Assessing the creative abilities of primary school children

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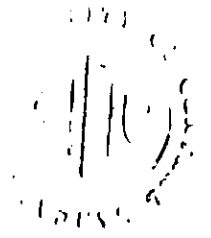

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Abstract

The study set out to establish viable methods of assessing the creativity of primary school children. Teachers were asked to identify children whom they thought were creative. Two hundred and seventy nine children were assessed subsequently with the Test for Creative Thinking - Drawing Production - TCT-DP (Urban & Jellen 1993) and the results were compared with the teachers' assessments. Verbal protocols were taken with a subsample to establish children's strategies whilst working on the TCT-DP. The story-telling technique of creativity assessment was also explored with a further subsample. The results indicated that although teachers did better than chance in identifying creative children, the TCT-DP was much more accurately able to identify creative children. There was no significant correlation between IQ and TCT-DP scores. The verbal protocols suggested subtle differences of approach to the TCT-DP in highly creative children. The story-telling assessment proved labour intensive and, although no real conclusions could be drawn, it showed interesting potential. General aspects of the assessment of creativity in primary school children are discussed.

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Chapter 1.

Introduction: Origins of the study.

Upon this age, that never speaks its mind,
This furtive age, this age endowed with power
To wake the moon with footsteps, fit an oar
Into the rowlocks of the wind, and find
What swims before his prow, what swirls behind -
Upon this gifted age, in its dark hour,
Rains from the sky a meteoric shower
Of facts . . . they lie unquestioned, uncombined.
Wisdom enough to leech us of our ill
Is daily spun; but there exists no loom
To weave it into fabric; undefiled
Proceeds pure Science, and has her say; but still
Upon this world from the collective womb
Is spewed all day the red triumphant child.

Edna St. Vincent Millay

Sonnet

from Huntsman, What Quarry?

Edna St. Vincent Millay's sonnet captures precisely the unease which teachers of a certain training and persuasion may have been feeling since the advent of the National Curriculum in schools. Most teachers have, but rarely, come across the child who was different, and whose difference shone like a bright light. These children had a rare gift not obviously linked to especially high IQ or anything immediately tangible. It could be an ease with words and ideas which made their writing unique, special, which moved the spirit, was a joy to read. Or the facility and inspiration which led one child to glimpse and understand something of the internal working of the atom, remarkable if only because of his young age. Creativity was at best a difficult concept

which in some way was focused by Milgram's (1990) major review of research on I.Q. and creativity which concluded that IQ cannot of itself predict real-life creativity which appears to demand something more ? The creative children described above, could conceivably weave wisdom into fabric. They questioned and combined ideas in a rare way when given room and time to develop the skills essential to sift and re-assemble facts, not just to absorb them untouched. Freeman (1994) argued that style of learning and working which includes the time available, is also important to creative outcome, and that space for creative thought can be overlooked. The skill and integrity of the sympathetic teacher was vital, if only not to waste children's time with questionable or mindless exercises. so that learning had an intrinsic purpose, and facts had a relevance.

'Creative' and 'creativity' were words commonly used in schools which valued the concept. The ethos of such schools was to recognise and value those whose ideas were original and spontaneous. Fryer & Collings (1991) noted that the distinguishing feature of teachers highly oriented to creativity is a preference for pupil-centred learning, while Cornelius & Casler (1991) stated that teachers need to clearly show children that they value and respect creativity for it to prosper and that teachers are *"the silent engineers of every classroom"* (p. 103.) ...*"a curious teacher who models, and offers opportunities for children is the creator of a powerful creative environment and creative children."* (p. 105.)

