual sets & entrenched ways of thinking
3. Questions norms, assumptions, rules
4. Builds new structures instead of using existing structures
5. Uses wide categories such as 'forest' not 'trees'
6. Thinks metaphorically
7. Thinks logically
8. Makes independent judgements
9. Alert to novelty & gaps in knowledge
10. Copes well with novelty
11. Finds order in chaos
12. Uses internal visualisation
13. May prefer non-verbal communication
14. Flexible and skilled in decision making

### Incubation

Insights, metaphors, 
Transformation of experiences & organisation of purpose (Gruber)
Here are all memories and ideas that produce creativity (Freud)
Integrated information
Collective unconscious
Disequilibrium

### Illumination

All desires, impulses, wishes that are human instinct: this takes on a destructive form.

### Verification

All groups are influenced by the following:

---

**Unconscious (delta)**

- Here are desires, impulses, wishes that are all part of human nature (Freud)
- Destructive energy from instincts (Freud)

**Subconscious (theta)**

**Cognitive Style**

**Persuasion, press & place:**

- General

**Bloom's Taxonomy**

- Here are all memories and ideas that produce creativity (Freud)
- Integrated information
- Collective unconscious
- Disequilibrium

---

**Botha 214**
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
<td>Creative climate</td>
<td>Distal commitments &amp; culture</td>
<td>Proximal environments &amp; family.</td>
<td>Taylor's Alpha Biographical Inventory (ABI) (Davis)</td>
</tr>
<tr>
<td>Opportunities (Education &amp; Training &amp; Others)</td>
<td>Priorities</td>
<td>Reinforcements</td>
<td>Resources</td>
<td>Customs</td>
</tr>
<tr>
<td></td>
<td>Preparations</td>
<td>Reinforcements</td>
<td>Resources</td>
<td>Customs</td>
</tr>
<tr>
<td></td>
<td>Values</td>
<td>Priorities</td>
<td>Reinforcements</td>
<td>Resources</td>
</tr>
<tr>
<td></td>
<td>Supports &amp; influences of significant others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Influences of perception</td>
<td>Formative pushes and pulls of proximal family</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formative pushes and pulls of proximal family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>Formative pushes and pulls of proximal family</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formative pushes and pulls of proximal family</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Incubation
- Economic
- Health factors (personal as well as within cultural setting)
- International
- Political
- Technological
- Industrial
- Religious
- Media information

### Focal Relationships:
- Support etc.

### Creative Climate:
- Settings, sensory input.

### Distal Commitments & Culture:
- Formative pushes and pulls of proximal family

### Proximal Environments & Family:
- Taylor's Alpha Biographical Inventory (ABI) (Davis)

### Preparation
- Values
- Priorities
- Reinforcements
- Resources
- Customs
- Dynamics of acceptance, encouragement and identity formation
- Support & influences of significant others
- Influences of perception
- Formative pushes and pulls of proximal family

### Incubation
- Possibility of product involvement in making it reality
- External Validation
- Evaluation involvement: acceptance or rejection
- Visual, Auditory, Kinesthetic, Gustatory stimulation

### Illumination
- Variables: could be pointed out by externally generated observation or influenced by a need, an idea or remark from other source
- Taylor's Alpha Biographical Inventory (ABI) (Davis)
- (HOYT) How do you think (Davis)
- Products to judged according to Taylor's four levels of creativity (Olivier 1985:43): Expressive, Productive, Ingenious, Innovative
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>the accumulated resources thrust into a new state of being</td>
<td>Novel, appropriate, useful, correct, valuable to task at hand, heuristic (search methods) not algorithmic (calculating methods) (Amabile p.9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>independent and takes on a &quot;life&quot; of its own</td>
<td>Product must actually work in its applied field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>glamorous, appearing easy, as if the creative product springs forth effortlessly</td>
<td>Need to apply qualitative analysis of imaginative responses, C. analogies &amp; imagery (Khatala)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Product is often inextricably contingent on the existence of other value creating people and processes within the creative ecosystem (Runco 148)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Validation, evaluation &amp; elaboration exerted by significant others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is a test fakable? (Ironson &amp; Davis)</td>
</tr>
</tbody>
</table>

| Public Creativity |            |            |            |
|                   |            |            |            |

| Private Creativity |            |            |            |
|                   |            |            |            |

Table 12: CPAM (CPAP#1)
5.5.2 CPAP#2

Definitions of Creativity

CPAP#2 is based on all criteria related data as researched in chapter two. Concepts will be compared to those in all the other CPAPs'. Comparisons and similar concepts will be categorised within the Creative Process Assessment Matrix. The criteria from CPAP#2 will henceforth be referred to as #2.

<table>
<thead>
<tr>
<th>Creative Person</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional? Intellectual?</td>
<td></td>
<td></td>
<td>Are there any signs of emotional intensity?</td>
<td>Is the result based on one individual ability or the result of the dynamics of a cluster of various abilities?</td>
</tr>
<tr>
<td>Psychomotor abilities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overexcitable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there any inner necessity? (that would intrinsically motivate?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Blanchard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there an internal locus of evaluation?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Declines with age?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p(t)=c(e-αt-e-βt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there characteristics of the person that brings about creativity as a trait?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task commitment?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a high degree of ego strength &amp; psychopathologic qualities?</td>
<td></td>
<td></td>
<td></td>
<td>This could mean that a test should allow the person to use alternative sources for completion</td>
</tr>
<tr>
<td>(Barron)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extrasensory perception, telepathy, precognition, clairvoyance &amp; psychokinesis?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transpersonal psychology? (helps to understand creativity through exploring higher states of awareness)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does he/she program himself or herself to ask the right questions?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allocentric perception?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there any use of psychedelic drugs?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Indicate uncertainty of measurement
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do social factors interact with personality factors to produce geniuses? Are there signs of high productivity and great ego strength are involved? Perceptive?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biographical traits</td>
<td>Notice things others seem to ignore?</td>
<td>Ability to manufacture variations on a theme?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Raw Creative ability? *</td>
<td>Ability to toy with elements &amp; concepts?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insanity?</td>
<td>Hunches?</td>
<td></td>
</tr>
<tr>
<td>Cognitive Style</td>
<td>To which of the 7 types of Intelligence do they relate?</td>
<td>Regression in the service of the ego?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceives and defines problems differently?</td>
<td>Generates solutions of high quality, imaginative, clever, elegant &amp; surprising?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stores &amp; retrieves information differently?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Creative thinking process:**

**Extra-conscious**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ego-controlled regression? (means whereby pre- &amp; unconscious material appear in creator's consciousness)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preconscious processes? *</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Most likely preconscious, non-verbal or preverbal &amp; may involve a sweeping, scanning, diffused, free and powerful action of the whole mind... <em>(is it measurable?)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synthesis?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conscious & Information processing (beta)**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left and right hemisphere: influence, balance, domination, dependency &amp; utility for C. Thinking?</td>
<td>DP: able to alternate solutions to open-ended problems?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Problem finding?</td>
<td>Insights, metaphors &amp; transformation of experience &amp; organisation of purpose? *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transfer recall? *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forming of associative elements? *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Search for alternatives?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illumines?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is the result spontaneous, original and imaginative ingenuity?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluating &amp; Testing?</td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Unconscious (delta)</strong></td>
<td>Generation, selection &amp; preservation of ideas?</td>
<td>Neogenetic Processes?</td>
<td>Previous independent mental skills transformed &amp; integrated into novel synthesis?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biosociation of matrices?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Janusian thinking?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transfer?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fantasy?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primitive magic synthesis?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artistic creation: &quot;Unconscious dedifferentiation&quot;?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is there any indication of an integration of facts, impressions &amp; feelings into new form?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Autonomous complexes unearth the Collective Unconscious. These have determining effect on the Consciousness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are there remote associations? (Mednick)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can it be estimated that imagination is the synthesising activity?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intuition: ideacombining?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is there any signs of meaning by synthesis?</td>
<td></td>
</tr>
<tr>
<td><strong>Subconscious (theta)</strong></td>
<td>Generation, selection &amp; preservation of ideas?</td>
<td>Are there any remote associations? (Mednick)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Previous independent mental skills transformed &amp; integrated into novel synthesis?</td>
<td>Can it be estimated that imagination is the synthesising activity?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intuition: ideacombining?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is there any signs of meaning by synthesis?</td>
<td></td>
</tr>
<tr>
<td><strong>Cognitive Style</strong></td>
<td>Were there any previous independent mental skills that now can be transformed &amp; integrated into novel synthesis? If there was, did transformation and integration take place? Was...See Verification</td>
<td>Are there insight and novel reactions to the insight?</td>
<td>Was the product a novel synthesis?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Were there any signs of selection, planning, and abstracting?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reasoning by analogy and qualitative mental models?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Were previous independent mental skills transformed &amp; integrated into novel synthesis?</td>
<td></td>
</tr>
</tbody>
</table>
Persuasion, press & place:

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal Relationships: support etc.</td>
<td>Have social factors interacted with personality factors to produce genius?</td>
<td>Was there any childhood trauma where warmth was present?</td>
<td>Is the result of the dynamics of a cluster of various abilities?</td>
</tr>
<tr>
<td></td>
<td>Is there an absence of threat to self?</td>
<td>What events and/or people stimulate C. thinking?</td>
<td>Is the product's idea is beyond the realm of conventional thinking?</td>
</tr>
<tr>
<td>Creative climate: settings, sensory input</td>
<td>Allocentric perception or openness to the world?</td>
<td>What are the influences or availability of aesthetic taste of the creative climate? Materials available?</td>
<td>Do the perceivers have symbolic emotional reaction to abstract apparition of the creative form?*</td>
</tr>
<tr>
<td></td>
<td>Developmental? Adaptive?</td>
<td></td>
<td>The Collective Unconscious accounts for an audience's favourable response (Jung)</td>
</tr>
<tr>
<td>Distal commitments &amp; culture</td>
<td>Requirement: Must be part of environment that offers advanced culture &amp; technical heritage</td>
<td>Activation of one's archetypes? * Are there primordial experiences &amp; images that appear? *</td>
<td>Is the product a part of the Creative Eco-system?</td>
</tr>
<tr>
<td></td>
<td>Is there enough relevant experience?</td>
<td>What previous experience &amp; skills have been acquired?</td>
<td>What is society's final say?</td>
</tr>
<tr>
<td></td>
<td>Talent in specific field?</td>
<td></td>
<td>Does this product have the capacity of raising the standard of living of its community?</td>
</tr>
<tr>
<td></td>
<td>Is there interaction of domain, person, field and time?</td>
<td></td>
<td>Is the product a response to current social needs?</td>
</tr>
<tr>
<td>Proximal environments &amp; family.</td>
<td>What Field?: Social counterpart of domain. (Individuals &amp; Institutions that render judgement, hierarchical) Creativity is related to the domain in which he/she works</td>
<td>What are the events, people &amp; circumstances surrounding this person that will influence him/her creatively?</td>
<td>Has the product changed the field in any way?</td>
</tr>
<tr>
<td></td>
<td>What Domain?: (set of practices associated with an area of knowledge) What are the tastes &amp; prejudices of current time and field? Is C. the result of childhood experiences? Were there any childhood experiences? Intrinsic motivation temporarily affected by external interference (Are there any that could interfere with test?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Interaction of a certain time in history on a certain mind in a certain domain (Gardner)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Product:**

**Product in General**

<table>
<thead>
<tr>
<th>Past C. achievements:</th>
<th>Is there a product growing from the uniqueness of the individual?</th>
<th>Original?</th>
<th>Public novelty: How is the product been judged?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special talent creativity?</td>
<td></td>
<td></td>
<td>3 Types C. as an achievement:</td>
</tr>
<tr>
<td>Self-actualising creativity?</td>
<td></td>
<td></td>
<td>1. Overt production criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Nomination criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Social recognition criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If its not the result of one individual ability, what are the other various abilities involved?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hypotheses testing?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Communication of the results?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Have all the specific requirements been met?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Private or Social?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Novel?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unique?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New, novel &amp; unique in the experience of an entire civilisation/mankind? Statistically infrequent?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Was there sustained evaluation, elaboration &amp; development of the initial insight? Were there any signs of insightful reorganisation?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Adaptive to reality? Does it solve a problem or have a recognisable goal?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do the products appear new?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is the product a tangible expression? (AHD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Was the work completed/realised? (Davis-Jung)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unique &amp; functional outcomes?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is there agreement from artistic &amp; scientific establishments?</td>
</tr>
</tbody>
</table>

N/A | None, some or multiple unconscious/conscious rejected products | | |
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Creativity</td>
<td>How many or what rejected products are there?</td>
<td></td>
<td>Accepted by experts as being scientific, aesthetic, and social or of technical value?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Capable of raising the standard of living of its community?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Social value?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Constructive/destructive?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Benefit to someone?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valuable? Valuable by consensus?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Useful?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Are there any new combinations of social worth?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do they meet specific requirements?</td>
</tr>
<tr>
<td>Private Creativity</td>
<td>None, some or multiple unconscious/conscious rejected products</td>
<td>Private novelty: Creativity as a trait?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>What value does the product hold for the individual?</td>
<td></td>
</tr>
</tbody>
</table>

Table 13: CPAM (CPAP#2)
5.5.3 CPAP#3

Theories of the Creative Process

CPAP#3 too, is based on all criteria related data as researched in chapter three. Again all these concepts will be compared and to those in all the other CPAPs. Comparisons and similar concepts will give rise to the Creative Process Assessment Matrix. All criteria from CPAP#3 will henceforth be referred to as #3.

<table>
<thead>
<tr>
<th>Components of creativity:</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-preparation of problem or task presentation? Here an individual should be able to assemble &amp; use info (Amabile)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Creative Person

<table>
<thead>
<tr>
<th>Does the test measure the 3 components contributing to variance in creative behaviour: Intrinsic motivation, talent, personality, and cognitive style? (Amabile)</th>
<th>Does it determine if there is a loss of self/ego or transcendence of self? (Ability to become 'lost in the present, timeless, selfless, outside of space, of society, &amp; of history.) See** (Maslow)</th>
<th>**Or, does the test allow the individual to become self/ego transcendence of self? (Maslow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Intrinsic motivation?: (Runco's)</td>
<td>Take into account? Emotion and intellect, freedom &amp; discipline, reason &amp; intuition, the precise &amp; the gossamer, primary &amp; secondary processes &amp; chaos and order, all opposites that exist in the creative harmony of the brain (Crabon &amp; Parnes)</td>
<td></td>
</tr>
<tr>
<td>(Intrapscbic conflict, identity formation, an interaction of self, talent and ego, &amp; significant relationships) (Runco's)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests? Motivated by two main instincts of the id, the libido (sex drive) and aggressive instincts (Kris).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it also measure endurance, perseverance, persistence, determination and insight into understanding the creative goal or problem? (Arnold)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Does it test the 4 human functions: Thinking: rational; Feeling: emotional; Sensing: talent; Intuition: higher consciousness? (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Individual is sufficiently aware of the task &amp; its parameters. Must have willingness to risk by stepping beyond the established (Fearn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Is there a measure of synthesis of all human functions? (Balance between action, emotion, &amp; cognition &amp; insight &amp; intuition: the ability to synthesise components of a situation into a meaningful whole.) (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Perception is a occurring dynamic system and constitutes a creative process (Shallcross)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? C. has its roots in deep discontent &amp; this discontent is felt with joy, gaiety and love (Fearn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account that representation of the highest degree of emotional health? (May)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Creativity at the highest levels can be accomplished only through a relaxing of controls exercised by verbal logic and by dogmas that are popularly known as common sense” (Koestler)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 aspects of the C. person: Personality &amp; value system? Ability to discover &amp; formulate new problems? Intensity of interest &amp; motivation in chosen domain? (Csikszentmihalyi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task Motivation? Responsible for initiating and sustaining process; determines some aspects of response generation. (Amabile)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there any signs of passive responding &amp; an aggressive receptivity? (Guilford)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test utilize the fact that there should be a relaxing of controls &amp; regression to modes of ideation which are indifferent to rules of verbal logic, unperturbed by contradiction, untouched by the dogmas and taboos common sense? (Koestler)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test consider or take into account that illumination is firstly an Eureka! feeling, then anxiety of separateness, &amp; finally a strong desire to communicate? (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account that creativity is an active letting go &amp; assimilation &amp; integration of polarities to find new directions, new solutions, a fresh viewpoint? (Guilford)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test for Maslow’s 15 Characteristics of Self-Actualised people? (Maslow)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Product is model of artist's attitude toward a phenomenon (Simonov)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Does the test take into account that new situations, especially ones in which old behaviour is ineffective, dramatic new behaviour can occur which we label as Creative? (Epstein)</td>
<td>Does the test make use of the fact that C. involves contrasts such as reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral? (Schachtel)</td>
<td></td>
</tr>
<tr>
<td>Does the test take note of an individual's multiple creative behaviour repertoires? (Epstein)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there feelings of self-confidence, acceptance, esteem? (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests? Awareness, fluency &amp; flexibility depend on self-discipline, elaboration, complexity preferences &amp; personal ability to risk, question, imagine &amp; perform originally (Fearn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test take into account the 3 most obvious characteristics of creative behaviour: being continuous in time, novel &amp; probabilistic? (Epstein)</td>
<td>Does the test take into account the abilities outside the D.P. &amp; transformation that should be considered during measurement? (Guilford)</td>
<td>Test for elaboration? (characterised by labour, concentration and endeavour) (Stein)</td>
</tr>
<tr>
<td>Are the individual's multiple behaviour repertoires checked &amp; noted? (Epstein)</td>
<td>Does the test administrators keep record of the statistical frequent behaviour patterns in order to identify behaviour transformations? (Epstein)</td>
<td>Principle of resurgence 2. Novel &amp; different. 3. Probabilistic. (Epstein)</td>
</tr>
<tr>
<td>Does the test ask the person if they consider themselves creative and live a creative life? (Maslow)</td>
<td>Tests? Creative behaviour comes from 2 major phases: inspiration (person is 'driven' in an exceptional state, unknown thoughts and images appear) &amp; elaboration (Stein)</td>
<td>Tests? Evaluative behaviours &amp; communicative skills? (William)</td>
</tr>
<tr>
<td>Does it measure one of the most important characteristic: the drive to carry a project through to completion? (Amed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it test for emotional well being and self-actualising qualities? (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it take account of the person's life choices: health, naturalness, intunedness, and development of unique potentials? (Clark)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for being more intuitively perceptive? (MacKinnon)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Biographical traits**
<table>
<thead>
<tr>
<th>Cognitive Style</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the underlying processes involving the abilities to find facts, problems, ideas, solutions, &amp; the acceptance of solutions investigated? (Parnes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative thinking process:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Readiness (purposeful intention)</td>
<td>2. Reception (perceptive awareness) Characteristics of induction (the recognition of many and varied parts) (Shallcross)</td>
<td>3. Reflection (adding on) Feedback (the return of a portion of the output of a system to the input), and acknowledges the presence of paradox and the need for collaborative interaction (Shallcross)</td>
<td>4. Revelation (emergent &amp; pattern integration) The underlying paradox exhibits contradictory aspects which produce tension. Existing systems are threatened &amp; need change to resolve state of conflict (Shallcross)</td>
<td>5. Recreation (expression/manifestation) (Shallcross)</td>
</tr>
<tr>
<td>Does the test make use of the fact that C. involves contrasts such as reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral? (Schachtel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Without access to alternative levels of awareness, creative behaviour may be stifled or blocked (Krippner)</td>
<td>Forming new hypotheses? (Torrance)</td>
<td>Does the test take into account that the pre- &amp; unconscious should be available to the C. person which is important for evaluation in creativity's higher levels of consciousness (Krippner)</td>
<td>Does the test take into account that in lateral thinking you put forward different views? All are correct and all can coexist. (Different views are not derived each from the other but are independently produced) (De Bono)</td>
<td></td>
</tr>
<tr>
<td>Does it test for structural opposition &amp; simultaneity of opposition termed Oppositional thinking? (Rothenberg) (Capacity to conceive &amp; utilize 2 or more opposite or contradictory ideas, concepts, or images simultaneously)</td>
<td>Test for structural opposition &amp; simultaneity of opposition termed Oppositional thinking? (Rothenberg) (Capacity to conceive &amp; utilize 2 or more opposite or contradictory ideas, concepts, or images simultaneously)</td>
<td>Tests? Sudden insight when creative ideas shift from preconscious to conscious (Kris).</td>
<td>Do tests determine whether there is an elaboration and development of the idea in which the Big Idea is implemented? (Davis)</td>
<td></td>
</tr>
<tr>
<td>Does it test if person senses gaps or missing elements? (Torrance)</td>
<td>Homospatial thinking? (Rothenberg)</td>
<td></td>
<td>Communicating the results? Modifying and retesting? (Torrance)</td>
<td></td>
</tr>
<tr>
<td>Does the test clearly distinguish two steps: the big idea (divergent) &amp; elaboration (convergent)? (Osborn &amp; Parnes)</td>
<td>Does it test for association of 2 self-consistent, incompatible frames of reference in the physical, psychological, or social world? (Koestler)</td>
<td>Tests? Produces new &amp; unexpected connections, metaphorical relationships, overlapping meanings, puns, &amp; allegories (Kris).</td>
<td>Take into account? C. behaviours increases consciousness to a total collection of possibilities (Fearn)</td>
<td></td>
</tr>
<tr>
<td>Does the test acknowledge that during the decisive stage of discovery, the codes of disciplined reasoning are suspended...true creativity often starts where language ends (Martindale)</td>
<td>Does it test to determine if there is an unstable equilibrium where balance of emotion and thought are disturbed? (Koestler)</td>
<td>Does the test includes testing 3 major phases?...Hypothesis formation Hypothesis testing Communication of results (Stein)</td>
<td>Does the test assess the 5 stages: fact-finding, problem-finding, idea-finding, solution-finding (evaluation), &amp; acceptance-finding (implementation) (Osborn &amp; Parnes)</td>
<td></td>
</tr>
<tr>
<td>Does the test take into consideration the importance of knowledge for the C. process? (Williams)</td>
<td>Can the test distinguish biosociative originality from associative routine? (Koestler)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synectics? (Gordon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>Take into account? Creativity refers to a natural process of growth &amp; change whereby patterns emerge &amp; evolve through a continuous process of combining acquired with existing information (Shallcross)</td>
<td>Synectics cite 3 metaphorical mechanisms: Direct Analogy, Personal Analogy, Compressed conflict (Gordon). Do the tests suggest or utilize Synectics?</td>
<td>4 Types Analogical thinking: direct analogy (comparisons to previous successes), personal analogy (you are the product), fantasy (far-fetched thinking), &amp; symbolic analogy (compressed conflict or book titles oxymoron's) (Davis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it assess important cognitive variable involved such as loosening of associative thinking &amp; some broadening of the associative horizons? (Eysenck)</td>
<td>Do the tests test for Synectics? [Synectics is the joining together of different irrelevant elements. These methods are conscious, analogy-based and metaphor-based techniques (Davis)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test monitor the process of gathering information from multiple sources to build an integral whole? (Eysenck)</td>
<td>Does the test determine if there is any signs of breaking metaphorical connections with 'old' facts &amp; feelings, then inventing connections with new facts &amp; feelings? (Gordon)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it assess the quality of over inclusiveness, a failure of inhibition that allows less relevant thoughts to intrude into the problem-solving process? (Eysenck)</td>
<td>Do tests gain insight into the use of analogical and metaphorical thinking? [Borrow ideas from one context &amp; utilize them in another, borrow a problem solution from a related problem or, see a connection between one situation and another (Davis)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it test if there is free flow &amp; no interference from unconscious determinants? (Kubie)</td>
<td>Does the test assess the ability to conceive of antithetical ideas simultaneously? (The bringing together habitually incompatible frames of reference (Bergquist's Symbolic))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the test assess if there is freedom of Preconscious functioning? (Kubie)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the test assess whether the preconscious makes free use of analogy &amp; allegory, superimposing dissimilar ingredients into new perceptual &amp; conceptual patterns &amp; reshuffling experiences? (Kubie)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can the test determine if all 3 processes act concurrently? (pre-, un- &amp; conscious) (Kubie)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tests? in the service of the ego, not 'id', ego exercises voluntary control over regression &amp; over the shifting of pre-cons. Ideas to the conscious mind (Kris).</td>
<td>Tests? divergent thinking abilities: fluency, flexibility, originality, sensitivity to problems, redefinition &amp; elaboration (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>Off-conscious</td>
<td>Does the test consider the fact that C. is a right sided brain function which in turn reacts more non-verbal and uses more of a holistic synthesis in its operations (Clark)</td>
<td>Test off-conscious mental activity in the &quot;transliminal chamber&quot; midway between the unconscious mind &amp; conscious mental activity (Rugg)</td>
<td>Here mind is free to draw from the vast store of experience from the unconscious (Rugg)</td>
<td></td>
</tr>
<tr>
<td>Extra-conscious</td>
<td>Take into account? Creativity calls for low cortical arousal and the defusing of one's powers of concentration while intellectual ability calls for low cortical arousal and focused attention (Martindale)</td>
<td>Test extra-conscious thinking &amp; allusive thinking/ looseness or slippage of ideation? (Eysenck)</td>
<td>\text{Does the test take into account?} Fluency produces more associations</td>
<td></td>
</tr>
<tr>
<td>Pre-conscious</td>
<td>Does it measure the integration of our logical side with our intuitive side, our left brain with our right? (Young)</td>
<td>Test pre-conscious incubation of the problem &amp; part of preconscious activity is regression to childlike thought processes-the primary process (Kris).</td>
<td>\text{Does it measure associations?} [Bringing together of entities that are remotely associated or connected with each other (Mednick)]</td>
<td></td>
</tr>
<tr>
<td>Conscious &amp; Info processing (beta)</td>
<td>Does the test take into account? Lateral thinking has to do with exploration: specific &amp; general. (De Bono)</td>
<td>Tests? Preconscious is not tied to realities of conscious or bound to rigid symbolic relationships of unconscious, but can engage in free play with ideas, meanings and relationships (Kris).</td>
<td>\text{Does the test take into account?} Fluency produces more associations</td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Associative elements? (evoked by contiguous environmental appearances, similarity, &amp; mediation of common elements) (Mednick)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Units: fluency? (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations: fluidity? (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Classes: flexibility? (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the test take into account that fluency &amp; flexibility are found in both verbal and non-verbal tests (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transformations: Flexibility &amp; originality? (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Systems?: fluency (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implications: Elaboration? (Guilford)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Take into account that conscious control over one's own thoughts and actions can obstruct creative spontaneity? (Bruner)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconscious (delta)</td>
<td>Tests alpha waves? (C. people produce fewer alpha waves when relaxing and increase them when working with an imaginative problem) (Martindale)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the test determine if there is structural opposition within the unconscious? Does it determine if the repressed material is solved or accepted? (Rothenberg) See *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* (Structural opposition takes account of what's unconscious &amp; repressed without removing repression or promoting acceptance of the repressed material)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subconscious (theta)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Persuasion, press & place:

- Does the test measure the 'length of time' and 'depth of application'? Does the test address the issues concerning to what degree interventions need to be "tailored" to particular person or problem? (Harrington)
- Tests? Creative product brings new & unique perceptions of the culture (William)
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same environment has different effects on different persons: Are C. tests administered, done in similar environments? If so, are their effects on different persons monitored or measured? (Amabile)</td>
<td></td>
<td></td>
<td>Does the test measure what the effects are of social evaluations on the individual's efforts? (Amabile)</td>
</tr>
<tr>
<td>Does the test question or refer to the 2 complementary sets of influences? The extrinsic &amp; intrinsic (a) &amp; (b) (Runco)</td>
<td></td>
<td></td>
<td>Are the test administrators' field-individuals that know domain's rules? Are they competent to decide if solution meets the criteria, or, if an individual who's solution departs from the standard rules can be added, ignored or censored? (Csikszentmihalyi)</td>
</tr>
<tr>
<td>(a) Extrinsic environmental conditions &amp; distal sources of motivation? (Runco's)</td>
<td></td>
<td></td>
<td>Does the test allow the 'Field' to select one Creative variation among many &amp; add it to the domain so that it transmits the selected variant to a new generation of individuals? (Csikszentmihalyi)</td>
</tr>
<tr>
<td>Does the test take into account that the social environment often takes the initiative in the expression of individual creativity? (Csikszentmihalyi)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does it establish the external conditions for the effective side of the creative process? (Accepting. Evaluation absent. Understanding empathetically) (Rogers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Cultural factors influence course of creative development &amp; as level &amp; type of creative functioning. (Torrance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Creative discontinuities occur whenever the children of that culture are confronted with new stresses and demands. (Torrance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? General cultural rankings are predictable with advantage children showing a higher creativity index than those of less advantaged cultures (Torrance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take into account? Limited environments restrict the level of creative performance. (Griffiths)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Focal Relationships:
- **Support etc.**

### Creative climate:
- **Settings, sensory input**

### Distal commitments & culture
- **Proximal environment & family**

### Product:
- **Preparation**
  - Take into account? All learning involves creative organisation of culture's knowledge with individual's experience (William)

- Take into account? Limited and confined by cultural space & time, reaching beyond limits to grasp ideas or concepts that already exist, but that are not known (Fearn)

- Take into account? Transactional motivation where the person shapes the environment rather than being shaped by it (Krishnamurti)

- Take into account? Environmental stimulation where behaviour is initiated toward unpredictable & creative outcomes that combine to form creative transactualization (Taylor)

- Domain-Relevant Skills?: Raw materials that feed the process (Amabile)

- Creativity-Relevant Skills?: Operate at the most general level; may influence responses in any content domain (Amabile)

- Does the test measure the parameters of the cultural symbol system (or domain) in which the creativity takes place, & the social roles and norms (or field) that regulate the given creative activity? (Csikszentmihalyi)

- Does the test determine how the environment acts upon the creator? (Skinner)

- Does it test for Taylor's 5 levels of creativity: expressive, productive, inventive, innovative and emergenative? (Maslow)

- Does it test for Special talent creativity? (Maslow)

- Does the test take into account that creativity is a way of conducting one's life rather than in terms of the number and kinds of objects one produces (Taylor)
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Does the test take into account that the longer a work survives (social consumption) the closer the creator comes to perceiving &amp; presenting an essential truth of human existence? (Simonov)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Does the test take account of the fact that systems change in dynamic ways that appear chaotic, non-linear and unpredictable (Eysenck)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is the product private creativity or social creativity? (Harrington)</td>
</tr>
</tbody>
</table>

**Table 14: CPAM (CPAP#3)**

This completes the CPAP's definitional, theoretical and prerequisite creativity criterium search. What follows is a creative assessment test questionnaire.
5.5.4 CATQ#4 (Creative Assessment Test Questionnaire)

This particular CPAP differs from all the others because most of the questions asked address the test itself and do not necessarily fall within one of the four stages of Wallas. It takes on the form of a questionnaire:

**CPAP#4: Test Questionnaire**

**Test Requirements**

Type? Norm-referenced tests, interviews, observations or an informal assessment?

Does the test focus exclusively on one test score?

**Information about the test**

Name?

Author?

Publisher?

Date of issue?

Alternatives available?

Cost?

Time-factor?

Test manual available?

Revisions been done?

What was the standardised group?

**Aids to Interpreting Test Results**

Does manual provide clear statement of the purpose and applications for which the test is intended and the qualifications needed to administer the test and interpret it properly?

Do the test, manual, record forms, and accompanying materials guide users toward sound and correct interpretations of the test results?

Are the statements in the manual that express relationships presented in quantitative terms, so that the reader can tell how much precision or confidence to attach to them?

**Examinee Considerations**

Prerequisite skills?

What language or modes of communication can the test be administered?

Appropriate vocabulary?

How are test items presented and responded to?

What stated or unstated adaptations can be made in presentation and response modes?

Sex and ethnic biases?

Interesting test materials?

Is test suitable for individual or group administration?

Administration and Scoring?
Directions clear and complete?
Procedures clear?
Scales and Norms?
Clear and carefully described?
Are norms reported in an appropriate form (usually standard scores or percentile ranks)?
Populations clearly defined and described?
If more than one form is available, are tables available showing equivalent scores on the different forms?
Does the manual discuss the possible value of local norms and provide any help in preparing local norms?

Any pre-testing preparation done such as the AUTA model?
Does the test have Longitudinal validity?

Validity and Reliability

What correlation’s have there been?
Construct?
Criterion Related?
Factor Analysis?
Concurrent validity?
Predictive validity?
Content validity?
Are the tests sensitised to barriers, blocks, and squelchers? See 4.2.2.1
Are there Stimulators of Creativity? See 4.2.2.1
What conditions are conducive to Creative Thinking? See 4.2.2.2
Are the results from the test used for purposes beyond identification?

Does the test follow the basics steps in an assessment process?

Review referral information?
Obtain information concerning medical, social, psychological, linguistic, educational, and physical development, including previous psychological evaluations?
Assess behaviour of relevant people sources?
Observe in various settings?
Is the test administered selected on basis of referral question; age; physical capabilities, language proficiency, and prior test results and reports?
Interpret data?
Formulate hypothesis?
Develop intervention strategies?
Write report with recommendations?
Meet all concerned individuals to discuss results and recommendations?
Are there any follow up recommendations and retesting?

Test Administrators and Scorers

What are the Guidelines for Training Creativity Test Administrators and Scorers?
How close do they resemble those suggested by Treferrer, Torrance and Ball? See 4.2.1.1 (e)
Is the Author of the test qualified in psychometrics?
Did the Author follow the set of seven basic guidelines for objective creativity assessment as set out in 4.2.3.2?
Does the Author have an understanding of the Laws and Government Regulations concerning assessment?

New trends and Research implications

Does the Author have knowledge of the following:
Motivation principle of creativity as set out in 4.2.4.1?
Pre-school Research Findings?
Alpha waves and Binaural Beats?
The MBTI Creativity Index?
Types of Creativity tests

4.3.2.1 Biographical? Does the test investigate histories of creative abilities & hobbies, experiential factors & abilities and taught skills such as implementing, discerning opportunities?

4.3.2.1 If Biographical? Does the test measure creative thinking talents of productive thinking, communication, forecasting, decision making, planning, getting-ideas-into-action talents of implementing, human relationships and discerning opportunities?

4.3.2.1 Biographical? Does the test group info according to 5 sections: physical characteristics, family history, educational history, leisure-time activities, and a miscellaneous category?

How does the test go about measuring for patterns of information processing? See 4.3.2.4

4.3.2.5 Do teachers, peers, and supervisors do any ratings?

Pre-requisites of Creativity Tests

4.3.3.1 Does the AUTA Model Of Creative Objectives or precede the test?

Is there any form of pre-test informative session or preparation?

Any other pre-test system of increasing the individual's awareness of the topic?

Test problem defining, visualisation, imagination, transformation, ability to regress, metaphorical thinking, Bloom's analysis, synthesis, evaluation, intuition, resisting premature closure, concentration, and logical thinking? (Davis 1989:261.)

4.3.3.2 Does the test ask the straight forward question: "Are you creative?"

Does the test base some of its assumptions on the Threshold theory?

4.3.3.3 Does the Author aware that Figural tests yield more reliably original responses? If so, does the test allow for this?

4.3.3.4 Does the test contain more Figural items than Verbal?

4.3.3.5 Does the test allow for open-ended problem solving & opportunity to find the problem

Is the factor 'Dimension of originality' given enough weight in the evaluation process?

4.3.3.6 Is the dimension of originality the key essence of product evaluation?

4.3.3.7 Tests reliable, easy to administer to groups and not take a long period of time to complete; culture fairness: validity for both minority and majority groups, results from the test should be used for purposes beyond identification Rimm1984:182

4.3.3.8 Can this test easily be faked for either a high or low creativity score?

4.3.3.9 A distinction between real-time creativity and multistage creativity? (spur-of-the-moment, improvisational, & demands output in a short interval of time vs. sufficient time allowed for generation & selection of ideas)

4.3.4.1 more open-ended subjectively assessed creativity tasks? (in order to assess more situationally-induced differences in creative performance, such as those brought about by the imposition of social constraints) Amabile (88:237)

4.3.4.3 Does the test take into consideration that C. in children should not be evaluated as a product being 'socially useful' (because it is not always a prerogative of a young child)

4.3.4.4 Does the test call for Testlike or Gamelike conditions?

4.3.4.5 What is the 'post-test process'? Is there any follow up? What is its longitudinal validity?

4.3.4.6 Are there any cultural drawbacks?

Does the test allow for cultural diversity?

4.3.4.7 Is the author of the test aware of all the problems with C. tests: Speed, commands, visual lay-out of assessment page, fluency score, flexibility, scoring elaboration & originality?

4.3.5 Is the Author of the test aware of recent Creativity Test Research-findings? (such as those outlined in 4.3.5)

Here it is relevant to recall that the researcher's original problem was what type of criteria do creativity tests base their evaluation on? It was originally identified that there exists a need to index creativity. This has lead to a pursuit of finding credible resources that identified the relevant components, which now serve as a yardstick for the researcher's meaningful criteria selection. The investigation evolved around the following hypotheses:
A set of criteria exist by which the creative process can be measured, and that;

existing tests for measuring the creative process do succeed, if to limited degree, in identifying useful assessment criteria.

Chapter six will highlight the synthesised and analysed criteria within a CPAM framework. The CPAM's main purpose is to bring more clarity and limpidity affirming to decades of research done into the creativity question. The CPAM will finally serve to evaluate existing creativity tests.

5.6 CONCLUSION

Multiple definitional and theoretical perspectives bring about a variety of informative data that can be effectively applied to creativity assessment. Extensive research has uncovered many areas of Creativity's multi-trait complexities, making assessment possible through several assessment strategies from various points of view. It has become clear that there is no brief or instant creative assessment tool that can comprehensively evaluate the creative process. Assessment is compelled to take on many forms to provide usable meaningful data and have interpretative strategies that will meet professional standards and, fully reflect the complex construct of creative assessment. The Creative Process Assessment Parameters' collective data will be a unique vehicle toward an objective, criterion based creative process assessment.

5.7 IN SUMMARY

The creative component's main products of the P theory have now been summarised and subcategorised. Some fundamental criteria from prominent sources are highlighted. Lowenfeld, Guilford, Runco and Youtz provide qualitative insight. Now criteria within the four stages of the creative process (a vertical grouping) are reviewed, explored and subcategorised into a concise summary.

The Preparation Stage seemed to include the majority of criteria found. It covered the following areas:
Personality, affective and extrinsic factors: blockers, openness (to new experience) ‘Extensionality’, non-conformity, intuition and knowledge, information seeking, concentration, sensitivity to problems and problem finding, questioning and problem sensitivity, imagination, motivation and environmental, memories and previous experience, personality and motivation for originality, curiosity (questioning), visualisation (predicting outcomes and consequences, evaluating, forming hypothesis), persuasion: opportunity variables and questioning/brainstorming.

*Incubation* included the majority of criteria concerned with creative thinking process:

Ability to regress, resistance (Resistance to premature closure), tolerance, divergent thinking / ideational fluency / ideagenerating, memories, flexibility, metaphorical production / thinking / mapping, creative Eco-system, Freeplay / playful state (Ego-controlled Regression / link between conscious and subconscious), original thinking / unique ideas, associations (Remote Associations), forming hypotheses.

*Illumination*

Actual moment of conception & sudden insight

*Verification*

Novel, new, unique, acceptable/appropriate/correct, social vs. individual (value or usefulness), elaboration/Adaptiveness/realization, evaluative, personal evaluation and societal evaluation (originality).

CPAP #1-3 bring more clarity and structure to the assessment of the creative process. Their content will shape the categorisation of criteria for the Creative Process Assessment Matrix. The Creative Assessment Test Questionnaire (CATQ#4) will be an additional tool that will accompany the assessment of the Creative Process Assessment Matrix (CPAM).

Chapter six will elevate the synthesised and prepared criteria within a framework to serve as a Creative Process Assessment Matrix (CPAM). The CPAM’s main purpose is to highlight significant criteria within an organised structure, based on decades of research done into the creativity question. An abridged version of the CPAM will
endeavour to capture categorised criteria that form an integral part of the creative process. Each stage of the creative process will be addressed separately. Each will pose questions related to the stage in conjunction to its creative component (creative person, creative thinking process, creative persuasion and creative product). Together with chapter four’s Creative Assessment Test Questionnaire (CATQ#4), they will serve to evaluate three creativity tests that proclaim to assess the creative process or a part thereof. This is an approach where all categories of creativity measurement will be tested. This approach will take on the form of an empirical investigation.
CHAPTER 6 THE CREATIVE PROCESS ASSESSMENT MATRIX

6.1 INTRODUCTION

The limitations and psychological questions of measuring creativity has not stopped the onslaught of multiple creativity tests that all attempt to measure its significance as found in individuals. Among the most notable are those of Guilford (1971), Torrance (1989), Getzels and Jackson (1962) and Davis (1992). Each researcher’s approach differs yet they all allude to similar fundamentals. It has also been noted that the most salient diversity characteristic of creativity measurement is its diversity. For example, considerable evidence proved that divergent thinking tests should not be dismissed as measures of creativity although their validity as true creativity measures are regarded as tenuous (Wakefield 1991:185). Chapter four sets out to clearly explain the taxonomy of creativity measurement.

![Figure 21: CPAM Hierarchy](image)

With this in mind, the eminent Creative Process Assessment Matrix (CPAM) evaluation of creativity tests is an approach where all categories of creativity measurement...
will be tested. It could be assumed that testing a divergent thinking test would not qualify as it does not profess to test personality, biographical or environmental and many other creativity issues and would thus fail at assessing these areas. The CPAM's (see Figure 21) main objective will be to highlight where a particular creativity test identifies criteria within the creative process.

6.2 EMPIRICAL STUDY: THEORY AND PURPOSE OF CPAM

The millennium poses us a challenge which states that if we are to survive this era, it is imperative that our survival will depend on differentiation by means of our ever-increasing reliance on our innovative creative powers making creative assessment an invaluable tool to all of humankind. The more obvious assessment has in the past always centred on the creative product, its usefulness and or whether it was meeting a cultural, social or mutual need. Research studies have proved that we have attempted and to a certain degree managed to assess the creative person through biographical inventories and personality questionnaires. It has however not yet been established whether or not the creative process can be assessed or not. This paper has dedicated its research in establishing the importance of the creative process within the full creative episode and has beyond any doubt highlighted not only its significance but also the necessity to pursue its assessment. The main purpose of the Creative Process Assessment Matrix is to formulate a holistic structural framework of creative process components. This would provide the categories for researched criteria, which will enable the CPAM to be used as an instrument to assess the creative process.

Figure 22 below explains CPAM’s unique composition and how the horizontal rows and vertical columns evolved from a holistic perspective of the creative process. The creative process has been set out according to the four stages of Wallas while in conjunction with the components of the P Theory. The distinction between the ‘creative process’ and ‘creative thinking process’ has merited a clear definition (See chapter three). Here the cognitive ‘process component’ of the p-theory is referred to as the ‘creative thinking process’ in order to clearly identify and evaluate the relevant criteria. The ‘creative thinking processes’ are influenced by creative abilities such as fluency, flexibility, originality and occur within the realms of the conscious,
Botha 241

subconscious and unconscious mind, and are either convergent or divergent. It has been made clear that the creative process referred to, ranges from conception to completion and, in its entirety, and, involves all the components of the P-Theory (the creative person, process, persuasion, and product) as they relate to the four stages of Wallas (Preparation, Incubation, Illumination and Verification). It is the multifaceted nature of creativity that demands reference to all its interrelated spectrum of components and, how they relate, depend on and intersect with each other. All research done has reiterated a holistic approach of the creative process.

Identification of key elements of the Creative Process

<table>
<thead>
<tr>
<th>Horizontal column based on the Creative Process Components of the P Theory</th>
<th>Vertical column the four stages the Creative Process from Wallas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Person</td>
<td>Preparation</td>
</tr>
<tr>
<td>Creative Thinking Process</td>
<td>Incubation</td>
</tr>
<tr>
<td>Creative Persuasion</td>
<td>Illumination</td>
</tr>
<tr>
<td>Creative Product</td>
<td>Verification</td>
</tr>
</tbody>
</table>

Framework of CPAM Matrix Established

**Figure 22 : CPAM Flow**

- CPAM assess the creative process, as it is perceived through the four stages of Wallas in conjunction with the components of the P Theory.

- CPAM endeavours to understand what the (place) environment’s impact and influence (sociological) is, on the creative process.

- CPAM also strives to determine exactly what motivates and supports (persuasion) this process.

The CPAP or the Creative Process Assessment Parameter refers to a matrix composed to summarise pertinent creative process research. CPAP will organise the main definitions and theories in order to cite and generate relevant criteria and this
will eventually provide the content for CPAM. The content will pose questions to evaluate existing creativity tests in order to assess whether they include measurement of the creative process or, if not, to assess where the gaps lie. Only current creativity tests that claim to fully, or partially, test the creative process, will be selected and assessed according to the selected criteria.

Figure 23 below explains how each chapter in this research paper played a role in supplying 'criterial' information that was summarised in a CPAP format. This data was used to identify and categorise relevant criteria. Pertinent criteria were then synthesised to meet the requirements of the CPAM. The cumulative information gave rise to sub categorised questions within each individual criterial-category. The result was formatted into five separate questionnaires: one for each of the creative process stages (preparation, incubation, illumination & verification) and one 'test questionnaire'. Chapter four yielded much relevance but its content was aimed at examining and evaluating tests rather than providing criteria for the CPAM. The Creative Assessment Test Questionnaire (CATQ#4) summarised its main concerns and is independent of the CPAM evaluation.

Another addition to the CPAM is the pre-test and post test section (see Chapter three). Successful illumination depends on an in-depth and thorough investigation during the preparation phase as well as an effective, but completed incubation period. This addition serves to successfully ignite the creative process to the motivation level of
such an in-depth investigation. The 'pre-process stage' or awareness stage is a natural and important step in personal creative understanding and growth.

A considerable demand exists to justify the long-term predictability of creativity tests. The evidence of a test's predictive-validity cannot only benefit the research field, but also adds significance to the test's content value. Divergent scores are related to real-life creative achievement and the value of creative thinking tests lie in their ability to predict later real-life creative behaviour (Howieson 1980:117). It can only benefit a creativity assessment program to initiate a ‘post-process’ evaluation in order to validate its relevance and significance to the creativity field, its longitudinal predictability, and, the aptness and accuracy of its content.

6.3 CPAM'S COLOR CODED FRAMEWORK

The assessment of creativity's multi-trait complexities is now made possible through several assessment strategies from various points of view. Here assessment takes on many forms to provide usable meaningful data and provide interpretative strategies that will meet professional standards. This version of the CPAM provides a coloured matrix, which holistically puts the reader in touch with the overall view of the CPAM's framework. Each component of the P Theory is grouped into sub sections indicated by means of different shades. This classification will prove to be of extreme value when the assessment of the test commences.

Additions can be spotted at the top and bottom of the matrix. They include a pre-test requirement as well as the need to assess whether or not there are any follow up testing or post test evaluations involved in the tests that are being assessed. The CATQ #4 Test questionnaire's inability to fit within the framework of the CPAM has compelled it to assess the tests separately. It does however play an important role in the assessment procedure and therefore needs to have its' results displayed with those of the CPAM.

Table 15 CPAM (Colour Coding)
CPAM's colour differentiating makes it user friendly and provides quick access to the fundamentals of the creative process.

The colour coded framework of the Creative Process Assessment Matrix (CPAM)

### Stages of the Creative Process:

<table>
<thead>
<tr>
<th>Pre-test</th>
<th>Personality &amp; Biographical traits</th>
<th>Affective Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Creative Thinking Processes

- Conscious & Information processing (beta)
- Unconscious (delta)
- Subconscious (theta & alpha)
- (Extra-/Pre-conscious)

### Cognitive Style

- Persuasion
- Focal Relationships: support etc.
- Creative Climate
- Distal Commitments & Culture

### Proximal Environment & Family

- Product in general
- Private Creativity
- Public Creativity

### Post test evaluations

- Creative Process Test Questionnaire #4 (CATQ#4)

### Table 15

**CPAM Colour Coding**
6.4 THE ABRIDGED VERSION OF THE CREATIVE ASSESSMENT PROCESS MATRIX

Synthesis and careful analysis clearly distinguish appropriate criteria within a CPAM framework. This creativity index endeavours to facilitate the key elements of the entire creative episode. Its structure provides some degree of stability after the endless search for relevant criteria within the creative process. This entire research paper has been focused on discovering the blueprint for the assessment of the creative process. It has cumulatively produced multiple layers of information that needed to be compared, evaluated and synthesised, to analyse in what stage and in what component the criteria needed to be ranked. The CPAM's criteria have been extracted from the research summarised from the CPAP#1-3. Its meaningful content parsimoniously gives credence to the magnitude and prominence of creativity. A brief description of the headings will explain meanings or abbreviations:

- The symbol # will indicate the number and chapter to which the instrument or criteria is referring to.
- **AUTA**: Awareness, Understanding, Techniques, Actualisation.

Davis & Sullivan's (1980:149) taxonomy of creative objectives refer to the affective domain where the hierarchical sequence of objectives are receiving, responding, valuing, organising, and characterising by means of a value complex. This hierarchy develops attitudes, willingness, commitment, and a particular value system.

The first column contains the P Theory components and divides them horizontally into colour-coded dimensions (See chapter 5.2.1). What follows is a brief description of these headings explaining their meanings and/or abbreviations:

- **Pre-test**: AUTA test done prior to testing (See chapter 3.3.8).
- **Affective Domain**: Research indicates that there seems to be an important affective dimension to the undertaking of creativity tests, both before and during the sessions. For example Lissitz and Willhoft's (1985:5) results clearly indicated an affective aspect.
- **Conscious Information Processing (beta)**: Conscious Information Processing. Brain wavelength known as beta (See chapter 4.2.4.5).
• **Unconscious (delta):** The unconscious domain considered to be accessible in delta mode (See chapter 4.2.4.5).

• **Subconscious (theta) Extra-conscious (Pre-conscious):** The subconscious where super learning takes place. Here the brainwaves are called theta (See chapter 4.2.4.6). Extra-conscious is a phrase coined by Koestler (See chapter 3.3.4.3) and Pre-conscious by Kubie (See chapter 3.3.5.1).

• **Focal Relationships:** Focal relationships such as support, encouragement, influence, significant others, the ambivalence between distal cultures, educational opportunities and content and, the formative pushes and pulls of the proximal family (See chapter 5.2).

• **Distal Commitments & Culture:** Distal commitments & culture. Distal, historical and ecological conditions are extraindividual reinforcements. They function as social prescriptions and Canalizers. The hidden hand of culture can be detected when a new product/style appears, the (creative) individual is in part the environment’s creative product, surroundings have functions such as social prescriptions & canalises as in religion, education, socio-economic status, race, ethnicity, family, civilisation and customs (See chapter 5.2).

• **Proximal Environment:** Proximal (historical) environment, family and workplace. Formative years, historical processors, location & influence from distal to social systems of present (e.g. work, family, environment etc.). Here the dynamics of acceptance, encouragement and identity formation come in to play. (See chapter 5.2).
**CREATIVE PROCESS ASSESSMENT PARAMETER (CPAM)**

### Pre-test:
- Warm-up: Pre-C. exercises AUT.A
- Pre-preparation or task presentation? Should be able to assemble & use info #3 (Amabile)
- Idea Quest #3 (Shallcross & O'Neill 1994:80)

### Wallace's Stages

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Person</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity to Problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-conformity/ Lack of conventionality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk-Taking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawn to complexity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense of humor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Talents?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Curiosity: see Questioning)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative History</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective Domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional well-being</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfactualising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural &amp; General Psychological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disequilibrium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative Thinking Process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural status &amp; potential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural status &amp; potential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural breakthrough</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural status &amp; potential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ Hemispheric Concentration:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceptive &amp; sensitive to problems:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking &amp; Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ego-controlled regression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tolerance for ambiguity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagination/ Im. Ability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxed state</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intuition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual moment of conception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unique/Original outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urge to communicate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicative skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verified manifestation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Evaluation/Internal locus of Evaluation Communication:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal / Non-verbal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selfactualising psychological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Botha 247**
<table>
<thead>
<tr>
<th>Cognitive Style</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal locus of evaluation</td>
<td>Questioning</td>
<td>Convergent thinking: Form hypothesis</td>
<td>Possibility of Elaboration</td>
</tr>
<tr>
<td></td>
<td>Questioning (Curiosity) Infoseeking</td>
<td>Brainstorming</td>
<td>Insightful reorganization? Solve a problem</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visualization (Prediction, Consequences, Implications, Hypotheses, Evaluations)</td>
<td>Divergent Production: (fluency, flexibility, elaboration, originality)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ideagenerating &amp; Imaginative Convergent / Logical Thinking</td>
<td>Ideational Fluency / Ideagenerating</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thinking:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Synthesis &amp; Analyses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conceptualize</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metaphorical thinking &amp; Antithetical traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Synectics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Freplay (Intellectual Imagery)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imagination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continued Info. Searching Transformation &amp; Integration with previous experience Evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern: delta</td>
<td>Memories &amp; previous experience (recall/retain) Id/Ego</td>
<td>Memories &amp; previous experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unconscious functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unconscious-functioning Free flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern: theta</td>
<td>Extra-conscious Pre-conscious</td>
<td>Sudden insight Strikes at any time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Extra-conscious)</td>
<td></td>
<td>Transporter of the idea / solution / concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Preconscious)</td>
<td>Loosening &amp; Overinclusion Theta: binaural beats Sub-Freeroaming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disequilibrium of sub</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information Processing</td>
<td>Information Processing</td>
<td>Analogical thinking</td>
<td>Information Processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>traits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wallas' Stages</td>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>Intuition &amp; Knowledge</td>
<td>Transformation / Integration</td>
<td>Intuition</td>
<td>Novel synthesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over Inclusiveness</td>
<td>Responsible for transporting outcome / idea / solution</td>
<td>Incessant Evaluation</td>
</tr>
</tbody>
</table>

**Persuasion:**

- See Persuasion Matrix
- Environmental:
  - Overall Similarity of Testing conditions
  - Opportunity variables
- Socioeconomic
  - Psychological-safety
- Source of info & previous methods, successes
- Influences & Availability
  - Extrinsic motivation:
  - Blockers
  - Extrinsic Rewards
- Stimulators
  - Skills:
    - C. Relevant skills
    - Domain Rel skills
- Aesthetic defined domain
  - Creative Ecosystem
  - Psychosocial dynamics
- Negative personality traits
  - acceptance, encouragement, support, influences
- Sensory input
  - Perceptual influences
  - Psychosocial
  - Extrinsic motivation
- Ambivalence
  - Influences, commitments
- Formative pushes & pulls of family
  - Stability & continuity
  - Field
  - Domain
  - Psychosocial

**Focal Relationships**

- Intuition & Knowledge
- Previous experience & skills

**Creative Climate**

- Intuition
- Resposible for transporting outcome / idea / solution
- Over inclusiveness

**Proximal Environment**

- Intuition
- Resposible for transporting outcome / idea / solution
- Over inclusiveness

**Distal Commitments & Culture**

- Intuition
- Resposible for transporting outcome / idea / solution
- Over inclusiveness

**Verification**

- N/A
- Product vs. Persuasion
- Social Validation (Judgement & Implications)
  - Audience /Perceiver/ Significant Others
  - Public Evaluation (Society's final say?)
  - Social need?
  - Changes field
  - Creative Eco-system
  - Agreement
<table>
<thead>
<tr>
<th>Wallas' Stages</th>
<th>Preparation</th>
<th>Incubation</th>
<th>Illumination</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product in general</strong></td>
<td>Past Achievements</td>
<td>Inseparable &amp; unknown</td>
<td>Product seems to:</td>
<td>Type: Taylor's 4 levels?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Products can be:</td>
<td>Product must be:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Product Prerequisites:</td>
<td>Private Creative Potential:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adaptive to reality?</td>
</tr>
<tr>
<td><strong>Private Creativity</strong></td>
<td></td>
<td></td>
<td></td>
<td>Validation:</td>
</tr>
<tr>
<td><strong>Public Creativity</strong></td>
<td></td>
<td></td>
<td></td>
<td>Product can be:</td>
</tr>
<tr>
<td></td>
<td>Private instantaneous Evaluation</td>
<td></td>
<td></td>
<td>Product achievements?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Can be evaluated for Public</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Creativity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Private Creativity Potential?</td>
</tr>
<tr>
<td><strong>Post test evaluations</strong></td>
<td></td>
<td></td>
<td></td>
<td>Validation:</td>
</tr>
<tr>
<td><strong>CATQ #4 test</strong></td>
<td></td>
<td></td>
<td></td>
<td>Agreement / Acceptability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Time Related</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Product Achievements?</td>
</tr>
</tbody>
</table>
6.5 SELECTED TESTS

Three distinct creativity tests were selected for this research paper. They are:

- Urban and Jellen: TCT-DP (Test for Creative Thinking-Drawing Production) (1986).

Each claim to assess the 'creative process' or parts thereof. Each has a differing style to the other and the group as a whole could therefore yield a more diverse investigation. ‘Word Association’ and ‘Modes of Thinking’ were created around the mid-sixties during the initial surge of creativity research and test production while the TCT-DP is a more recent test. ‘Word Association’ and ‘Modes of Thinking’ each form part of a series of tests that pursue to focus on ‘creative potential’. Both were based on the notion that the numbered association clearly highlights a fluency score, which is in accordance with Guilford’s theory of creativity. The difference between ‘Word Association’ and ‘Modes of Thinking’ is that the former is a written and the latter a verbal test. The third test TCT-DP is a non-figural test, of German origin and focuses on creative thinking in an innovative, imaginative, and divergent sense via a drawing production.

6.5.1 Getzels and Jackson: “Word Association” (1962)

Getzels and Jackson’s (1962) ‘Word Association’ ask subjects to give as many definitions as possible to fairly common stimulus words. Scores depend on number of definitions and number of different categories into which these definitions can be put. Here it refers to the ability to shift frames of reference within an organised structure. This indicates that the test would focus on the ‘creative process’ as well as part of the ‘creative product’. It is the researchers opinion that word association cannot be considered a creative product but merely an associative response which does
however form part of the 'fluency ability' of the creative thinking process. No time limit was set in the instructions.

The assumption that Getzels & Jackson (1962:16) made was that the application of term 'creativity' as criterion would make the empirical study of creative thinking almost impossible. These thinking abilities they assumed, such as word association, finding uses for things, finding hidden shapes, completing fables and making up problems could be logically related to the more common definition of creativity. They concluded that an absence of these abilities might lead too a prognosis of probable failure in creative accomplishment (Getzels & Jackson 1962:17).

The CPAM will refer to Getzels and Jackson’s Word Association in the form of the abbreviation G&J:WA.

6.5.2 Wallach and Kogan: “Modes of Thinking: Instances” (1965)

Wallach and Kogan’s (1965:11) main aim was to measure fluency. They clearly explain fluency as the rapid generation of various kinds of units. ‘Continually one finds creative people in the arts and letters preoccupied with the generation or production of cognitive units when they concern themselves with their own creativity.’ (Wallach & Kogan 1965:13). Their procedure for exploring creativity concerned the generation of five types of associates (instances, alternatives, similarities, pattern meanings and line meanings). Their interest was in measuring two related variables: the number of unique responses and the number of responses produced (Wallach & Kogan 1965:28). The researcher has chosen their verbal test called ‘Instances’ which measures the variable as the total number of verbal responses given to a particular item. The variable of uniqueness is given to an item that is offered by only 1 out of 151 participants (Wallach & Kogan 1965:30). Again this test focuses on the assessment of the ‘creative process’. ‘Instances’ provides as much time as the test taker wishes.

This test was administered in a game-like and relaxed context. Behaviour was monitored during two weeks prior to the test taking. Four weeks of additional testing brought about results pertaining to personality functioning, categorising processes, and sensitivity to physiognomic properties of visual stimuli.
The CPAM will refer to Wallach and Kogan’s ‘Instances’ test in the form of the abbreviation W&K: I.

6.5.3 Urban and Jellen: TCT-DP (Test for Creative Thinking-Drawing Production) (1986)

The TCT-DP (Jellen & Urban 1989:79) is said to have assessed low, average, and high creative potential of 569 subjects tested in eleven countries. It was unique in the sense that it was discovered to be culture-fair, culture-sensitive, and gender-fair. It is based on Rogers tentative theory of creativity. "Creative thinking in the context of the TCT-DP means productive thinking in an innovative, imaginative, and divergent sense via a drawing production" (Jellen & Urban 1986:139). In order to avoid verbal clues they chose a drawing task with certain figural stimuli. Based on a set of eleven criteria it consists of six differing fragments that mirror diverse characteristics. Criteria such as risk-taking, elaboration, fluency, synthesis, transformation, non-conforming, humorousness, speed and unconventionality are prompted. All the mentioned criteria are part of the ‘creative process’ although they could be subcategorised as follows:

- Creative person: risk-taking, non-conforming, humorous and unconventionality.
- Creative thinking process: elaboration, fluency, synthesis and transformation.
- (Creative) Persuasion: risk-taking, non-conforming, humorous and unconventionality.
- Creative product: elaboration, non-conforming, humorousness, speed and unconventional.

It was interesting to note that their scoring deliberately steered away from a ‘flexibility’ rating and that in their post research discussion Jellen and Urban (1989:86) point out that the two variables humour and speed, were rejected as relevant for the TCT-DP.
An explanation of the TCT-DP's scoring abbreviations may shed light on some answers as can be found in CPAM Questionnaires:

Continuations (Cn) referring to elaboration or usage of the six figural fragments.

Completions (Cm): This is referring to drawing additions to extended figural fragments.

New Elements (Ne): Any new figures. This could be referring to flexibility.

Connections made with a line (C1): Any drawing made with one line.

Connections made to produce a theme (Cth): Any figure contributing to a theme.

Boundary-breaking that is fragmented-dependent (Bfd)

Boundary-breaking that is fragmented-independent (Bfi)

Perspective (Pe)

Humour (Hu)

Unconventionality (Uc)

Speed (Sp)

The CPAM will refer to Urban and Jellen's TCT-DP test in the form of the abbreviation TCT-DP.

6.6 IMPLEMENTATION OF CPAM: AN EMPIRICAL INVESTIGATION

Wallas's four stages of the creative process divide the CPAM's vertical columns into four separate questionnaires (CPAM's Preparation Questionnaire, CPAM's Incubation Questionnaire, CPAM's Illumination Questionnaire and CPAM's Verification Questionnaire). They are visually categorised to form the colour-coded creative components of the P Theory. Each Questionnaire will evaluate the three creativity tests according
to a standard of evaluation. Where necessary the symbol # is indicative of the chapter referred to or the author being quoted.

The CPAM will use the following abbreviations in referring to the tests:

- Wallach and Kogan's 'Instances' test: W&K: I.
- Getzels and Jackson's 'Word Association': G&J: WA.
- Urban and Jellen's TCT-DP: TCT-DP.

6.6.1 CPAM's Preparation Questionnaire

In short the preparation stage of the creative process involves where a problem is investigated from all directions. What is the problem situation, what are its difficulties, what methods have been tried and what are their success rates? Information is gathered and integrated with previous experience. New ideas and associations are made while in a state of disequilibrium.

The cumulative data from research done now gets categorised according to the criterial framework of the CPAM. This data forms the backbone for the questions asked within the preparation phase of the creative process. The same procedure applies to all the stages that ensue. The standard for evaluation rates as follows:

*Yes:* awarded only when the particular criteria were ultimately met.

*In part:* awarded when criteria were met only in part.

*Psble:* indicates that there indeed exists the possibility that full criteria can be met.