The following is a collection of statements from such teaching colleagues in a highly successful primary school which valued the creativity concept and pupil centred learning in the 1980's pre- National Curriculum:

- *"some children stand out as being creative from the start, in others one becomes aware over a period of time."*
- *"I find you can teach them anything with the greatest of ease, but to understand them or prepare to provide an environment for them that will lead to opportunity where their particular creativity can bloom and grow, this is very difficult."*

- *"through their ideas new concepts can be explored."*
- *"tasks need to be sufficiently challenging and stimulating and one needs to be prepared to deviate from original plans to accomodate their ideas and schemes."*
- *"originality of thought ...children prepared to think for themselves instead of simply accepting situations."*
- *" a constantly questioning attitude is not an easy one to live with in the classroom"*

Such statements reveal a level of motivation in teachers which is necessary to meet modern educational demands. For example, Torrance and Safter (1986) proposed that the kinds of thinking skills children need today and in the future are those which will help them adapt to a world of accelerated change and that they need to learn how to think rather than to learn the products of other people's thinking. Flexibility, creativity and enthusiasm for learning may be more crucial to success than the ability to remember data. These attributes are well served by the use of computers as data processors which leave scope and time perhaps for more higher order thinking. With the advancements in technology assisting, educating children held exciting potential.

In response to the needs of today came the National Curriculum in schools, which ravaged teachers' ideas and working practices and subjected them to constant change, each time prescribing precisely what was to be taught and when and in what way. The key working document issued to all teachers in the primary sector - DFE Key Stages 1and 2 of the National Curriculum (England) Jan. 1995. makes no mention of "creativity" but has one reference to 'creative' as in *Art Key Stages 1 and 2 Programmes of study pages, 98 and 100.*

" 2. In order to develop visual perception, pupils should be taught the creative, imaginative and practical skills needed to:

a. express ideas and feelings;

b. record observations;

c. design and make images and artefacts."

Not exactly encouraging to those teachers who value and wish to promote creative thinking abilities in children, across the curriculum. Increasingly some teachers were

also finding that a back to basics, drill-type approach to delivering the curriculum was unsatisfactory and irksome for bright children. The N.C. thus prescribed, demanding on time to the exclusion of all else, no longer quirky, can discourage the individual, talented, intuitive, creative teacher. Amongst teachers who have strong direction from head teachers and school governors, with pressures of internal management, limitations of scarce resources, parental demands, constraints of 'back to basics' knowledge -based, SATs - led curriculum, and performance-league tables creativity has become squeezed out as concept in the forefront of important issues. The structure children encounter upon entering school is dictated by the N.C., that is, the N.C. dictates by law what is taught in our schools. School inspections may govern the way the N.C. is taught in our schools. From the lack of direct reference in N.C. working documents to creativity it appears that creativity is respected less than intelligence and academic ability. Linked to this notion is the disquieting evidence offered by Gowan & Olson (1979) stating that formal education tends to increase creativity to a certain point, after which it exerts a negative effect with an over-commitment to traditional ways of learning and teaching, i.e. by emphasizing a cognitive orientation and high performance on standardised intelligence tests.

Torrance (1981) found that a child's creative ability thrives at around four and a half years of age but that a drastic decrease occurs once the child enters kindergarten. This decrease is followed by a slow gain during the next three years. A drop occurs again towards the beginning of the fourth grade. In view if this, Torrance suggested that teachers must cultivate creativity, especially in the early years. Are the creative abilities in children which teachers have struggled to nurture to be lost somewhere later on ? The nature of cognitive development is such that some skills diminish as others are acquired - the ability to use visual imagery, for example - but it is neither necessary nor of value for creativity to be lost.

Further lack of support for formal education, comes from Gardner's (1991) argument, that schools provide a poor education for genuine understanding and creative endeavour in children, and West's (1991) claim that for the gifted, conventional school education is a positive handicap to creativity. The major problem according to

to West was in the manner of presentation of the material to be learned, it being too ordered and non-visual, so that gifted visual thinkers were disadvantaged. It could be argued that the development of creativity in children and subsequently adults is in some way dependent on the value educators put on creativity.

According to Bruner & Olson (1978) *"Schooling generally reflects a 'naive psychology' based on the general assumption that the effects of experience can be considered as knowledge, that knowlege is conscious, and that knowledge can be translated into words ....words can be translated into knowledge; hence, one can learn, that is, acquire knowledge, from being told."* This interpretation devalued the task of fostering abilities in students, excepting those abilities that led to *"the accumulation of decontextualized knowledge."* (p. 1.) They continued by suggesting that the emphasis upon knowledge conveyed by text created its own distinctive set of skills which may be nothing less than verbal intelligence.