*?*: Applies to all issues that either cannot be measured, the information is unavailable or simply form part of the murky sphere of the creative process.
### CPAM-Criterion Assessment within the Preparation Stage

#### Pre-test:
- Warm-up Pre-C. exercises
- E.g. AUTA: Awareness, Understanding, Techniques, Action.
- Pre-preparation or problem or task presentation? Here an individual should be able to assemble & use info #3 (Amabile)
- E.g. Idea Quest #3 (Shallcross & O’Neill 1994:80)

**Preparation Stage**

<table>
<thead>
<tr>
<th>Creative Person</th>
<th>Personality / Biographical traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality:</td>
<td></td>
</tr>
<tr>
<td>Personality #3 (Amabile). Does it test the 4 human functions: Thinking: rational; Feeling: emotional; Sensing: talent; Intuition: higher consciousness?</td>
<td>#2 &amp; #3 (Clark)</td>
</tr>
<tr>
<td>3 aspects of the C. person: Personality &amp; value system? Ability to discover &amp; formulate new problems? Interest of interest &amp; motivation in chosen domain?</td>
<td>#3 (Csikszentmihalyi) Does the test measure this?</td>
</tr>
<tr>
<td>Defensive, productive, adaptive, elaborative, or developmental personalities</td>
<td>#2 (Willings) Does the test set out to measure these personality traits?</td>
</tr>
<tr>
<td>Is there a measure of synthesis of all human functions?</td>
<td>(balance between action, emotion, &amp; cognition &amp; insight &amp; intuition: the ability to synthesize components of a situation into a meaningful whole.) #3 (Clark)</td>
</tr>
<tr>
<td>Does it take into account? Emotion and intellect, freedom &amp; discipline, reason &amp; intuition, the precise &amp; the gossamer, primary &amp; secondary processes &amp; chaos and order, all opposites that exist in the creative harmony of the brain #3 (Osborn &amp; Parnes)</td>
<td></td>
</tr>
<tr>
<td>Does it also measure endurance, perseverance, persistence, determination and insight into understanding the creative goal or problem? #3 (Arnold)</td>
<td></td>
</tr>
<tr>
<td>Does the test take note of an individual’s multiple creative behavior repertoires? #3 (Epstein)</td>
<td></td>
</tr>
<tr>
<td>Does it test for feelings of self-confidence, -acceptance, &amp;-esteem?</td>
<td>#3 (Clark)</td>
</tr>
<tr>
<td>Tests? Awareness, fluency &amp; flexibility depend on self-discipline, elaboration, complexity preferences &amp; personal ability to risk, question, imagine &amp; perform originally (Fearn)</td>
<td></td>
</tr>
<tr>
<td>Myers-Briggs Type Indicator: E or I + NFP (Intuitive, feeling, Perceptive)</td>
<td>#1 (Piloto)</td>
</tr>
<tr>
<td>Use MBTI: (for example to adapt test to character differences?) #4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personality / Biographical traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness:</td>
</tr>
<tr>
<td>Does it test for being open-minded &amp; perceptive?</td>
</tr>
<tr>
<td>Does it test for being sensitive to difficulties, gaps &amp; problems?</td>
</tr>
<tr>
<td>Does it test for perceptive abilities?</td>
</tr>
<tr>
<td>Does it monitor if the testee notices things others seem to ignore?</td>
</tr>
<tr>
<td>Raw Creative ability</td>
</tr>
<tr>
<td>1. Readiness (purposeful intention) 2. Reception (receptive awareness)</td>
</tr>
<tr>
<td>Characteristics of inclusion (the recognition of many and varied parts) #3 (Shallcross) Does the test measure this?</td>
</tr>
<tr>
<td>Extensionality &amp; openness to experience #3 (Rogers)</td>
</tr>
<tr>
<td>Does the test take into account or measure? Individual is sufficiently aware of the task &amp; its parameters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G&amp;J:WA</th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>W&amp;K:</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TCT-DP</td>
<td>No</td>
<td>No</td>
<td>In part</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pable</td>
<td>Pable</td>
<td>In part</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>In part</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
Does the test take into account? Perception is a occurring dynamic system and constitutes a creative process #3 (Shallcross)

Does it test if person senses gaps or missing elements? #3 (Torrance)

Does it test if a problem has been identified, important aspects isolated, subproblems identified &/or alternative problem definitions proposed? #4

Does it test if person is sensitive to problems & problem defining? (requires a certain perceptiveness and intuitiveness) #4

Non-conformity/ Lack of conventionality Does the test test for this?

Independent:
Task commitment #2 (Renzulli) Does the test test for this?
Enjoys alone-time #1 (Davis) Does the test test for this?

Risk taking
Risktaking #1 (Davis) Does the test test for this?

Take into account? Must have willingness to risk by stepping beyond the established #3 (Fearn)

Drawn to complexity Does the test test for this?

Intrinsic Motivation:
Does it test the needs of the testee? (acceptance, variety, recognition, to improve accepted rules/orders/systems, instability for l. ordering, problemdriven )

Intrinsic motivation #2 & #3 (Amabile),(Intrapsychic conflict, identity formation, an interaction of self, talent and ego, & significant relationships) # 3(Runco)

Created as a result of inner necessity#2 (Blanschard) Does it test for this?

Tests? Motivated by two main instincts of the Id, the libido (sex drive) and aggressive instincts #3 (Kris).

Task Motivation?: Responsible for initiating and sustaining process; determines some aspects of response generation. #3 (Amabile)

Any inner necessities that intrinsinctly motivates? #2 (Blanschard) Does the test endeavor to inquire?

Sense of humor

Determination: Creative focus & persistence. Does it measure endurance, perseverance, persistence, determination and insight into understanding the creative goal or problem ? #3 (Arnold) Task commitment #2 (Renzulli)

Does it test to see if person has sufficient discipline to see a task through? #3 (Fearn)

Does it measure one of the most important characteristic: the drive to carry a project through to completion? #3 (Arnold)

Special Talents?
#3 (Amabile)

Previous activities & accomplishments #1 (Davis)

Age: Creative potential declines with age. #2 & #1 (Simonton) Does the test use Simonton's formula p(t)=c(e -at -e-bt) ?

AWARE of own creativity #1 (Davis)

Does the test ask the person if they considers themselves creative and live a creative life? #3 (Maslow)

If there is a personality inventory that asks the straight forward question: "Are you creative?" #4
### Curiosity (See Questioning)

**Creative History:**
- Hereditary & Genetic factors #1 Does the test investigate?
- Natural Abilities? #1 Does the test investigate?
- Early age assessment is important for more original responses #1 (Moran) Does the test investigate?

**Other:**
- Davis identifies 12 major & sub categories: Such as: Curiosity/ inquisitive, energetic, sense of humor, original, aesthetic, problem-driven, attracted to complexity & novelty #1 (Davis) Does the test investigate?
- Negative personality traits: #1 (Davis 1992:79) Demanding, assertive, autocratic, sloppy, careless, self-centered, intolerant, tactless, capricious, temperamental, moody, emotional, withdrawn, aloof, uncommunicative, forgetful and more. Does it test?

<table>
<thead>
<tr>
<th>Affective</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional well-being</td>
<td></td>
</tr>
<tr>
<td>(Highest degree) High degree of ego strength &amp; psychopathologic qualities #2 (Barron) #3 May Does the test investigate?</td>
<td>No No No</td>
</tr>
<tr>
<td>Take into account? Creativity has its roots in deep discontent &amp; this discontent is felt with joy, gaiety and love #3 (Feam)</td>
<td>No No No</td>
</tr>
<tr>
<td>Take into account? Creativity at the highest levels can be accomplished only through a relaxing of controls exercised by verbal logic &amp; by dogmas of common sense' #3 (Koestler)</td>
<td>No No No</td>
</tr>
<tr>
<td>Does it test for emotional well-being and self-actualizing qualities? #3 (Clark)</td>
<td>No No No</td>
</tr>
<tr>
<td>High school pupil often have older or younger or imaginary friends #1 (Davis 1992:84) Does the test investigate?</td>
<td>No No No</td>
</tr>
<tr>
<td>In the process of Selfactualising</td>
<td></td>
</tr>
<tr>
<td>Does it take account of the person’s life choices: health, naturalness, intunedness, development of unique potentials? #3 (Clark)</td>
<td>No No No</td>
</tr>
</tbody>
</table>

### Behavioral or General:
- Does the test take into account that new situations, especially ones in which old behavior is ineffective, dramatic new behavior can occur which we label as creative? #3 (Epstein)
- Are the individual’s multiple behavior repertoires checked & noted? #3 (Epstein)
- Does the test take into account the abilities outside the D.P. & transformation that should be considered during measurement? #3 (Guilford)
- Does the test administrators keep record of the statistical frequent behaviour patterns in order to identify behavior transformations? #3 (Epstein)

### Psychological:
- Result of childhood trauma where warmth was present #2 (Miller), Internal locus of evaluation #2 (Rogers), Intrinsic motivation #2 (Amabile) Does the test investigate for any of these?
- (Intrapsychic conflict, Identity formation, an interaction of self, talent and ego, & significant relationships) #3 (Runco) Are there any psychological testing involved?
- Tests? Motivated by two main instincts of the id, the libido (sex drive) and aggressive instincts #3 (Kris).
- Extrasensory perception, telepathy, precognition, clairvoyance & psychokinesis (Krippner & Murphy)
- Does it test for task commitment? #2 (Renzulli)
- Does it measure the urge to be drawn to complexity? #1 (Davis)
- Does it test for any of Barron’s 6 affective & cognitive traits?: (Davis 1992:88) #1

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

---

Botha 258 Preparation
Creative thinking process:

<table>
<thead>
<tr>
<th>Neural Status &amp; Potential:</th>
<th>1. Readiness (purposeful intention)</th>
<th>2. Reception (receptive awareness)</th>
<th>Characteristics of inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hemisphere: influence, balance, domination, dependency &amp; utility for C. Thinking? #2 (Bogen &amp; Bogen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test consider the fact that C. is a right sided brain function which in turn reacts more nonverbally and uses more of a holistic synthesis in its operations #3 (Clark)</td>
</tr>
<tr>
<td>Does it measure the integration of our logical side with our intuitive side, our left brain with our right? #3 (Young)</td>
</tr>
<tr>
<td>IQ: Does the test measure or take into consideration the IQ of the testee?</td>
</tr>
<tr>
<td>Threshold theory #2</td>
</tr>
<tr>
<td>Seven types of intelligence #2 &amp; #4</td>
</tr>
<tr>
<td>Threshold Theory: Average to above average intelligence #1 (Runco)</td>
</tr>
<tr>
<td>Threshold theory is incorrect #1 (Pilrto)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conscious &amp; Information processing (beta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptive &amp; sensitive to problems: alert to novelty &amp; gaps in info, perceives and defines problems differently. Does the test investigate?</td>
</tr>
<tr>
<td>Ability to discover &amp; formulate new problems? #3 (Csikszentmihalyi) Does the test investigate?</td>
</tr>
<tr>
<td>Problem finding, not problem solving #2 (Geltzeis &amp; Csikszentmihalyi) Does the test investigate?</td>
</tr>
<tr>
<td>Allocentric perception or openness to the world #2 (Schachtel) Does the test investigate?</td>
</tr>
<tr>
<td>Avoids perceptual sets &amp; entrenched ways of thinking #1 (Davis) Does the test investigate?</td>
</tr>
<tr>
<td>Alert to novelty &amp; gaps in knowledge #1 (Davis) Does the test investigate?</td>
</tr>
<tr>
<td>Thinking &amp; Learning:</td>
</tr>
<tr>
<td>Does the test clearly distinguish two steps: the big idea (divergent) &amp; elaboration (convergent)? #3 (Osborn &amp; Parnes)</td>
</tr>
<tr>
<td>Redefining, ability to define problem, logical reasoning. Does the test investigate?</td>
</tr>
<tr>
<td>Clark's 2 modes of thinking (p.586): Psychometric i. (posterior) &amp; Biological i. (frontal) #1 Does the test investigate?</td>
</tr>
<tr>
<td>Thinks logically #1 (D/S-Davis)</td>
</tr>
<tr>
<td>Bloom's Taxonomy</td>
</tr>
<tr>
<td>Internal locus of evaluation:</td>
</tr>
<tr>
<td>An internal locus of evaluative judgment. #3 (Rogers) Does the test investigate?</td>
</tr>
<tr>
<td>Concentration (ability to focus, task-orientation &amp; driving absorption) #4 Does the test investigate?</td>
</tr>
<tr>
<td>Sustained attention #1 Does the test investigate?</td>
</tr>
<tr>
<td>Intensity of interest &amp; motivation in chosen domain? #3 (Csikszentmihalyi) Does the test investigate?</td>
</tr>
<tr>
<td>Questioning:</td>
</tr>
<tr>
<td>Questions norms, rules &amp; assumptions #1 (Davis) Does the test investigate?</td>
</tr>
<tr>
<td>Can program him or herself to ask the right questions #2 (Schank) Does the test investigate?</td>
</tr>
<tr>
<td>A list of probing questions should be asked to initiate C. #4 Does the test investigate?</td>
</tr>
<tr>
<td>Infoseeking: whole person resources, previous methods &amp; successes &amp; experiences found</td>
</tr>
<tr>
<td>Info gathered integrated with previous experiences #1</td>
</tr>
<tr>
<td>Getting acquainted with the innuendo's and implications of unsuccessful solutions #1</td>
</tr>
<tr>
<td>Selecting and redefining to find meaning #1</td>
</tr>
</tbody>
</table>

| Visionary/Predictory/Hypothesize |  |
| Ability to visualize #4 | Uses internal visualization #1 (Davis) | Does the test investigate? | Yes | Yes | Yes |
| Selection, planning, and abstracting #2 (Perkins) | Does the test investigate? | No | No | No |
| Ability to foresee, predict outcomes/consequences, visualize, futurization. | Does the test investigate? | No | No | Yes |

| Ideagenerating & Imaginative |  |
| Generation, selection & preservation of ideas (Perkins) | Does the test take this into account? | In part | In part | In part |

| Convergent / Logical Thinking |  |
| Yes | Yes | Yes |

| Unconscious (delta) |  |
| Memories & previous experience (Recall & Retain): Does the test test for this? | In part | In part | In part |
| Here are desires, impulses, wishes that are all part of human nature #1 (Freud) | Does the test test for this? | In part | In part | In part |
| Does the test test for a repertoire of associations? | In part | In part | In part |

| Id/Ego: |  |
| Does the test investigate the testee's desires, impulses, instincts, wishes, destructive energy from instincts? | In part | In part | In part |
| Does the test determine if the person perceives and defines problems differently, stores & retrieves | In part | In part | In part |
| Does it endeavor to inquire if scraps of knowledge have been organized into useful patterns #2 (Read)? | No | No | In part |
| Does it monitor the destructive energy from instincts? #1 (Freud) | No | No | In part |

| Information Processing: |  |
| Does the test determine if the person being tested uses previous knowledge as basis? #1 (T/D-Davis) | In part | In part | In part |
| Does it test to see if new structures have been built instead of using existing structures? #1 | (B/T-Davis) | In part | In part | In part |
| Does it determine if wide categories such as 'forest' not 'trees' were used? #1 (B/T-Davis) | No | No | No |
| Does it inquire whether the person makes independent judgements or not? #1 (B/T-Davis) | No | No | No |
| Does it investigate whether the person being tested can cope well with novelty? #1 (B/T-Davis) | No | No | No |
| Does it test to determine whether the testee finds order in chaos or not? #1 (B/T-Davis) | No | No | No |
| Does it inquire whether the person prefers nonverbal communication? #1 (B/T-Davis) | No | No | No |
| Does it reveal whether the person is flexible and skilled in decision making? #1 (B/T-Davis) | In part | In part | In part |
| Are the underlying processes involving the abilities to find facts, problems, ideas, solutions, & the acceptance of solutions investigated? #3 (Parnes) | No | No | No |
| Does the test acknowledge that during the decisive stage of discovery, the codes of disciplined reasoning are suspended...true creativity often starts where language ends #3 (Martindale) | Psble | Psble | Psble |
Intelligence: Does the test investigate the Seven types of Intelligence? #2 (Gardner)
Does the test take into consideration the importance of knowledge for the C. process? #3 (Williams)
Does it test Davis's mental self-government: low conventionality, preference for creating one's own rules, a liking for problems that are not prestructured, an anarchic form of mental self-government, a random approach to problems...continued below. #1

...#1 Frequent lack of clear goals, tendencies to simplify, an inability to set priorities, fuzzy motivation (Davis)

Thinking: Does it test for previous independent mental skills that are now transformed & integrated into novel synthesis? #2 (Koestler)

Intuition & Knowledge:
Does it test for being more intuitively perceptive? #3 (MacKinnon)
Take into account? Without access to alternative levels of awareness, creative behavior may be stifled or blocked #3 (Krippner)

Cognitive Style: #3 (Amabile)

<table>
<thead>
<tr>
<th>Persuasion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

See Persuasion Matrix:

Interaction of domain, person, field and time #2 (Csikszentmihalyi)

Test Environment:
Same environment has different effects on different persons: Are the tests administered, done in similar environments? If so, are their effects on different persons monitored or measured? #3 (Amabile)

Does the test take into account that the social environment often takes the initiative in the expression of individual creativity? #3 (Csikszentmihalyi)

Does it establish the external conditions for the affective side of the creative process? (Accepting, Evaluation absent, Understanding empathetically). #3 (Rogers)

Take into account? Cultural factors influence course of creative development & as level & type of creative functioning. #3 (Torrance)

Take into account? Creative discontinuities occur whenever the children of that culture are confronted with new stresses and demands. #3 (Torrance)

Take into account? General cultural rankings are predictable with advantage children showing a higher creativity index than those of less advantaged cultures #3 (Torrance)

Take into account? Limited environments restrict the level of creative performance. #3 (Griffiths)

Take into account? All learning involves creative organization of culture's knowledge with individual's experience. #3 (William)

Take into account? Limited and confined by cultural space & time, reaching beyond limits to grasp ideas or concepts that already exist, but that are not known. #3 (Fearn)

Take into account? Transactional motivation where the person shapes the environment rather than being shaped by it. #3 (Krishnamurti)

Take into account? Environmental stimulation where behavior is initiated toward unpredictable & creative outcomes that combine to form creative transactualisation. #3 (Taylor)
| Influences & Availability: Does the test consider influences such as aesthetic tastes and resource availability? | In part | In part | In part |
| Does the test take into consideration the importance of knowledge for the C. process? #3 (Williams) | No | No | No |
| **Extrinsic motivation: Attitudes & perceptions** | | | |
| Requirement: Must be part of environment that offers advanced culture & technical heritage #2 (Rhodes) | No | No | No |
| Does the test investigate this option? | No | No | No |
| Response to current social needs #2 (Rhodes): Does the test investigate this option? | No | No | No |
| Does the test investigate the possibility that intrinsic motivation can temporarily be affected by external interference? #2 (Amabile) | No | No | No |
| Does the test question or refer to the 2 complementary sets of influences? The extrinsic & intrinsic #3 (a) & (b) (Runco) | No | No | No |
| (a) Extrinsic environmental conditions & distal sources of motivation? #3 (Runco’s) | No | No | No |
| **Blockers & restrictions?** Does the test address the need for psychological safety? | No | No | No |
| Allocentric perception or openness to the world #2 (Schachtel) | No | No | No |
| Take into account? Without access to alternative levels of awareness, creative behavior may be stifled or | No | No | No |
| **Skills: Relevant experience is essential #2 (Thorndike)** Does the test test to see if relevant experience has been reached? | No | No | No |
| Does the test determine if there is talent in specific field? #2 (Dabrowski & Piechowski) | No | No | No |
| **C. Relevant skills?** | | | |
| Creativity-Relevant skills? (Operate at the most general level, may influence responses in any content domain) #3 (Amabile) Does the test acknowledge and test for this? | No | No | No |
| **Domain relevant skills:** knowledge, experience, technical skill, talent | No | No | No |
| Domain-Relevant Skills? Does the test assess whether the person has acquired the raw materials that feed the process? #3 (Amabile) | No | No | No |
| **Aesthetic defined domain: styles, roles, norms.** Does the test recognize and test for this? | No | No | No |
| **C. Ecosystem:** | | | |
| Creativity is evolutionary: Creative products and people have evolved through a mutational process #2 (Findlay & Lumsden) Does the test search for this phenomena? | No | No | No |
| Does the test pursue Skinner’s “Natural selection over evolved time”? #2 (Skinner) | No | No | No |
| Creativity is incremental, that is, grounded in the work of those who came before #2 (Weisberg) Does the test investigate this option? | No | No | No |
| **Focal Relationships: support etc.** | | | |
| Psychodynamics: Neg personality traits that impact persuasion: Questions laws, rules, authority; indifferent to common conventions and courtesies, stubborn, uncooperative, resists domination, argumentative, may not participate, rebellious and more #1 (Davis 1992:80) Does the test take this into account? | No | No | No |
| Dynamics of: Acceptance, encouragement, id. formation, support, influences of others | No | No | No |
| Social factors interact with personality factors to produce genius #2 (Simonton) Does the test inquire into this form of influence? | No | No | No |
### Proximal environments & family

**Sensory input:**
Visual, auditory, kinesthetic, gustatory input. Is the test aware of sensory impact? Does it use it as a

**Perceptual influences:** (continuously takes in info)
Sensory Input: Aesthetic defined styles, roles, norms. Does the test take this into account when scoring?

**Psychosocial Needs:**
Absence of threat to self #2 (Isaksen)

**Does C. climate:**
Creativity is developmental, adaptive #2 (Cohen) Does the test take this into account?

**Distal commitments & culture**

**Ambivalence** between distal cultures
Does the test measure the parameters of the cultural symbol system (or domain) in which the creativity takes place, & the social roles and norms (or field) that regulate the given creative activity? #3 (Csikszentmihalyi)
Formative years & Historical processors #1 Does the test inquire?
Educational opportunities & content #1 Does the test inquire?
Family & workplace #1 Does the test inquire?
Location & its influence from distal social systems to present day #1 Does the test inquire?

**Formative pushes & pulls** of family. Does the test investigate?

**Stability & contiguity** such as from institutions

**Field:** Social counterpart of domain. Individual & Institutions that render judgement, hierarchical #2
Tastes & prejudices of current time and field #2 (Bode) Does the test investigate?

**Domain:** set of practices associated with an area of knowledge #2 (Gardner) Does the test take this into account?
Creativity is related to the domain in which he/she works #2 (Bode) Does this test focus on a particular domain?
Interaction of a certain time in history on a certain mind in a certain domain #2 (Gardner) Does the test take this into account?

**Psychosocial:**
Result of childhood experiences #2 (Gowan) Does the test inquire into such experiences?
High school pupil often have older or younger or imaginary friends #1 (Davis 1992:84) Does the test ask this?
### Past Achievements:

- Special talent creativity & self actualizing creativity #2 (Maslow) Does the test assess for this?  
  - No
- Signs of high productivity #2 Does the test assess for this?  
  - No
- Artistic: the result of symbolically compensating for disabilities #2 (Lee) Does the test assess for this?  
  - No
- Artistic creation: Specific process called "unconscious dedifferentiation" #2 (Ehrenzweig) Does the test assess for this?  
  - No
- History of creative activities #1 Does the test assess for this?  
  - No

#### Partial results from the Preparation Phase Questionnaire

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

- 6 Yes
- 8 Yes
- 14 Yes

- 17 In prt
- 26 In prt
- 38 In prt

- 9 Psb
- 11 Psb
- 22 Psb

- 15 ?
- 16 ?
- 10 ?

- 118 No
- 111 No
- 93 No
6.6.2 CPAM's Incubation Questionnaire

Briefly summarising the incubation stage of the creative process it can be said to be where the creator is not consciously thinking about the problem. Considered to be a peculiar stage in creativity, it is the interval between the completion of 'preparation' and the sudden insight when 'illumination' occurs. Timing can be a few minutes or even several months. It is a very active period although the person does not report much 'conscious activity' but seems preoccupied and abstracted. Here the individual controls his capacity to tolerate ambiguity. They may experience depression, anxiety, and feelings of inadequacy. An extremely important state here is regression in the service of the ego. Incubation follows and 'accompanies' preparation. Now the subject is thinking of other things and ideas involuntarily repeat themselves and keep recurring.

The standard for evaluation rates is exactly as before:

Yes: awarded only when the particular criteria were ultimately met.

In part: awarded when criteria were met only in part.

Psible: indicates that there indeed exists the possibility that full criteria can be met.

?: Applies to all issues that either cannot be measured, the information is unavailable or simply form part of the murky sphere of the creative process.
### CPAM-Criterion Assessment within the Incubation Stage

#### Incubation Stage Questionnaire

<table>
<thead>
<tr>
<th>Personality / Biographical traits</th>
<th>G&amp;J/WA</th>
<th>W&amp;K/I</th>
<th>TCT-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resistance:</strong> Resistance to premature closure: suspended judgement. Does the test test for this?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Tolerance:</strong> Does the test measure the ability to operate simultaneously at different levels of consciousness? (It is characteristic of Creative person in contrast with those in rational, everyday consciousness functioning below their optimum level) #3 (Krippner)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tolerance for ambiguity and failure #1 (Youtz)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Imaginative:</strong> Does this test measure to find the most far fetched dreamers as well as solutions of high quality that are clever &amp; elegant &amp; surprising? #2 (Millgram)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Affective</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ego-controlled regression</strong> Does the test test for characteristics such as being uninhibited, playful and humorous?</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Does the test measure or test for the regression in the service of the ego #2 (Kris)</td>
<td>In part</td>
<td>In part</td>
<td>Yes</td>
</tr>
<tr>
<td>Ego-controlled regression is the means whereby preconscious and unconscious material appear in the creator's consciousness #2 (Kris) Does the test measure this?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Regression/Freeplay (Emotional sphere):</strong> Creativity at the highest levels can be accomplished only through a relaxing of controls exercised by verbal logic and by dogmas that are popularly known as common sense' #3 (Koestler) Does the test take this into account?</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Does the test look out for or assess factors such as spontaneity and non-rationality? #2 (Hausman)</td>
<td>In part</td>
<td>In part</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test take into account the intuitive approach which highlights irrationality &amp; the mechanisms of exploring the unconscious and subconscious? #3 (Koestler)</td>
<td>In part</td>
<td>In part</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test assess whether thinking like a child comes into play in the creative process? (not restricted by habits, traditions, rules)</td>
<td>In part</td>
<td>In part</td>
<td>Yes</td>
</tr>
<tr>
<td>Is the ability to play spontaneously with elements &amp; concepts investigated? #3 (Rogers)</td>
<td>In part</td>
<td>In part</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Psychological:</strong> Creative Instinct Activation of one's archetype #2 (Jung)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does it test to determine if there is an unstable equilibrium where balance of emotion and thought are disturbed? #3 (Koestler)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>State of Disequilibrium:</strong> Does it test for a state of confusion, frustration or disequilibrium? #1</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Psychological Safety</strong> During the taking of the test are there conditions &amp; atmosphere that are non-critical, non-evaluative, receptive?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test take into account or measure the ability to relax &amp; mastering skills of imagery &amp; imagination the first skills necessary to facilitate creativity &amp; development of higher levels of consciousness? #3 (Krippner)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Does the test utilize the fact that there should be a relaxing of controls & regression to modes of ideation which are indifferent to rules of verbal logic, unperturbed by contradiction, untouched by the dogmas and taboos common sense? #3 (Koestler)

All desires, impulses, wishes that are human instinct: this takes on a destructive form #1 Does the test take it into account?

Does the test investigate depression, anxiety, feelings of inadequacy and for flexibility in the affective sphere #1 (Stein)

Does the test take into consideration the affective state during the creative process? Confused, frustration #1

**Creative thinking process:**

<table>
<thead>
<tr>
<th><strong>Neural Status &amp; Potential:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test assess reflection? (adding on)</td>
</tr>
<tr>
<td>Does the test test feedback? Here it refers to the return of a portion of the output of a system to the input and, acknowledges the presence of a paradox and the need for collaborative interaction #3 (Shallcross)</td>
</tr>
<tr>
<td>Does it assess visualization, imagination, transformation, ability to regress, metaphorical/analogue thinking, Bloom's analysis of synthesis and evaluation, intuition, resisting premature closure #4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Alpha Waves:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests alpha waves? (C. people produce fewer alpha waves when relaxing and increase them when working with an imaginative problem) #4 (Martindale)</td>
</tr>
<tr>
<td>Does the test determine if there is structural opposition within the unconscious? Does it determine if the repressed material is solved or accepted? #3 (Rotenberg) See *</td>
</tr>
<tr>
<td>* [Structural opposition takes account of what’s unconscious &amp; repressed without removing repression or promoting acceptance of the repressed material] #3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CONSCIOUS Info processing (beta)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Take into account? Creativity calls for low cortical arousal and the defusing of one's powers of concentration while intellectual ability calls for low cortical arousal and focused attention #3 (Martindale)</td>
</tr>
<tr>
<td>Does the test allow for an alternative activity such as sleep or relaxing? (recreational) #1</td>
</tr>
<tr>
<td>Take into account that conscious control over one's own thoughts and actions can obstruct creative spontaneity? #3 (Bruner)</td>
</tr>
<tr>
<td>Complete 'break-away' from conscious problem #1</td>
</tr>
<tr>
<td>Relaxed: During incubation the person does not report much conscious activity #1 (Youtz) Does the test test for this?</td>
</tr>
<tr>
<td>Ego-controlled regression: is the means whereby preconscious and unconscious material appear in the creator's consciousness #2 (Kris). Can the test assess this?</td>
</tr>
<tr>
<td>Does it determine if there is a loss of self/ego or as transcendence of self? (Ability to become 'lost in the present, to be timeless, selfless, outside of space, of society, &amp; of history) #3 (Maslow)</td>
</tr>
<tr>
<td>Does it test the phenomenon that in the service of the ego, not 'id', the ego exercises voluntary control over regression &amp; over the shifting of pre-cons. ideas to the conscious mind #3 (Kris).</td>
</tr>
<tr>
<td>Does it measure the ability to regress? (uninhibited by habits, traditions, rules, conforming pressures, playfulness and humor) #4</td>
</tr>
</tbody>
</table>
### Incubation

<table>
<thead>
<tr>
<th>Questioning: ([WWMW]) #4</th>
<th>Test Q. only</th>
<th>Test Q. only</th>
<th>Test Q. only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there any techniques applied such as E.g.: Osborn's 73 Idea- Spurring Questions, Arnold's checklist &amp; Small's product-development checklist? #4</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test determine whether the person is questioning any sources, applying questioning techniques or asking the right questions during the creative process?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Brainstorming</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test take into account? Lateral thinking has to do with exploration: specific &amp; general #3 (de Bono)</td>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test test to see if there is specific &amp; general exploration based on the behavior of self-organizing information systems? #3 (de Bono)</td>
<td>In part</td>
<td>No</td>
<td>In part</td>
</tr>
<tr>
<td><strong>Divergent Production</strong></td>
<td>Yes</td>
<td>Yes (Ne)</td>
<td>Yes (Ne)</td>
</tr>
<tr>
<td>Has the test made use of open-ended problem solving? #4</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Divergent production is the ability to alternate solutions to open-ended problems #2 (Guilford)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test assess divergent thinking abilities such as fluency, flexibility, originality, sensitivity to problems, redefinition &amp; elaboration #3 (Guilford)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test take into account the abilities outside the D.P. &amp; transformation that should be considered during measurement? #3 (Guilford)</td>
<td>Yes</td>
<td>No</td>
<td>Yes (Ch)</td>
</tr>
<tr>
<td><strong>Ideational Originality</strong></td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Does it assess transformations: Flexibility &amp; originality? #3 (Guilford)</td>
<td>In part</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Fluency</strong> (idea generating) Ideational, word, expressional, associational (most ideas)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Units: fluency? #3 (Guilford)</td>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Relations: fluency? #3 (Guilford)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Systems?: fluency #3 (Guilford)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Flexibility</strong>: spontaneous, adaptive (different ideas)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Classes: flexibility? #3 (Guilford)</td>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test take into account that fluency &amp; flexibility are found in both verbal and nonverbal tests #3 (Guilford)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Transformations: Flexibility &amp; originality? #3 (Guilford)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Thinking</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rational, analysis (details/ whole into parts), synthesis (relationships, combine parts into a workable C. whole), insights #2 (Gruber) Does the test for any of these?</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Selection, planning, and abstracting #2 (Perkins)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test measure the ability to operate simultaneously at different levels of consciousness? (it is characteristic of Creative person in contrast with those in rational, everyday consciousness functioning below their optimum level) #3 (Krippner)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Convergent thinking: concentration &amp; logical thinking #4</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Analysis (separate details, break down a whole into parts) #4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Logical thinking (deduce reasonable conclusions) #4</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bloom's analysis synthesis? #4</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
</tbody>
</table>
Synthesis #2 (Botha) & Analyses

Does the test measure or assess the following:
Primal magic synthesis #2 (Arioli)
Integration of fact, impressions & feelings into new form #2 (Porsche)

Imagination is the synthesizing activity #2 (Collingwood)
Hypotheses formation #2 (Stein)
Meaning by synthesis #2 (Alten)

Does the test investigate to establish if previous independent mental skills have been transformed & integrated into a novel synthesis? #2 (Koestler)
Synthesis? (see relationships, to combine parts into a workable whole) #4

Conceptualize: Does the test recognize the following? Ability to predict, hypothesize and analyze. Ability to conceptualize implications? #3 (Guilford)
Ability to elaborate? #3 (Guilford)
The ability to predict outcomes or consequences (related to evaluation) #4
Forming new hypotheses? #3 (Torrance)

Associations
Forming of associative elements #2 (Boden)
Remote Associations by means of contiguity (process), serendipity (unexpected pleasant surprise) & mediation (communication) #2 (Mednick)
Loosening of Associations & broadening of associative horizons, overinclusiveness, failure of inhibitions, avoidance of perceptual sets #2
Can the test distinguish biosociative originality from associative routine? #3 (Koestler)
Does the test take into account? Fluency produces more associations #3 De Bono?
Does it measure associations? [Bringing together of entities that are remotely associated or connected with each other] #3 (Mednick)
Associative elements? (evoked by contiguous environmental appearances, similarity, & mediation of common elements) #3 (Mednick)

Metaphorical thinking & Antithetical traits: #4
Making metaphors #2 (Gordon), metaphors #2 (Gruber)
Biosociation of matrices #2 (Koestler)
Janusian thinking (Rothenberg)
Take into account? Emotion and intellect, freedom & discipline, reason & intuition, the precise & the gossamer, primary & secondary processes & chaos and order, all opposites that exist in the creative harmony of the brain #3 (Osborn & Pames)
Does the test make use of the fact that C. involves contrasts such as reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral? #3 (Schachtel)
<table>
<thead>
<tr>
<th>Test for structural opposition &amp; simultaneity of opposition termed Oppositional thinking? (Rothenberg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Capacity to conceive &amp; utilize 2 or more opposite or contradictory ideas, concepts, or images simultaneously) #3</td>
</tr>
<tr>
<td>Homospatial thinking? #3 (Rothenberg) [In part]</td>
</tr>
<tr>
<td>Does it test for association of 2 self-consistent, incompatible frames of reference in the physical, psychological, or social world? #3 (Koestler) [No]</td>
</tr>
<tr>
<td>Does the test determine if there is any signs of breaking metaphorical connections with ‘old’ facts &amp; feelings then inventing connections with new facts &amp; feelings? #3 (Gordon) [No]</td>
</tr>
<tr>
<td>Do tests gain insight into the use of analogical and metaphorical thinking? (Borrow ideas from one context &amp; utilize them in another, borrow a problem solution from a related problem or, see a connection between one situation and another #3 (Davis) ) [No]</td>
</tr>
<tr>
<td>Does the test assess the ability to conceive of antithetical ideas simultaneously? (The bringing together habitually incompatible frames of reference #3 (Bergquist's Symbiotic) [?]</td>
</tr>
<tr>
<td>Thinks metaphorically #1 (T/S-Davis) [?]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Syneectics#: #3 (Gordon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syneectics cite 3 metaphorical mechanisms: Direct Analogy, Personal Analogy, Compressed conflict #3 (Gordon). Do the tests test for the use of syneectics? [No]</td>
</tr>
<tr>
<td>Do the tests test for syneectics? (Syneectics is the joining together of different irrelevant elements. These methods are conscious, analogy-based and metaphor-based techniques #3 (Davis)) [No]</td>
</tr>
<tr>
<td>Does the test make use of the fact that C. involves contrasts such as: conscious-unconscious, rational-irrational, sensation-intuition, thinking-feeling, extraversion-intraversion, and collectiveness-individualism? #3 (Ferguson) [?]</td>
</tr>
<tr>
<td>Ability to see the connection or borrow ideas from one context and use them in another #4 [?]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternatives?:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listing alternative problem definitions #4 Does the test request such alternative problem definitions? [Yes]</td>
</tr>
<tr>
<td>Search for alternatives is the most basic of all creative operations #2 (De Bono) Does the test present such problems? [Yes]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freplay (Intellectual sphere):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended boundaries:beyond the expected &amp; usual, primary process thinking, flights of fantasy, imagery [In part]</td>
</tr>
<tr>
<td>Take into account? Creativity at the highest levels can be accomplished only through a relaxing of controls exercised by verbal logic and by dogmas that are popularly known as common sense #3 (Koestler) [?]</td>
</tr>
<tr>
<td>Ability to toy with elements &amp; concepts #2 (Rogers) Does the test permit such exploration? [Yes]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imagery: (visualization, imagination, transformation) Does the test allow such exploration? [In part]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fantasy: a manifestation of preconscious thought &amp; feelings #2 (Freud) Does the test permit such exploration? [In part]</td>
</tr>
<tr>
<td>Imagination is the synthesizing activity #2 (Collingwood) Does the test explore what the imagination can achieve? [In part]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transformation &amp; integration with previous experience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to adapt something to a new use, related to imagination &amp; visualization, 'see' new meanings, implications &amp; applications, transformation of experience #2 (Gruber) Does the test test for this? [No]</td>
</tr>
<tr>
<td>Allocentric perception #2 (Schachtel) [?]</td>
</tr>
<tr>
<td>Developmental transformation of insight into novelty #2 (Feldman) [Poble]</td>
</tr>
<tr>
<td>Transformations: Flexibility &amp; originality? #3 (Guilford) [?]</td>
</tr>
</tbody>
</table>
**UNCONSCIOUS (delta)**

- Creativity is extra-conscious process rather than unconscious, with no determining effect upon consciousness #2 (Cannon). Does the test test this?
- Off-conscious mental activity in the 'transliminal chamber' midway between the unconscious mind & conscious mental activity #3 (Rugg). Can this test verify this?

---

**SUBCONSCIOUS (theta)**

- Extra-conscious
  - Creativity is extra-conscious process rather than unconscious, with no determining effect upon consciousness #2 (Cannon). Does the test test this?
  - Off-conscious mental activity in the 'transliminal chamber' midway between the unconscious mind & conscious mental activity #3 (Rugg). Can this test verify this?

- Pre-conscious
  - Preconscious processes #2 (Kubie). Does the test investigate this process?
  - Most likely preconscious, nonverbal or preverbal & may involve a sweeping, scanning, diffused, free and powerful action of the whole mind #2 (Calvin W. Taylor). Does the test investigate this process?
Does the test assess if there is freedom of Preconscious functioning? #3 (Kubie)

Does the test assess whether the preconscious makes free use of analogy & allegory, superimposing dissimilar ingredients into new perceptual & conceptual patterns & reshuffling experiences? #3 (Kubie)

Can the test determine if all 3 processes act concurrently? (pre-, un- & conscious) #3 (Kubie)

Tests? Preconscious incubation of the problem & part of preconscious activity is regression to childlike thought processes-the primary process #3 (Kris).

Tests? Preconscious is not tied to realities of conscious or bound to rigid symbolic relationships of unconscious, but can engage in free play with ideas, meanings and relationships #3 (Kris).

Loosening of Associations

Does it assess important cognitive variable involved such as loosening of associative thinking & some broadening of the associative horizons? #3 (Eysenck)

Test over inclusiveness & allusive thinking/ looseness or slippage of ideation? #3 (Eysenck)

Sub-Freeplay: sweeping, scanning, free roaming, best if free form restriction of conscious & interference from unconscious. (obstructs) Does the test investigate this obstruction?

Sub-functioning: Metaphorical thinking?

Dissequilibrium of sub?

Information Processing Traits:

Does the test assess any of the 15 IPT as set out by Tardiff & Sternberg (Davis 92:91)?

Transformation & Integration:

Are previous independent mental skills transformed & integrated into novel synthesis? #2

Does the test make use of the fact that C. involves contrasts such as reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral? #3 (Schachtel)

Patterns of information processing (See 4.3.2.4) #4 Does the test examine these patterns?

Organization of purpose #2 (Gruber) Does the test investigate if there is an organization of purpose involved?

Lateral thinking: changing concepts and perceptions. Based on the behavior of self-organizing information systems #2 (De Bono)

Does it assess the quality of Over Inclusiveness, a failure of inhibition that allows less relevant thoughts to intrude into the problem-solving process? #3 (Eysenck)

Does the test test for over inclusiveness & allusive thinking/ looseness or slippage of ideation? #3 (Eysenck)

Intuition:

Hunches in certain phases of the scientific approach #2 (Cannon)

Intuition: idecombining #2 (Davis) Does the test test for intuitive idecombining?

Does the test address the issues concerning to what degree interventions need to be ‘tailored’ to particular person or problem? (time, depth of application) #3 (Harrington)

Does the test investigate previous independent mental skills that are now transformed & integrated into novel synthesis? #2 (Koestler)

<table>
<thead>
<tr>
<th>In part</th>
<th>In part</th>
<th>In part</th>
<th>Incubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td></td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>?</td>
<td>In part</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td></td>
</tr>
<tr>
<td>Sub-Freeplay: sweeping, scanning, free roaming, best if free form restriction of conscious &amp; interference from unconscious. (obstructs) Does the test investigate this obstruction?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sub-functioning: Metaphorical thinking?</td>
<td>No</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Dissequilibrium of sub?</td>
<td>No</td>
<td>Pable</td>
<td>Pable</td>
</tr>
<tr>
<td>Information Processing Traits: Does the test assess any of the 15 IPT as set out by Tardiff &amp; Sternberg (Davis 92:91)?</td>
<td>Yes</td>
<td>Pable</td>
<td>Pable</td>
</tr>
<tr>
<td>Transformation &amp; Integration: Are previous independent mental skills transformed &amp; integrated into novel synthesis?</td>
<td>No</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Does the test make use of the fact that C. involves contrasts such as reconciliation of such paradoxical (contradictory) variables as detachment and commitment, passion and decorum, and immediacy and deferral?</td>
<td>No</td>
<td>No</td>
<td>Pable</td>
</tr>
<tr>
<td>Patterns of information processing (See 4.3.2.4)</td>
<td>No</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Organization of purpose</td>
<td>No</td>
<td>Pable</td>
<td>Pable</td>
</tr>
<tr>
<td>Lateral thinking: changing concepts and perceptions. Based on the behavior of self-organizing information systems</td>
<td>No</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Does it assess the quality of Over Inclusiveness, a failure of inhibition that allows less relevant thoughts to intrude into the problem-solving process?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test test for over inclusiveness &amp; allusive thinking/ looseness or slippage of ideation?</td>
<td>No</td>
<td>Pable</td>
<td>Pable</td>
</tr>
<tr>
<td>Intuition: Hunches in certain phases of the scientific approach</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Intuition: idecombining</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Does the test address the issues concerning to what degree interventions need to be ‘tailored’ to particular person or problem? (time, depth of application)</td>
<td>In part</td>
<td>Pable</td>
<td>Pable</td>
</tr>
</tbody>
</table>
### Persuasion

*Events, people & circumstances #2 (Rogers) Does the test examine the concept of events or people that caused creative persuasion?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

### Focal Relationships: support etc.

*Does the test investigate focal relationships that support or suppress creativity?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

### Creative climate: settings, sensory input

*Result of childhood trauma where warmth was present #2 (Miller) Does the test investigate?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

*Events, people #2 (Rogers) Do the test event and people involved promote a creative climate?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

*Aesthetic taste, energy & imagination #2 (Davis) Does the test adhere to an aesthetic taste, have an intrinsic-energy and motivate imagination and therefore promote a creative climate?*

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
</table>

*Materials #2 (Rogers) Are the right and appropriate materials available to complete the test?*

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
</table>

### Distal commitments & culture

*Activation of one’s archetypes? * Are there primordial experiences & images that appear? * #2 Does the test investigate?*

<table>
<thead>
<tr>
<th></th>
<th>?</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
</table>

*Previous experience & skills?*

*Previous independent mental skills transformed & integrated into novel synthesis #2 (Koestler) Does the test first determine what is previous independent mental skills before investigating for the integration into novel synthesis?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

*Experience & skills #2 (Davis)*

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
</table>

### Proximal environments & family

*Events, people & circumstances #2 (Rogers) Does the test examine these to determine in what way they have an influence on the illumination process?*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

### Product:

*Inseparable & Unknown:
Product still inseparable & unknown unable to survive independantly-symbiotic. Does the test examine or acknowledge this?*

<table>
<thead>
<tr>
<th></th>
<th>?</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
</table>

*Rejected products:
Some: false starts, trial & error. Does the test investigate if there are any rejected products such as false starts etc.?*

<table>
<thead>
<tr>
<th></th>
<th>?</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
</table>

*Is the product growing from the uniqueness of the individual? #2 (Rogers) & #1*

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
</table>

### Private Creativity

*None, some or multiple unconscious/conscious rejected products #2*

<table>
<thead>
<tr>
<th></th>
<th>?</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
</table>

### Public Creativity

*None, some or multiple unconscious/conscious rejected products #2*

<table>
<thead>
<tr>
<th></th>
<th>?</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
</table>

Partial results from the Incubation Phase Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>13 Yes</th>
<th>16 Yes</th>
<th>30 Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 Inprt</td>
<td>34 Inprt</td>
<td>28 Inprt</td>
<td></td>
</tr>
<tr>
<td>5 Pab</td>
<td>20 Pab</td>
<td>28 Pab</td>
<td></td>
</tr>
<tr>
<td>52 ?</td>
<td>46 ?</td>
<td>44 ?</td>
<td></td>
</tr>
<tr>
<td>57 No</td>
<td>47 No</td>
<td>37 No</td>
<td></td>
</tr>
</tbody>
</table>
6.6.3 CPAM's Illumination Questionnaire

Illumination is the stage during which the 'happy idea' occurs. Sudden insight brings about the 'Eureka!' or better known as the 'Aha!' Patterns emerge that anticipates a solution. Here predictions of the outcome and the ability to 'foresee' play an important role. Now there is crystallisation of the idea which is incubating into definite form. Initially criticism was absent, but as the process evolves and fantasy becomes art, the imagination has to submit its work to the scrutiny of the critical faculties. From here on the individual assumes a new role and it is here that the interpersonal aspects of the creative process become evident. He now proceeds to communicate his findings or solutions in a way acceptable to others.