An interesting question to consider is whether children's creative abilities are hampered by an environment that does not value or give creativity status and to what degree? It would require a study beyond the scope of this research to investigate such an idea, but it is non the less intriguing in the onset of the N.C. in state schools that perhaps the private sector, not similarly hampered by the N.C., may be able to provide comparisons.

Despite pressures on teachers to focus on classroom performance rather than creativity and despite the elusive quality of creativity and the difficulty of finding a universally accepted definition, creative abilities in children are recognised and valued in school by teachers. Academics and theoreticians, notably Treffinger (1981, 1986), discuss the difficulty of defining creativity and this will be examined at length later. However, creativity, in schools that value it, has somehow managed to span the 'definition chasm' and may suffer the scepticism of academics for doing so, but teachers are practical people who are at the application end of educational theories and welcome the use of objective measures to evidence their perceptions born of years of experience of educating and knowing their children. Teachers can

provide valuable information about the creative abilities of children, information which must be observed before one validates or discards any test results. Many teachers subscribe to the statement from 'Education Counts'* (1992) that *"we must learn to measure what we value rather than valuing what we can easily measure".* (p. 11.)

The search for the elusively perfect creativity test, dismissed by Treffinger (1986), is never really an issue, but a real world measure of creative performance is sought, presenting children with something similar to their everyday activities, as favoured by Hennessy and Amabile (1988b). No test material for creativity specifically is available in schools to primary teachers, so objective, psychometric evaluation is difficult. Standardised tests tend to ignore creativity, as noted by Ford, Harris & Winborne (1990) A number of teachers have come across parts of Torrance tests of divergent thinking, such as the unusual uses test or the figural test, which asks the subject to produce drawings. However, scoring such tests is difficult due to an elaborate scoring guide, even if it is possible to get hold of the tests and manual for use in school. Another factor to consider is that the limited concept of creativity in measuring parts of divergent thinking such as fluency or flexibility gives only quantitative information. A need for a reliable and manageable objective assessment of children's creative abilities in school is recognised. An assessment programme in terms of a multi-dimensional creative process relying on personality variables, as well as environmental conditions such as material resources and social obstacles, real world factors, is required. The nature of their work with children favours teachers taking a holistic and culture fair approach. Time constraints require expediency .

This research study (the aims of which are outlined in Chapter 7) is motivated by the need to address creativity assessment in school in the light of its conspicuous absence in the National Curriculum. However, before assessment can be considered it is necessary to examine definitions and theories of creativity in the next chapter.

* see 'National Indicators Panel' in references.

Chapter 2.

What is Creativity?.

Looking at definitions and theories.

2.1 Definitions.

The term 'creativity' has become associated with various aspects of creative behaviour and mental processes. This chapter explores a range of definitions to bring into focus the diversity of approaches, views and controversy that surrounds the 'creativity' phenomenon.

One of the major reasons for the complications in the field of creativity research is the diversity of theoretical perspectives upon which the research is based (Treffinger, Isaksen & Firestein, 1983). Adding to the complexity, the theoretical approaches themselves are linked and contribute to the semantic confusion. The fact that there is no widely-held and uniformly applied definition of creativity, arguably makes creativity a difficult field to study (Isaksen,1987)

Morgan (1953) found 25 definitions of creativity, all having one common element - the development of something unique, while Taylor (1959) found in excess of 100 definitions of creativity in literature. Repucci's (1960) investigation of the word 'creativity' revealed the existence of 50 to 60 definitions and indications that the list was expanding daily. Having examined the definitions, Repucci classified them into six major classes. The main theme of each definition determined the choice of class. His classes of definitions were as follows:-