It is interesting to note that the verbal test of Wallach and Kogan is the only test that allows for immediate communication after illumination. This does not suggest that the other tests do not allow for it or deny any form of communication straight after illumination has occurred. Many of the questions posed are difficult to answer, as illumination is but a short, split second event, that some individuals hardly even understand or utilize.

Again the standard for evaluation rates as follows:

*Yes:* awarded only when the particular criteria were ultimately met.

*In part:* awarded when criteria were met only in part.

*Psble:* indicates that there indeed exists the possibility that full criteria can be met.

*?:* Applies to all issues that either cannot be measured, the information is unavailable or simply form part of the murky sphere of the creative process.
## CPAM-Criterion Assessment within the Illumination Stage

### Illumination Stage Questionnaire

<table>
<thead>
<tr>
<th>The Creative Person</th>
<th>Personality / Biographical traits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relaxed state</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test examine if the testee experiences illumination by focussing on other problems during a period where he/she is free from anxiety?</td>
<td>No</td>
</tr>
<tr>
<td>Intense emotional intensity #1 and #2 (Dabrowski)</td>
<td>No</td>
</tr>
<tr>
<td>Novel Psychological activity #2 (Newel)</td>
<td>No</td>
</tr>
<tr>
<td>Does the test set out to observe a novel psychological activity?</td>
<td>No</td>
</tr>
<tr>
<td>Does the test consider or take into account that illumination is firstly an Eureka! feeling, then anxiety of separateness, &amp; finally a strong desire to communicate? #3 (Clark) If so does it test for this?</td>
<td>No</td>
</tr>
<tr>
<td>Eureka, aha &amp; happy idea #1 (Stein)</td>
<td>No</td>
</tr>
<tr>
<td>Ability to foresee (Youtz) #1</td>
<td>No</td>
</tr>
<tr>
<td>A sense of certainty when illumination occurs, excitement and an urge to communicate the insight, can be incoherent, only stage where significant others are not included #1</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Intuition</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden insight (Ability to make intuitive leaps and/or act on hunches). Does the test investigate?</td>
<td>No</td>
</tr>
<tr>
<td>Sudden insight brought to the conscious, holistic synthesis. Does the test investigate?</td>
<td>No</td>
</tr>
<tr>
<td>Idea can strike at any time (very brief) Provides basis for a C. response. Does the test investigate?</td>
<td>No</td>
</tr>
</tbody>
</table>

| **Actual moment of conception.** Does the test determine or investigate this moment? | No |

<table>
<thead>
<tr>
<th><strong>Unique outcomes</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solutions from the uniqueness of individual #1 Does the test first establish what makes the individual unique and then determine whether or not the solutions are indeed from the uniqueness of individual?</td>
<td>Yes</td>
</tr>
<tr>
<td>Generates solutions: Glamorous, appearing easy, as if the creative product springs forth effortlessly #1 Does the test investigate the solutions to investigate if they appear glamorous and appear easy?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Urge to communicate</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong desire to Communicate new concept. Does the test assess this strong need to communicate?</td>
<td>No</td>
</tr>
<tr>
<td>A personal experience that is communicated to others #1 Does the test examine this?</td>
<td>Yes</td>
</tr>
<tr>
<td>Communicates a new concept #2 (Rhodes) Does the test determine if that which is communicated is indeed a new concept?</td>
<td>In part</td>
</tr>
<tr>
<td>Communications skills? #3 (William) Does the test examine and address communication abilities and skills?</td>
<td>In part</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Affective</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Result of childhood trauma where warmth was present (Miller). Does the test test this?</td>
<td>No</td>
</tr>
<tr>
<td>Emotional intensity, anxiety (separateness), can be incoherent, appearing easily, usually accompanied by a good feeling (straight after) Does the test investigate these psychological issues?</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G&amp;W</th>
<th>W&amp;K</th>
<th>TCT-OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G&amp;W</th>
<th>W&amp;K</th>
<th>TCT-OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>?</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>?</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Creative thinking process:

**Creative thinking process:**

**Conscious Information Processing (beta)**

- Generates solutions #1: Does the test determine if solutions are being generated?
- Sudden change in perception #1: Does the test assess for this change?
- Urge to communicate #1 (Stein): Does the test examine whether or not there is such an urge?
- Does the test provide the means to meet the illumination-communication need?
- Idea can strike at any time #1
- Rush of insight #1: Does the test test for this?
- Very brief (short period) #1: Does the test test for this?
- Provides the basis for a creative response #1: Does the test evaluate the response in order to determine if it's basis is the illumination that occurred consciously?
- Pieces of a whole or the whole itself (see the whole concept at once) #1: Does the test evaluate if the illumination that occurred is pieces of a whole or the whole itself?
- Does the test test the following: Produces new & unexpected connections, metaphorical relationships, overlapping meanings, puns, & allegories #3 (Kris).
- Generates solutions of high quality, imaginative, clever, elegant & surprising #2 (Milgram): Does the test evaluate the solutions according to the mentioned categories?
- Does the test investigate or acknowledge 'Conscious reverie/solitude'?

**Instantaneous & consequential (rapid) Evaluation**

- Does the test investigate?
- Relevant, Appropriate. Does the test assess whether the testee evaluates according to the mentioned criteria?
- Illumines #2 (Botha): Does the test investigate if an illumination has occurred or not? If so whether or not it is being evaluated?

**Urge to Communicate**

- Does the test include testing 3 major phases?...
- Hypothesis formation
- Hypothesis testing
- Communication of results #3 (Stein)

**Unconscious (delta)**

- Previous independent mental skills transformed & integrated into novel synthesis #2 (Koestler): Does the test investigate the unconscious?
- If so, are previous mental skills evaluated and, after illumination has taken place, monitored to determine if transformation or synthesis has taken place? #2 (Koestler)
- Does the test take into account that the pre- & unconscious should be available to the C. person? It is important for evaluation in Creativity's higher levels of consciousness #3 (Krippner)

The underlying paradox exhibits contradictory aspects which produce tension. Existing systems are threatened & need change to resolve state of conflict #3 (Shallcross). Does the test test for this tension and state of conflict?
**SUBCONSCIOUS** (theta)  

<table>
<thead>
<tr>
<th>Extra-conscious</th>
<th>Pre-conscious</th>
<th>Sudden insight</th>
<th>Cognitive Style</th>
</tr>
</thead>
</table>
| Here mind is free to draw from the vast store of experience from the unconscious #3 (Rugg) Does the test observe if there is a vast store of experience? And if so, does the test determine if the mind free to draw from it? | Does the test take into account that the pre- & unconscious should be available to the C. person? #3 (Krippner) Does the test detect sudden insight when creative ideas shift from preconscious to conscious #3 (Kris). | Strikes at any time. Does the test set out to observe this? | Analogical thinking:
4 Types Analogical thinking: direct analogy (comparisons to previous successes), personal analogy (you are the product), fantasy (far-fetched thinking), & symbolic analogy (compressed conflict or book titles/ oxymorons) (Davis) #3 Does the test acknowledge... Intuition
Dependent on insight and novel reactions to the insight #2 (Sternberg) Does the test investigate if there has been insight, does the test test for novel reactions? Does the test include testing 3 major phases?...Hypothesis formation. Hypothesis testing. Communication of results #3 (Stein) |  

**Transporter of the Idea/Solution/Concept**

| Persuasion: |
| Focal Relationships: support etc. |
| Psychosocial: Can solutions be freely listed without the threat of criticism or evaluation? Is there time set aside for some relaxing activity, or is there allowance made for the preoccupation of another problem? #4 |

**Creative climate**: settings, sensory input

| Time: Is there enough time for the idea to surface? #4 |

---

Botha 277

Illumination
## Product:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>In part</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product seems to:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meet requirements &amp; criteria in preparation stage(#1), be easy(#2). Does the test evaluate these aspects of illumination?</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test take account of the fact that systems change in dynamic ways that appear chaotic, non-linear and unpredictable #3 (Eysenck)</td>
<td>?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Products can be:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products like sights, thoughts, inventions #2 (Vernon) Do tests test for all these types of products?</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product Prerequisites:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original: #2 (Mason, Fox) Does the test verify the originality content of the illumination that has taken place?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does it test for Taylor's 5 levels of creativity: expressive, productive, inventive, innovative and emergenative? #3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>New idea combination or transformation #1 Does the test test for this?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Illuminated solution appears to meet the requirements#1 Does the test test for this?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the illuminated idea satisfy the need &amp; criteria defined in preparation stage?#1 Does the test test for this?</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>Does the test test for the accumulated resources thrust into a new state of being? #1</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Product is independent and takes on a &quot;life&quot; of its own #1</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the test evaluate the illumination according to aspects such as: Novel/unique, original...?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Illumination product is glamorous, appearing easy, as if it springs forth effortlessly #1 Does the test investigate?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Unconventional? Statistically infrequent? Does the test evaluate illumination according to these criteria?</td>
<td>In part</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Private Creativity

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>In part</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>What value does the illuminated product hold for the individual? #2 (Eysneck) Does the test investigate?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Private novelty: Creativity as a trait #2 (Eysneck) Does the test evaluate?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Public Creativity

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>In part</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test evaluate the illuminated product's public (social) appeal or worth?</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
</tbody>
</table>

### Partial results from the Incubation Phase Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>6 Yes</th>
<th>17 Yes</th>
<th>10 Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 In part</td>
<td>13 In part</td>
<td>8 In part</td>
</tr>
<tr>
<td></td>
<td>1 Pab</td>
<td>2 Pab</td>
<td>4 Pab</td>
</tr>
<tr>
<td></td>
<td>26 ?</td>
<td>20 ?</td>
<td>18 ?</td>
</tr>
<tr>
<td></td>
<td>30 No</td>
<td>21 No</td>
<td>30 No</td>
</tr>
</tbody>
</table>
6.6.4 CPAM's Verification Questionnaire

Now the validity of the idea is tested and the idea reduced to exact form. Here elaboration and modification of the idea take place. Lack of verification or revision is the major difference between psychotic imaginative thinking and the creative thought of the healthy individual. As soon as the individual has completed his work does not mean that the total creative process is at an end, but now needs to be presented to and accepted by a group of significant others as 'tenable, useful or satisfying'. This covers the areas of ideas, objects and aesthetic experiences.

Evaluation rates as follows:

Yes: awarded only when the particular criteria were ultimately met.

In part: awarded when criteria were met only in part.

Psble: indicates that there indeed exists the possibility that full criteria can be met.

?: Applies to all issues that either cannot be measured, the information is unavailable or simply form part of the murky sphere of the creative process.
CPAM-Criterion Assessment within the Verification Stage

Verification Stage Questionnaire

<table>
<thead>
<tr>
<th>Creative Person</th>
<th>Personality / Biographical traits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Verified manifestation:</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test examine if the result of one individual ability or the result of the dynamics of a cluster of various abilities? #2 (Jones)</td>
<td></td>
</tr>
<tr>
<td>Does the test evaluate any of the following? 1. Principle of resurgence 2. Novel &amp; different. 3. Probabilistic. #3 (Epstein)</td>
<td></td>
</tr>
<tr>
<td><strong>Private Evaluation/ Internal locus of Evaluation:</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test determine if the product meets the various expectations? Individual's? &quot;Persuasional&quot; expectation?</td>
<td></td>
</tr>
<tr>
<td>Does the test take into account that the product is model of artist's attitude toward a phenomenon #3 (Simonov)</td>
<td></td>
</tr>
<tr>
<td>Does it test for elaboration? (Here it is characterized by labor, concentration and endeavor) #3 (Stein)</td>
<td></td>
</tr>
<tr>
<td>Does the test recognize if the product response is adaptive to, or of reality? (Must serve to solve a problem, fit a situation or accomplish some recognizable goal. #2 MacKinnon</td>
<td></td>
</tr>
<tr>
<td><strong>Communicate:</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test require a verbal or a non-verbal response?</td>
<td></td>
</tr>
<tr>
<td>Does the test evaluate behaviors &amp; communicative skills? #3 (William)</td>
<td></td>
</tr>
<tr>
<td>Does the test determine if the verified product communicates a new concept? #2 (Rhodes)</td>
<td></td>
</tr>
<tr>
<td><strong>Affective</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test test for creative actualization? #1</td>
<td></td>
</tr>
<tr>
<td>Does it test for Maslow's 15 Characteristics of Self-Actualized people? #3 (Maslow)</td>
<td></td>
</tr>
<tr>
<td>Does the test take into account that creativity is a way of conducting one's life rather than in terms of the number and kinds of objects one produces #3 (Taylor)</td>
<td></td>
</tr>
<tr>
<td>Verification highlights difference between psychotic imaginative thinking &amp; C. thought of healthy individuals #1 (Youtz) Does the test highlight the individuals that cannot verify their products?</td>
<td></td>
</tr>
<tr>
<td><strong>Psychological:</strong> Does the test inquire as to the psychological health of the testees?</td>
<td></td>
</tr>
<tr>
<td><strong>Creative thinking process</strong></td>
<td></td>
</tr>
<tr>
<td>Does the test seek out expression in terms of a verified product? Recreation (expression/ manifestation) #3 (Shallcross)</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the test take into account that in lateral thinking you put forward different views? All are correct and all can coexist. (Different views are not derived each from the other but are independently produced) #3 (BF Youtz)</td>
<td>No</td>
</tr>
</tbody>
</table>
## CONSCIOUS Information processing (beta)

### Concentration
- Does the test take into account that C. behavior increases consciousness to a total collection of possibilities #3 (Feam)?
  - No
- Does the test assess the 5 stages: fact-finding, problem-finding, idea-finding, solution-finding (evaluation) & acceptance-finding (implementation) #3 (Osborn & Pames)?
  - No
- Does the test in any way determine if the C. process has led to the discovery of an entirely different
  - No
- Does the test evaluate or identify an action plan? #4
  - No
- Does the test keep track of whether the initial goal or problem has been solved or not? (determination) #4
  - No
- Use Binaural Beats? #4?
  - No

### Incessant Evaluation
- Does the test test for convergent justification of the proposed product? (listing evaluation criteria; evaluating ideas and then selecting the best idea) #4 (Evaluative: justification, testing, appropriateness) #2?
  - No
- The ability to recognize an alternative application of a failed verification #2 (Form hypothesis: Ability to recognize an alternative application of a failed verification)
  - No
- Does the test identify modifying and retesting? #3 (Torrance)
  - No
- Does the test investigate convergent thinking? Here it refers to evaluative, elaboration, fine tuning & Empirical testing #1?
  - No
- Does the test investigate if product has sustained its original insight, made an evaluation & elaboration of it, and a developing of it to the full. #2 (Kayak)
  - No
- Was there any signs of insightful reorganization? #2: Does the test test this?
  - No
- Does it **solve a problem** or have implications for the setting of another recognizable goal? #2: Does the test evaluate the product and its implications?
  - No
- Does the test investigate any signs of Evaluating, Testing & Communicating the results? #2 (Torrance, Rhodes)
  - No

### Communicate
- Does the test monitor if the response has been successfully communicated? #3 (Torrance)
  - Yes

### Convergent Thinking:
- Does the test search for Hypothesis formation?
  - No
- Does the test identify and evaluate insightful reorganization? Does it determine that the product has indeed solved a problem?
  - In part

### Possibility of Elaboration
- Do tests determine whether there is an elaboration and development of the idea in which the Big Idea is implemented? #3 (Davis)
  - No
- Does the test investigate or search for revision, elaboration and modification? #1 (Youitz)
  - No
**UNCONSCIOUS** (delta)

Did the Creator's Collective Unconscious account for an audience's favourable response? #2 Jung

<table>
<thead>
<tr>
<th>Verification</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SUBCONSCIOUS** (theta)

Here the illuminating link up of conscious and unconscious takes place during illumination. The conscious is more at work during verification.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Information Processing:**

The result of the spontaneous, original and imaginative ingenuity #2 (Andre Olivier) Does the test test spontaneity, originality, imagination and ingenuity?

Is the product a novel synthesis? #2 (Koestler) Does the test probe this notion?

A result of the dynamics of a cluster of various abilities? #2 Does the test acknowledge and verify this?

Must sustain original insight & development to the full (Adaptiveness & realization) #1 (Harrington) Reviews, refines, and adjusts the product of illumination to the realities of reason #1 Does the test monitor this?

Incessant evaluation, elaboration, revisions, modifications, alternatives & implementation. Does the test investigate any of these issues?

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Psble</td>
<td>Psble</td>
<td>Psble</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>In part Cn &amp; Cm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Cognitive Style**

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Persuasion:**

Product vs. Persuasion:

Is there any signs of passive responding & an aggressive receptivity? #3 (Guilford)

Product: beyond the realm of conventional thinking? #2 (Botha) Does the test investigate?

Not the result of one individual ability but the result of the dynamics of a cluster of various abilities #2 (Jones ) Does the test investigate?

Tests? Creative product brings new & unique perceptions of the culture #3 (William)

Social Validation (Judgement & Implications):

Social: Does the test measure what the effects are of social evaluations on the individual’s efforts?

Are the test administrators field-individuals who know domain’s rules? Are they competent to decide if

Does the test allow the ‘Field’ to select one C. variation among many & add it to the domain so that it

transmits the selected variant to a new generation of individuals? #3 (Csikszentmihalyi)

Does product evaluation depend on the direct subjective judgment of independent raters familiar with the

product domain? #4

Significant others are to judge as tenable, useful or satisfying in terms of, ideas, objects and aesthetic

experience #1 (Stein) Is this the case with this test?

Possibility of product involvement in making it reality #1 Does the test inquire as to product involvement?

External validation #1 What additional external validation does the test require?

Evaluation involvement. Is there any evaluation involvement for this test? (acceptance or rejection by

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
### Audience/Perceiver & Significant others:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test take into consideration that the Collective Unconscious accounts for an audience's favorable response?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test seek an audience's favourable response?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test determine if any variables have been added?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test investigate if there were any changes made?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test check whether any skills/help was sought for Verification?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Do the above have symbolic emotional reaction to abstract apparition of the creative form?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Focal Relationships: support etc.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Evaluation? To what extent does the test measure the support, encouragement or influence of public evaluation has had on the final product? Or was the test done in isolation?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>If in isolation, was there any post product public evaluation involvement?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Society's final say? What is Society's final say? #2 Csikszentmihalyi Does the test seek such an opinion?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Additional variables added, pointed out or remarked upon by significant others or influenced to elaborate</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test investigate? Creative Eco-system in which creators add to, and create new value from previous creativity. Novel contribution is a collective enterprise? #2 (Harrington) Does the test investigate?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Creative Climate

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test allow for the material needs of product verification?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Distal commitments & culture

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social need? Does the test investigate if the product is a response to current social need? #2 Revesz</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Raise standard of living of its community? #2 (Revesz) Does the test investigate?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Changes field? Product changes the field (Feldman) Does the test investigate?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Creative Eco-system Does the test attempt to determine how responsible the individual versus the environment is for a creative product? #3 (Skinner)</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Part of a Creative Eco-system? #2 (Harrington) Does the test investigate?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Product involvement? Team work?</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Agreement? Does the test seek agreement? 

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>No</th>
<th>?</th>
</tr>
</thead>
</table>

### Proximal Environment & Family
<table>
<thead>
<tr>
<th>Type:</th>
<th>express</th>
<th>express</th>
<th>express</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor 4 levels: Expressive, productive, ingenious, innovative. Does the test investigate?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product must be:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>#2 Does the test inquire whether or not the product is completed?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Judged (privately or publicly)</td>
<td>#2 Does the test judge the product?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>New/Novel/Unique:</td>
<td>#2 [Newell, Shaw, Simon, Barron, May, Rhodes] Does the test investigate?</td>
<td>Possible</td>
<td>Yes</td>
</tr>
<tr>
<td>Statistically infrequent</td>
<td>#2 Beyond the realm of conventional thinking</td>
<td>#2 [Botha] Does the test investigate?</td>
<td>In part</td>
</tr>
<tr>
<td>Ideas that are imaginative, clever, elegant &amp; surprising</td>
<td>#2 (Milgram) Does the test investigate?</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Product must sustain original insight, an evaluation &amp; elaboration of it, a developing of it to the full</td>
<td>#2 (MacKinnon) Does the test investigate this?</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Novel, appropriate, useful, correct, valuable to task at hand, heuristic(search methods) not algorithmic(calculating methods)</td>
<td>#1 (Amabile p.9) Does the test investigate this?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unique &amp; functional outcomes</td>
<td>#2 (Botha) Trait? Value? Useful? Does the test investigate this?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Acceptability/ appropriateness. Does the test investigate this?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Product can be:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the product is based on Private C. Potential, does the test determine if it is adaptive to reality?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test investigate if the product is Visual, Auditory, Kinesthetic or Gustatory based?</td>
<td>#1 No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test profess the need to apply qualitative analysis of imaginative responses, C. analogies &amp; imagery?</td>
<td>#1 (Klatens)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test include the validation, evaluation &amp; elaboration exerted by significant others</td>
<td>#1 In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Is this test fakable?</td>
<td>(Ironsan &amp; Davis)</td>
<td>#1</td>
<td></td>
</tr>
<tr>
<td>Product could be made, built, constructed or established by someone other than the creative person him/herself or a combination of both. Does the test test for this?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test question whether the product is Constructive C. or Destructive C.?</td>
<td>#2 Rogers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test measure or consider the significance of the C. Ecosystem?</td>
<td>#2 Jones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is product inextricably contingent on the existence of other value creating people and processes within the C. Ecosystem (based on one individual or contributions by others of a cluster of various abilities)</td>
<td>#2 (Jones)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test test for this?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test examine whether the product is inextricably contingent on the existence of other value creating people and processes within the creative ecosystem or not?</td>
<td>#1 (Runco 148)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test determine if the product is private creativity or social creativity?</td>
<td>#3 (Harrington)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Achievements?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the test investigate the product's length of time and depth of application?</td>
<td>Indirect</td>
<td>Indirect</td>
<td>Indirect</td>
</tr>
</tbody>
</table>
### Private Creativity

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test determine if the product is not completely rational or intelligible?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test examine whether it is understandable to some persons in its consequences?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test examine whether it is adaptive to reality?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test examine whether the product can be put forward for Public Evaluation?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Maslow's Self actualizing-Creativity or Special Talent Creativity? Does the test test for this?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Public Creativity

<table>
<thead>
<tr>
<th>Validation:</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validation done by significant others: Appropriate, useful</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Valuable</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Agreement from experts &amp; establishments (scientific, aesthetic, social or technical value)?</td>
<td>Poble</td>
<td>Poble</td>
<td>Poble</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acceptability/ appropriateness:</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test take into account that the above may change with time?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Does the test address the issues concerning to what degree interventions need to be ‘tailored’ to particular person or problem?</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>Time</td>
<td>(Time)</td>
<td>(Time)</td>
<td>(Time)</td>
</tr>
<tr>
<td>Does the test take into account that creativity is a way of conducting one’s life rather than in terms of the number and kinds of objects one produces?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the test test for Variables concerning the product worth? These could be pointed out by externally generated observance or influenced by a need, an idea or remark from some other source?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Related</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the test take into account that the longer a work survives (social consumption) the closer the creator Length of time vs. ‘depth of application’?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>(Sip)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product achievements?</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does it test for Special talent creativity?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Overt production criteria (patents etc)?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Professional recognition (product's value in field)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Social recognition (peers &amp; supervisors)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Post Test Evaluation:

Are there any Post test evaluations or follow up tests?  
Are recommendations made?  
Is the test part of longitudinal studies?  
Is the test available for other research purposes or on the w.w.w.?  
Can the test add value to potential (worldwide) research in search of the understanding and statistical analysis of creative process criteria?

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there any Post test evaluations or follow up tests?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Are recommendations made?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Is the test part of longitudinal studies?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Is the test available for other research purposes or on the w.w.w.?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Can the test add value to potential (worldwide) research in search of the understanding and statistical analysis of creative process criteria?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Additional test: Creative Assessment Questionnaire #4 (test criteria)

<table>
<thead>
<tr>
<th></th>
<th>9 Yes</th>
<th>10 Yes</th>
<th>25 Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 In part</td>
<td>7 In part</td>
<td>6 In part</td>
<td></td>
</tr>
<tr>
<td>0 Pab</td>
<td>2 Pab</td>
<td>1 Pab</td>
<td></td>
</tr>
<tr>
<td>28 ?</td>
<td>33 ?</td>
<td>16 ?</td>
<td></td>
</tr>
<tr>
<td>29 No</td>
<td>15 No</td>
<td>20 No</td>
<td></td>
</tr>
</tbody>
</table>

Partial results from the Verification Phase Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>8 Yes</th>
<th>11 Yes</th>
<th>11 Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 In part</td>
<td>20 In part</td>
<td>22 In part</td>
<td></td>
</tr>
<tr>
<td>6 Pab</td>
<td>8 Pab</td>
<td>10 Pab</td>
<td></td>
</tr>
<tr>
<td>20 ?</td>
<td>21 ?</td>
<td>21 ?</td>
<td></td>
</tr>
<tr>
<td>59 No</td>
<td>56 No</td>
<td>50 No</td>
<td></td>
</tr>
</tbody>
</table>
Chapter four's content (See chapter four) concerning assessment yielded much relevance but its content was aimed at examining and evaluating tests rather than providing criteria for the CPAM. It concerns test requirements, basic background information about tests, the interpretation of results (scoring), examinee considerations, validity and reliability, test administrators and scorers, new trends and research implications, what type of test it is and whether or not it fulfils the prerequisites for testing creativity. The Creative Assessment Test Questionnaire (CATQ#4) stands outside the CPAM evaluation.

**CPAP#4:**

**TEST QUESTIONNAIRE**

<table>
<thead>
<tr>
<th>Test Requirements</th>
<th>G&amp;J:WA</th>
<th>W&amp;K:</th>
<th>TCT-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type? Norm-referenced tests, interviews, observations or an informal assessment?</td>
<td>Norm</td>
<td>Norm</td>
<td>Norm</td>
</tr>
<tr>
<td>Does the test focus exclusively on one test score?</td>
<td>Part of a series</td>
<td>Part of a series</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Information about the test**

<table>
<thead>
<tr>
<th>Name?</th>
<th>Author?</th>
<th>Publisher?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date of issue?</th>
<th>Alternatives available?</th>
<th>Cost?</th>
<th>Time-factor?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>Yes</td>
<td>15 minutes in research/no time limit in instructions</td>
<td>15 minutes in research/no time limit in instructions</td>
</tr>
<tr>
<td>1962</td>
<td>Yes</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test manual available?</th>
<th>Revisions been done?</th>
<th>What were the standardised groups in research done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research only</td>
<td>Yes</td>
<td>151 Gr. 5 pupils - from 11 countries</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

**Aids to Interpreting Test Results**

| Does manual provide clear statement of the purpose and applications for which the test is intended and the qualifications needed to administer the test and interpret it property? | In part | In part | Yes |
| Do the test, manual, record forms, and accompanying materials guide users toward sound and correct interpretations of the test results? | In part | No | In part |
Are the statements in the manual that express relationships presented in quantitative terms, so that the reader can tell how much precision or confidence to attach to them? No No Yes

**Examinee Considerations**

<table>
<thead>
<tr>
<th>Prerequisite skills?</th>
<th>None</th>
<th>?</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>What language or modes of communication can the test be administered?</td>
<td>English, Verbal</td>
<td>English</td>
<td>Non-verbal</td>
</tr>
<tr>
<td>Appropriate vocabulary?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>How are test items presented and responded to?</td>
<td>Written form</td>
<td>Verbally</td>
<td>Open-ended</td>
</tr>
<tr>
<td>What stated or unstated adaptations can be made in presentation and response modes?</td>
<td>Less scoring limitations, more freedom to respond</td>
<td>A wider choice of response modes</td>
<td>Biographical information</td>
</tr>
<tr>
<td>Sex and ethnic biases?</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Interesting test materials?</td>
<td>No</td>
<td>No</td>
<td>In part</td>
</tr>
<tr>
<td>Is test suitable for individual or group administration?</td>
<td>Both</td>
<td>Individual</td>
<td>Both</td>
</tr>
</tbody>
</table>

**Administration and Scoring**

| Are norms reported in an appropriate form (usually standard scores or percentile ranks)? | Yes | No | Yes |
| Populations clearly defined and described? | No | No | ? |
| If more than one form is available, are tables available showing equivalent scores on the different forms? | No | No | No |
| Does the manual discuss the possible value of local norms and provide any help in preparing local norms? | No | No | No |
| Any pre-testing preparation done such as the AUTA model? | No | No | No |
| Does the test have Longitudinal validity? | ? | ? | ? |

**Validity and Reliability**

| What correlation’s have there been? | .87 (N=32) | ? | ? |
| Construct? | ? | ? | ? |
| a) Experimental construct validity: | ? | ? | ? |
| b) Discriminant construct validity: | ? | ? | ? |
| c) Convergent construct validity: | ? | ? | ? |
| Criterion Related? | Concurrent (Associative thinking) | Concurrent (Associative thinking) | Concurrent (Set of 11 criteria) |
| a) Concurrent validity? | ? | ? | ? |
| b) Predictive validity? | ? | ? | ? |
| Content validity? | In part | Yes | Good |
| Factor Analysis? | ? | ? | ? |
| Are the tests sensitised to barriers, blocks, and squelches? See 4.2.2.1 | No | In part | Yes |
| Are there Stimulators of Creativity? See 4.2.2.1 | No | In part | Yes |
| What conditions are conducive to Creative Thinking? See 4.2.2.2 | No time limits. | No time limits. | Game-like |
| Are the results from the test used for purposes beyond identification? | ? | ? | ? |
Does the test follow the basics steps in an assessment process?

| Does the test have referral information? | ? | No | Yes |
| Obtain information concerning medical, social, psychological, linguistic, educational, and physical development, including previous psychological evaluations? | No | No | No |
| Observe in various settings? | ? | 2 weeks of observing prior to test | No |
| Is the test administered selected on basis of referral question; age, physical capabilities, language proficiency, and prior test results and reports? | ? | ? | No |
| Interpret data? | ? | ? | Yes |
| Formulate hypothesis? | ? | ? | ? |
| Develop intervention strategies? | ? | ? | ? |
| Write report with recommendations? | ? | ? | ? |
| Meet all concerned individuals to discuss results and recommendations? | ? | ? | No |
| Are there any follow up recommendations and retesting? | Pable | Pable | Pable |

Test Administrators and Scorers

| What are the Guidelines for Training Creativity Test Administrators and Scorers? | None | ? | None |
| How close do they resemble those suggested by Treffinger, Torrance and Ball? See 4.2.1.1 (a) | N/A | ? | N/A |
| Is the Author of the test qualified in psychometrics? | ? | ? | ?No |
| Did the Author follow the set of seven basic guidelines for objective creativity assessment as set out in 4.2.3.2? | In part | In part | In part |
| Does the Author have an understanding of the Laws and Government Regulations concerning assessment? | ? | ? | ? |

New trends and Research implications

| Does the Author have knowledge of the following: | None | ? | None |
| Motivation principle of creativity as set out in 4.2.4.1? | No | Yes | Yes |
| Pre-school Research Findings? | No | Pable | ? Fluency & flexibility does not carry much weight |
| Alpha waves and Binaural Beats? | No | No | No |
| The MBTI Creativity Index? | No | No | No |

Types of Creativity tests

| #4.3.2.1 Biographical? Does the test investigate histories of creative abilities & hobbies, experiential factors & abilities and taught skills such as implementing, discerning opportunities? | No | No | No |
| #4.3.2.1 If Biographical?: creative thinking talents of productive thinking, communication, forecasting, decision making, planning, getting-ideas-into-action talents of implementing, human relationships and discerning opportunities | No | No | No |
| #4.3.2.1 Biographical? Does the test group info according to 5 sections: physical characteristics, family history, educational history, leisure-time activities, and a miscellaneous category? | No | No | No |
| How does the test go about measuring for patterns of information processing? See #4.3.2.4 | None | Communicating only | Experiential support, comm., decision making, planning, getting-into-ideas-info-action |
| #4.3.2.5 Are there any ratings done by teachers, peers, and supervisors? | None | ? | No |
Pre-requisites of Creativity Tests

#4.3.3.1 Does the AUTA Model Of Creative Objectives or precede the test?

Is there any form of pre-test informative session or preparation?

Any other pre-test system of increasing the individual's awareness of the topic?

Test? Problem defining, visualisation, imagination, transformation, ability to regress, metaphorical thinking, Bloom's analysis, synthesis, evaluation, intuition, resisting premature closure, concentration, and logical thinking?

(Davis 1989:261.)

#4.3.3.2 Does the test ask the straightforward question: "Are you creative?"?

Does the test base some of its assumptions on the Threshold theory?

Is the Author aware that Figural tests yield more reliably original responses?

If so, does the test allow for this?

#4.3.4. Does the test contain more Figural items than Verbal?

#4.3.5. Does the test allow for open-ended problem solving & opportunity to find the problem?

#4.3.6. Is the dimension of originality given enough weight in the evaluation process?

#4.3.7. Is the dimension of originality the key essence of product evaluation?

#4.3.8. Can this test easily be taken for either a high or low creativity score?

#4.3.9. A distinction between real-time creativity and multistage creativity?

(spin-of-the-moment, improvisational, & demands output in a short interval of time vs. sufficient time allowed for generation & selection of ideas)

#4.3.10. Are there more open-ended subjectively-assessed creativity tasks?

(in order to assess more situationally-induced differences in creative performance, such as those brought about by the imposition of social constraints) Amabile (88:237)

#4.3.11. Does the test take into consideration that C. in children should not be evaluated as a product being 'socially useful' (because it is not always a prerogative of a young child)

Does not use 'useful' as a criteria

#4.3.12. Does the test allow for cultural diversity?

Does this test carry a validity for both minority and majority groups?

#4.3.13. Is the Author of the test aware of all the problems with C. tests: Speed, commands, visual lay-out of assessment page, fluency score, flexibility, scoring elaboration & originality?

#4.3.14. Is the Author of the test aware of recent C. Test's Research-findings?

(such as those outlined in #4.3.5)

Index for CPAP #4: Creativity Test Questionnaire Results

| 5 Yes | 10 Yes | 26 Yes |
| 7 In part | 7 In part | 6 In part |
| 0 Possible | 2 Possible | 1 Possible |
| 27 ? | 33 ? | 16 ? |
| 29 No | 15 No | 20 No |

The assessment of numerous questions cannot be completed without the cooperation or permission of the author of the test him/herself. Unfortunately it has
not been possible to achieve this ideal. This leaves the researcher to assess the given only, which is the test and its accompanying manuals and research. After all, it is the test itself that ultimately determines whether creativity is being measured or not.
6.7 DISCUSSION AND RESULTS OF SELECTED TESTS

It came as no surprise that all the tests’ CPAM evaluations revealed large gaps in assessing the creative process. In fact all three tests revealed that the only definite creative assessment that took place, was the persuasional’s creative climate during both the illumination and verification stage. The former asks whether enough time has been allowed for the idea to surface and the second asks whether the test has allowed for the material needs for verification to take place.

The diagrams reveal the results in an easy and effective manner. The CPAM’s colour differentiating makes it user friendly and provides quick access to the fundamentals of the creative process and how creativity tests have averaged. The abridged version of the CPAM’s components serves as a referral aid. As referred to above, note that with each test, only two of the sixty criteria within the CPAM were positively assessed.

Word Association and Instances did not demonstrate any sensitivity to sociocultural and personal factors. Social, cultural, historical, and all the persuasional variables are vital for our understanding of creativity. All three tests do not include a pre-test preparation or post-test evaluation and seem to not consider issues such as the settings, and sensory stimulation (visual, auditory, kinesthetic, and gustatory). These are considered to have a profound effect on evoking aesthetic affective modes that precede creative thinking and are crucial to the initial spark of the creative process.

It is by no coincidence that Urban and Jellen’s TCT-DP creativity test scored considerably higher than the other two tests. All the results, except the two from sixty CPAM criteria assessed, indicated that the TCT-DP was able to assess far more factors relating to the creative process. This in no ways indicates that it has indeed succeeded in its measurement but can only be given credit for measuring the creative process in part. It is therefore evident that all creativity tests need to clearly distinguish what aspect of the creative process they are measuring before claiming to assess ‘creative potential’.

### CPAM's Assessment Results: Getzel & Jackson's "Word Association"

**Getzel & Jackson:**

**Word Association (input):**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>No</td>
<td>Pble</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
</tbody>
</table>

6 Yes 13 Yes 6 Yes 8 Yes
17 In part 31 In part 10 In part 20 In part
9 Possible 5 Possible 1 Possible 6 Possible
15? 52? 26? 20?
118 No 67 No 30 No 59 No

**Assessment portion of the creative process:**

**Word Association (output):**

### CPAM's Assessment Results: Wallach & Kogan's "Instances"

**Wallach & Kogan:**

**Instances (input):**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>No</td>
<td>Pble</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>?</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
</tbody>
</table>

8 Yes 16 Yes 17 Yes 11 Yes
26 In part 34 In part 13 In part 20 In part
11 Possible 20 Possible 2 Possible 8 Possible
16? 46? 20? 21?
111 No 47 No 21 No 56 No

**Assessment portion of the creative process:**

**Instances (output):**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>In part</td>
<td>In part</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>No</td>
<td>Pble</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>No</td>
<td>Pble</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>In part</td>
<td>Yes</td>
<td>Yes</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In part</td>
<td>No</td>
</tr>
</tbody>
</table>

52 Yes 93 In part 41 Possible 103?
235 No
CPAM's Assessment Results: Urban & Jellen's (TCT-DP)

Urban & Jellen: Test for Creative Thinking-Drawing Production & its assessment portion of the creative process:

(TCT-DP) (input)

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(TCT-DP) (output)

<table>
<thead>
<tr>
<th></th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
<th>In part</th>
</tr>
</thead>
<tbody>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In part</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results CATO #4:

Creativity Test Questionnaire

<table>
<thead>
<tr>
<th>G&amp;J:WA</th>
<th>W&amp;K:J</th>
<th>TCT-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Yes</td>
<td>10 Yes</td>
<td>26 Yes</td>
</tr>
<tr>
<td>9 In part</td>
<td>7 In part</td>
<td>6 In part</td>
</tr>
<tr>
<td>0 Possible</td>
<td>2 Possible</td>
<td>1 Possible</td>
</tr>
<tr>
<td>10?</td>
<td>18?</td>
<td>21?</td>
</tr>
<tr>
<td>93 No</td>
<td>47 No</td>
<td>30 No</td>
</tr>
</tbody>
</table>

Botha 294

65 Yes
102 In part
56 Possible
95?
220 No

Results
6.7.1 Results: Getzels and Jackson: ‘Word Association’

- Only two of CPAM’s criteria were fully measured (See discussion above).

- CPAM’s standards for evaluation revealed that there were 274 criterial issues not addressed and only 33 positively approached. The fuzzy areas rendered a score of 212 (78-in-part, 21-possible, 113-? or unknown).

- In all, 28 (indicated by amount of coloured cells in Word Association output) of the 60 CPAM Criteria were assessed, though some of them were met only partially.

- The CATQ#4 compared a score of 9 positively answered to a score of 29 not addressed.

It is again important to remember that Word Association is but one test in a series of 5. ‘Uses for things’, ‘Hidden Shapes’, ‘Fables’ and ‘Make-up Problems’ form the rest of the creativity battery. It claims to assess creativity but rather focuses on scoring the number of associations made. It was at first scored according to the relative uniqueness of each meaning but subsequent testing revealed that only the number of associations proved to be a more beneficial way of measuring. It is in the scoring procedure that this test reveals some of its many flaws. If, for example, a homonym association was given to the stimulus word, no credit was given. The dictionary was used as the final authority. Slang expressions from known adolescent jargon were also given credit. This test, according to the CPAM, does not allude to, or give much recognition to the affective side of the creative person nor does it take the distal commitments or culture into consideration. The testee’s proximal environment or family does not seem to play a role in assessment at all neither does the notion of private creativity feature.

6.7.2 Results: Wallach and Kogan: “Modes of Thinking: Instances”

- Again, only two of CPAM’s criteria were fully measured (See discussion above).
Botha 296

- CPAM’s standards for evaluation revealed that there were 235 criterial issues not addressed and 52 positively approached. Here the fuzzy areas rendered a score of 231 (93-inpart, 41-possible, 103-? or unknown).

- Like Word Association, 28 (indicated by amount of coloured cells in Word Association output) of the 60 CPAM Criteria were assessed, though some of them were met only partially.

- The CATQ#4 compared a score of 10 positively answered to only 15 not addressed.

This creativity test titled ‘Instances’, was the only verbal test assessed. This elevated it’s significance somewhat in the sense that it was the only test that was able to capture the moment of illumination in it’s entirety. During illumination the ‘urge to communicate’ is fulfilled simply by means that this is a verbal test and being asked questions the testee is called to attention to instantly recall, in this case, make associations to stimulus suggestions. Similar to Word Association, it sets out to measure the total number of responses given. Only difference is that it defines the variable of ‘uniqueness’ by giving credit to an item that is offered by only 1 out of 151 individuals tested. Some care has been given to the affective side in that no pressure for speed is stipulated. The administrator explains an example in such a manner as to convey the feeling of suggestion rather than of finality. However it’s failure to involve issues from the persuasional component and lack of credit for private creativity is obvious. It managed to assess, mostly in part, 28 (indicated by amount of coloured cells in Instances output) of the CPAM’s 60 listed Criteria.

6.7.3 Results: Urban and Jellen: TCT-DP (Test for Creative Thinking-Drawing Production)

- Two of CPAM’s criteria were fully measured (See discussion above).

- CPAM’s standards for evaluation revealed that there were 220 criterial issues not addressed (the least of all three tests) and 65 positively approached (the
most of the three tests). Fuzzy areas rendered around a score of 253 (102-
inpart, 56-possible, 95-? or unknown).

- Like Word Association and Instances, 28 (indicated by amount of coloured
cells in TCT-DP output) of the 60 CPAM Criteria were assessed, though some
of them were met only partially.

- The CATQ#4 compared a score of 26 positively (the highest score of the
three tests) answered, to 20 not addressed.

The TCT-DP is non-figural German test that focuses on a drawing production. It is
considered to be culture-fair, culture-sensitive, and gender-fair. Based on the theory
of Carl Rogers it attempts to address and reward more cognitive efforts in form of
"Thema" and "Gestalt" (Jellen & Urban 1989:79). Eleven criteria such as risk-
taking, elaboration, fluency, synthesis, transformation, non-conforming,
humorousness and unconventionality are prompted of which humour and speed,
were eventually rejected as relevant for the TCT-DP. It is evident that of all the tests
assessed, the TCT-DP seems to capture most of the criteria listed within the
'creative thinking' component, especially within the incubation stage. It was also the
only test that partially recognised the creative individual's personality and
biographical traits throughout all the stages. Similar to the other tests, it too does
not take into consideration many of the persuasional factors or investigate for
private creativity. The CPAP #4 test questionnaire's results need mentioning. This
could possible indicate that it's test components are better structured than the other
two tests. Issues like the fact that it is easily administered, economical in time and
cost, together with a set of evaluation requiring minimal training. This all could only
add to its credibility. The researcher needs to indicate that these results were not used
as a statistical analysis but rather as an operational guideline as to how a test rated
according to the assessment questionnaire standards. It is the researchers opinion
that the TCT-DP's 65 'Yes' for CPAM's standards for evaluation score, makes this
test a more appropriate assessment instrument than its two counterparts.
6.8 CONCLUSION

Urban and Jellen's TCT-DP creativity test did succeed in assessing more than Getzels and Jackson's Word Association or Wallach and Kogan's Instances. All three tests however did not come near to testing the 60 set of criteria as set forth by the CPAM. Only two of the set criteria carried some form of significance.

6.8 IN SUMMARY

The CPAM instrument elevates significant aspects that preclude assessment and drives the obligation of further investigation. Measuring creativity has not stopped many researchers' attempts to capture and assess its magnitude. Guilford, Torrance, Getzels and Jackson and Davis each recognised its diversity. Chapter four has clearly explained the taxonomy of creativity measurement. The CPAM-evaluation of creativity tests is an approach where all categories of creativity measurement are tested. Some aspects such as those related to the sub- and unconscious functioning during the creative process, cannot by today's standards be accurately ascertained, lesser yet measured. These and many other examples raise the question once again of whether or not the full extent of the creative process CAN be measured or not. Chapter six has beyond doubt established a scale of evaluation that highlights what research dictates and what tests ultimately should set out to assess. What could be of value is finding the weight that each of the criteria listed in the CPAM should carry. Furthermore each criteria listed within the CPAM can host many other additional perspectives and, ask significant questions before a final evaluation is given. The scrutiny each test needed to endure during its CPAM screening was severe but, in all fairness, cannot and should not be able to escape the magnitude and diversity of trying to measure creativity.
CHAPTER 7 SUMMARY, FINDINGS AND RECOMMENDATIONS

7.1 INTRODUCTION

In order to assess creativity tests, one must first understand the concept of creativity. In order to understand creativity, one has to investigate its definitions and theories, and the rational built around these interpretations.

Chapters two and three expose a melange of substantial research that, through synthesis and evaluation, established the elements for a framework as set out in chapter five. In chapter six the CPAM as well as the Creativity Questionnaire, which surfaced from an investigation into assessment in general (chapter four), have put three tests under scrutiny. These were distinct creativity tests selected because of their diversity for this research paper. They are Getzels and Jackson’s “Word Association”, Wallach and Kogan’s “Instances and Urban and Jellen’s TCT-DP (Test for Creative Thinking-Drawing Production). CPAM’s severe scrutiny revealed that the prerequisites of only two of its sixty criteria were met. Many of the questions posed, cannot at this point in time, be answered. For an example, how to accurately interpret and translate the part that the unconscious plays in creative thinking still remains unanswerable. Another problem was finding the weight that each of the criteria listed in the CPAM should carry. Before suggesting further research areas it is imperative to summarise the findings of the theory done in the preceding chapters.

7.2 SUMMARY AND FINDINGS OF THEORY

7.2.1. Chapter 2

Definitions of the general term ‘Creativity’ were researched. Relevant sources provided definitions which the researcher used to ascertain which ‘elements’ refer to person, persuasion (place & environment), product or, the creative thinking process,
in order to 'categorise' future creative process criteria. Prominent authors' own creativity definitions and discussions regarding the term creativity's ambiguous nature were analysed and documented. Their conclusions concerning the lack of a universal definition considered. Similarities and gaps were noted and discussed in chapter five. Relevant criteria from chapter two were documented in the Creative Process Assessment Parameter #2 (CPAP#2) in chapter five. The researchers own definition of creativity offered a personal holistic perspective: 'A perceptive synthesis that illuminates a unique and functional outcome beyond the realm of conventional thinking'. This was the only definition that consolidated all the elements and creative process stages.

7.2.1 Chapter 3

Chapter three focussed in more detail on the different perspectives placed on creativity and the diverse theories put forward by the pioneers of this research field. General variables within the creative process needed to be identified. Clarification concerning the term 'creative process' and 'creative thinking process' was established. Prominent theories, which in particular refer to the 'Creative Process', were analysed. These sources too, were used to ascertain which 'elements' refer to the P theory (the creative Person, the creative thinking Process, the creative Press/Persuasion and the creative Product) and in what stage (Creative stages of Wallas) they were located. Similarities were pointed out as well as environmental, psychosocial, behavioural, antithetical, psychoanalytical and humanistic related perspectives. A subsection for unique theories provided an interesting bias. Relevant criteria from chapter three were documented in the Creative Process Assessment Parameter #3 (CPAP #3) in chapter five.

7.2.3 Chapter 4

Issues relating to assessment procedures such as guidelines for as well as the four pillars of assessment was discussed. Other related research such as the seven basic
test evaluation questions, test administrators, validity and reliability as well as the code of fair test and test evaluations were examined. Psychological factors deemed important aspects such as blockers and stimulators. The assessment of the creative process needs specific mention. The scoring procedures as well as a discussion of each of the four stages was investigated. New trends and research implications opened up new avenues that every creativity test should take into consideration.

In the second part of Chapter four, creativity tests were scrutinised for their uses, prerequisites, and their problems as well as what their recent research findings had to offer. A selected group of current creativity tests was examined to determine which evaluate the creative process. Each test's main theme for testing was analysed and grouped accordingly. Once the process-testers were identified, all the relevant research regarding the particular tests are taken into consideration for the Creative Process Assessment Matrix (CPAM) evaluation. Chapter four gave rise to the Creative Assessment Test Questionnaire called CATQ#4. It contains questions that document creative assessment prerequisites. The CATQ#4 main purpose would be to assess certain selected creativity tests.

7.2.4 Chapter 5

The need to index creativity had brought about a criteria problem. This related to creativity tests in terms of what they base their evaluation on. Chapter five reveals relevant 'criteria' as derived from the above theories and definitions grouped according to the four stages of Wallas as well as within the four P categories of creativity (CPAP#1). A brief account of the creative process components were explained (creative person, thinking process, persuasion and product). Fundamentals from the creativity research pioneers such as Guilford and Runco, provided the base for criterial categories. Some identified criteria within the four stages of the creative process (preparation, incubation, illumination and verification) were presented. The Creative Process Assessment Parameters or CPAPs summarised all relevant criteria.

- The definitions' creative process criteria were grouped in CPAP#2
- The theories' creative process criteria were grouped in CPAP#3.
- The assessment prerequisites were grouped in a questionnaire CATQ#4.
Botha 302

This formed the *core data* of the investigation. From CPAP#1-3 the creative process components were highlighted, investigated, scrutinised and recorded to serve on the CPAM model.

7.3 SUMMARY AND FINDINGS OF EMPIRICAL INVESTIGATION

7.3.1 Chapter 6 (Evaluation)

Chapter six is a culmination of the results of chapter 2-5. Now groups of selected 'criteria' were classified (according to the four stages of Wallas) and listed on an Creative Process Assessment Matrix (CPAM). Three distinct creativity tests that measure the creative process or in part were selected for this research paper. They were: Getzels and Jackson's 'Word Association', Wallach and Kogan's 'Instances' and Urban and Jellen's TCT-DP (Test for Creative Thinking-Drawing Production). These selected tests were examined, evaluated and assessed according to the matrix's categorised criteria. The chosen tests were evaluated in terms of their strengths as well as their deficiencies. Gaps were identified, recommendations were made and discussed accordingly. The aim of the empirical investigation was to test two hypotheses. These were:

- A set of criteria exist by which the creative process can be measured, and that;

- Existing tests for measuring the creative process do succeed, if to limited degree, in identifying useful assessment criteria.

Some pertinent questions have been answered as a result of the establishment of CPAM. A brief summary of the results highlighted the significance of the CPAM's value for assessment and in this research paper.

- CPAM strives to understand what the extent of environmental impact and influence (sociological) on creativity is, and attempts to render it measurable.
Botha 303

- CPAM could be used to measure what motivates and supports (persuasion) the creative process.

- CPAM was not designed to measure the radical distribution of creative factors within the environment of the creative individual but strives to set about to measure the social environment's significance on the creative process.

- CPAM pursues issues such as the setting and sensory stimulation (auditory, kinesthetic and gustatory) and its effect on the initial spark of creativity and endeavours to make it measurable.

With relevance to the aforementioned hypotheses the research findings were as follows:

- It is possible to construct a set of criteria by which the creative process can be measured.

- Existing tests for measuring the creative process do succeed only to a limited degree, in identifying useful assessment criteria.

7.4 RECOMMENDATIONS

This research paper opened numerous interesting but unsolved areas. These need to be researched and investigated to promote a wider understanding of creativity. The following is a brief look into the theory and empirical investigation of this research paper and what research recommendations it calls for.

7.4.1 Theory

7.4.1.1 PRETEST-PREPARATION:

Although creativity is an age-old phenomenon, the concept of testing for creativity is relatively new to society. Before any test can be administered, the person being tested should be given the opportunity to equip him/herself with the necessary understanding of what the term means as well as skills he needs to develop or utilise.
during such an operation. It is only fair to assume that an individual needs to know the rules (or freedoms) of what ultimately he/she is being tested for. A pre-test acquaintance of what is to be tested as well as the opportunity to develop these skills is a fair request and one that needs closer examination.

7.4.1.2 THE COMPLETE PICTURE

The World Wide Web hosts multiple sites where creativity tests set out to suggest your creative potential. Many of these tests are based on multiple choice answers and do not endeavour to even come close to actually measuring the full creative episode. It would seem that the use of the term Creativity Quotient (CQ) has already been saturated by tests that simply measure the creative personality traits or some small particle of the creative gestalt. Any test that claims to measure creativity should include assessment of all the listed criteria as set out within the CPAM. Complete assessment of creativity involves the entire creative process. Not testing for crucial issues such as 'creativity relevant skills' in the preparation phase, the tolerance for ambiguity in the incubation phase and the incessant evaluation in the verification phase, to name but a few, will not provide the complete picture.

7.4.1.3 STAGES OF CREATIVITY

Each stage needs to be appropriately addressed in order to significantly activate and initiate the full creative process. CPAM suggests criteria within each stage that either need to be taken into account, or tested for. The assessment of the creative process cannot be contained within the boundaries of one creativity test but needs to be addressed through various assessment procedures. These procedures must endeavour to encourage an understanding of creativity and should include interviews, biographically and historically related, creative thinking tests and behavioural assessment. An assessment package made up of a variety of evaluations, that incorporate and monitor the creative Eco-system, promote an understanding of creativity and can initiate a creative climate, could be the right step closer to effectively assessing the creative process.
7.4.1.4. FREE TIME IN AN ENRICHED ENVIRONMENT

The understanding that paying attention to ideas that pop up during free time can lead to an imaginative breakthrough, seem to get lost in most of the creativity tests. In most cases no free or relaxed time is provided. The illogical, sometimes-random nature of the creative process could pose a problem to many tests. They must be open to and allow as much freedom as possible in order to bring the climacteric illumination into being. This by definition would mean that a testee would need to be surrounded by an enriched environment, full of knowledgeable resources from which he/she could find or be given a problem to investigate. During the preparation phase the testee should, if the environment does not provide the needed resources, be allowed to gain access to reach his/her needed information. Tests should investigate how much research was done, what persuasional influences there were, how much focused attention and how much deferred attention was given to the problem. Finally a complete breakaway should be activated for the idea to surface. Illumination can occur at any time but a test should ultimately allow for a relaxed period crucial for this stage. A detailed account will relay where and when illuminations occurs.

7.4.2 Empirical Investigation

7.4.2.1 A HOLISTIC VIEW

Defining and understanding the concept of creativity has always posed a challenge. Its measurement has eluded our schooling and therefore neglected, as a most integral skill needed for our future survival. Creative assessment is not necessarily an attribute of individuals, but of social systems making judgement calls about trends, individuals and, as can be expected, the creative product itself. It is a combination of complex functions, capacities and tendencies of which the social world can extract and create value from these novel products. This creative judgement is always laden with subjectivity. It is evident that all three tests were designed with this subjectivity in mind. One cannot help but be influenced by the passion of his interest field. It has been clearly evident that both the assessment of the person and product are not the ideal evaluation methods but constitute a need for an additional measuring
instrument that is both unpredictable (unfakable) and reliable. A holistic endeavour to creative assessment could parallel a more objective perspective of the creative process. The author of a creativity test should yield to the criterial objectives of the CPAM in order to produce an assessment that could be justified in the holistic assessment of the creative process.

7.4.2.2 THE RECOGNITION OF A SOCIAL COUNTERPART AND THE CREATIVITY ECO-SYSTEM

This research paper has highlighted the importance of persuasion within the P theory. Its matrix needs to be explored in more detail and the significance of its influences investigated and monitored. It has been quite obvious that so many tests have not recognised its importance and therefore not taken it into consideration. Creativity is so much more than just fluency, flexibility, originality and elaboration. Nor is there one prime factor, such as fluency, that can accurately measure its gravity. It is a much wider and deeper concept than was originally thought. Creativity spirals out from the individual with his particular personality and biographical disposition to his affective needs and well being, his environmental pushes and pulls, influences, tutors, motivation from family & friends, institutions, learnt skills, available resources and more, to his innate creative thinking abilities that fuel the fire of his creative expression. It is relevant to conclude that every test should at least recognise and/or test for the part that the creative Eco-system and its persuasional social counterpart play and how it impacts the creative process within each creativity stage.

Like the subconscious, criteria such as intuition, free flow, the neural breakthrough during illumination, the time related validation of creative significance, the impact of the creative Eco-system on the product as well as many issues related to persuasional assessment, should pose to challenge many future creativity tests developers.
7.5 PROBLEMS EXPERIENCED DURING INVESTIGATION

7.5.1 Ambiguity of available sources

One of the problems experienced during the empirical investigation was the lack of information and gaps in knowledge about the particular tests examined. Ample studies were referred to, as well as clear objectives established however many of the questions posed by the CPAM and CATQ #4 were not answerable. Even though their authors' fixed assumptions gave some indication of intent, many of the questions asked cannot be answered even if the author was present. There are numerous 'fuzzy' components that made responses such as 'possible', 'in part' and 'not known' or '?' necessary. It was not the sole purpose of the CPAM to have all the questions answered but to simply supply criteria to rate creativity tests. Research constructed to investigate these 'fuzzy' areas in accordance with recent neurological and breakthroughs could shed more light on the cognitive side of the creative process.

7.5.2 The importance and weight of each of CPAM's 60 Criterion

Each of CPAM's 60 Criterion need to be prioritised or certain factors given some degree of notability. It is for example clearly evident that both Word Association and Instances specifically focus on the 'fluency' factor of the creative thinking process. This particular factor is part and parcel of the Divergent Production (D.P.) criterion. Because Word Association and Instances do not assess any of the other D.P. factors (such as flexibility, originality and elaboration), it does not carry enough weight to show up positively on the CPAM's evaluation chart. It is therefore imperative that the importance and weight of each of CPAM's 60 Criterion be re-examined, assessed and a criterion priority system taken into consideration.

7.6 ASPECTS WHICH COULD BE INVESTIGATED

7.6.1 Test Must Prepare For Chaos

Creative people are in constant search for change possibilities but with it comes the notion of chaos. Tests need to address this thoroughly by seeking to identify and
allow for it. Even though the CPAM calls for 'determination' within its Personality traits, the test designer needs to realise that it is often determination with a twist. To the innovator rules are made to be broken therefore a test administrator should take heed to any indices from the test-taker that may pertain to this fact. It could be issues beyond what the test has allowed for. This is a still murky area but one that needs more investigation.

7.6.2 Utilising MBTI

The Myers Briggs Type Indicator is probably the most widely used well-person assessment in the world. Its concepts are intuitive and its assessment includes a creativity index, which is used as a guidepost for individuals not working in his/her complementary domain. This test has stood out as one of the most reliable personality and biographical assessment of the creative individual. Its application could be of extreme importance for any creativity test program. Different groups of people are motivated by entirely different circumstances and can function at optimum level when particular needs are met. The MBTI highlights an individual's strengths and weaknesses. The knowledge could mean that the author of a test could create different options within a creativity test where the individual would feel most suited or most comfortable. This is of course a crucial element in creating the ideal creative climate to accommodate the sensitivity of the affective side of the creative personality. Further investigation into the MBTI's resources could pose an considerable advantage for test designers to meets the requirements of the CPAM's criteria.

7.6.3 Relaxed Theta State

Creativity is a fascinating dimension of mental functioning. The relaxed state in which illumination occurs is possible due to the fact the brain waves have slowed down to theta-state. It would be highly efficient if a creativity test could artificially induce such a state for optimum performance. Perhaps a creativity test should not
Botha 309

Allude to/or follow the process of testing in the traditional sense. Behavioural clues could be a leading factor to score for in an artificially set up ‘waiting or sitting room’ where individuals are monitored in their interaction with various items, events, involving people and problems which are presented in an informal setting. Using binaural beats to induce theta brain wave frequency could also add to promoting a mental quality state. This could pose to be a fascinating research field to explore.

7.7 CONCLUSION: CREATIVE RESPONSIBILITY

The CPAM instrument strives to understand what the extent of the environmental impact and influence (sociological) on creativity is, and attempts to render it measurable. CPAM could be used to measure what motivates and supports (persuasion) the creative process. The CPAM was not designed to measure the radical distribution of creative factors within the environment of the creative individual but strives to set about to measure the socio-environmental significance on the creative process. Finally, the CPAM pursues issues such as the setting and sensory stimulation (auditory, kinaesthetic and gustatory) and its effect on the initial spark of creativity and endeavours to make it measurable.

Creativity exists in a continuum. The predisposition of creative metacognition will pose to be of extreme benefit to all of humankind. An increased awareness of creative thinking abilities will enrich the aesthetics of a community and heighten the awareness of creativity individualism. Trends, fashions, and style dictate to the masses a new, unique creative outlet. This creative outlet often gives expression to that which they cannot. It may be true to say that the majority has not yet developed their ability to effectively utilize inner creative potential. This potential needs to be understood, accepted and developed to bring a higher margin of creative actualisation into being. Once creativity has partially realised, it could give way to individual uniqueness in a world rich in variety. Novelty will be a daily occurrence, which could possibly put mass production in jeopardy. But, how can a phenomenon like creativity be understood and advanced in a world that seems trapped in old habits and rigid traditions? It is the researcher's aim to add value in furthering this global understanding. The CPAM's colour-coded matrix clarifies the skeletal
structure of the diverse attributes of the creative process. This could undoubtedly be key to a holistic understanding of our innate creative responsibility.

The CPAM's value lies in its application as a research tool to facilitate an understanding of the various perspectives and components of the creative process. It strives to understand what the extent of the environmental impact and influence (sociological) on creativity is, and attempts to render it measurable. CPAM could be used to measure what motivates and supports (persuasion) the creative process. The CPAM was not designed to measure the radical distribution of creative factors within the environment of the creative individual but strives to set about to measure the socio-environmental significance on the creative process. Finally, the CPAM pursues issues such as the setting and sensory stimulation (auditory, kinaesthetic and gustatory) and its effect on the initial spark of creativity and endeavours to make it measurable.

We are all individually unique but of equal importance are our responses to our outer world from which we strive to find meaning. One does not and cannot create within a vacuum. We are innately embedded in a universe of creativity. Creators serve as a vehicle through which information is transferred and elaborated upon. The creativity Eco-system transmits its own resonance bringing about a new state, which is more than the sum of its parts (creators). When one creator verifies their symphony, a new state is awakened in all and all is united in creative celebration. By being sensitised to tune into larger creative pulses, we are ultimately able to increase our individual creative expression. This attempt, along with a quest to explore a greater understanding of creativity, will inevitably lead to a more perceptive society that will take pride in accepting its creative responsibility.
BIBLIOGRAPHY


Botha 314