1. *"Gestalt" or "Perception" type definitions [e.g. Wertheimer (1945)]*
2. *"End product" or "Innovation" oriented definitions [e.g. Stein (1953)]*
3. *"Aesthetic" or "Expressive" [e.g. Lee (1957]*
4. *"Psychoanalytic"or "Dynamic" [e.g. Kris (1952), Kubie (1958)]*
5. *"Solution Thinking" [e.g. Wallas (1926), Guilford (1959a)]*

6. "Varia" (because there was no easy way of characterizing them.) [e.g. Rand (1952)]

Rhodes (1961) set out to find a single definition of the word by collecting more than 56 different definitions and found that they were not "*mutually exclusive*" (p. 307.) but rather formed four strands. These strands being *person* - covering information about personality, intellect and behaviour, *process* applicable to motivation, perception, learning, thinking and communicating, *product*, when an idea becomes embodied into a tangible form, and *press* which refers to the relationship between human beings and their environment.

Getzels (1975) argued that there is no universal agreement on the definition of creativity. He saw it as subjective experiences that are process and product oriented.

Welsch (1980) reviewed 22 definitions of creativity looking for common elements and searching for an universal definition - " *the definitions of creativity are numerous, with variations not only in concept, but in meaning of subconcepts and of terminology referring to similar ideas. There appears to be, however, a significant level of agreement of key attributes among those persons most closely associated with work in this field. . . . on the basis of the survey of literature, the following definition is proposed: Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator.*" (p. 97.)

For Deri (1982) creativity was a discovery of a new way to do things and an a new matching between the external and internal worlds.

Csikszentmihalyi (1988) asked, 'where is creativity?' a question which, he said should precede definition. Creativity, he believed, was a phenomenon which resulted from interaction between three main systems - *person* (the individual), *field* (consisting of people who control or influence a domain by evaluating and selecting new ideas),

and *domain* (a culturally defined symbol system which conserved and transmitted creative products to other individuals and future generations).

Simonton (1990) stated that the diverse approaches to defining creativity could be grouped into five categories, adding another 'P' to that of Rhodes (1961)- process, product, person, press and *persuasion* (the ability to persuade others of the value of one's work).

More recent definitions have included those of Mumford & Gustafson (1988) who stated the emphasis in definitional issues is on creative behavior, and Lubart (1994) who in defining creativity, noted the differences between creative performance, the creative person and creative potential.

A list of 35 definitions of creativity were chosen and have been included as *Appendix 1.* Together they give an indication of the complexity and diversity of defining creativity and give an historical overview of the development of thinking on creativity by definition.

To address the question of, 'what is creativity ? ' the definitions each add useful information to formulating some sort of higher order position on the same question. Whether taking an explicit cognitve approach to definition, e.g. Guilford's (1959b) or a more open-ended 'creative' approach, e.g. Lefrancois (1982) *(see Appendix 1)* it is apparent that complex other variables of genetics, personality, motivation, and environment are implicit and hint of no easy solution.

2.2. Theories.

The previous diversity of definitions is similarly reflected in theories of creativity, as there are scarcely fewer theories than definitions. In this chapter, after consideration of the

creativity/intelligence debate there is a historical overview of theoretical thinking into creativity. A partly - chronological perspective allows categories to evolve as theoretical approaches developed. There is no shortage of categories for the classification of theories of Creativity. In any recent general literature on creativity, the subject index may reveal as many as 15 different categories of theories listed, reflecting the same broad diversity of perspectives as in the preceeding look at definitions, and reflecting similar semantic confusion. The view of Treffinger, (1986) that there was still no single unifying theory of creativity which was accepted by all researchers nor was it likely there would ever be such a general theory is possibly correct.

Gowan (1972) analysed theories of creativity and developed five general categories for classifying many theories namely, (1) cognitive, rational, semantic (2) personality and environmental (3) mental health (4) Freudian and neo-Freudian and (5) psychedelic.

Lubart (1994) in his overview of creativity categorized and described the following alternate approaches - the *Mystical* approach, (the earliest accounts of creativity relied on divine intervention) the *Psychodynamic* approach, (suggesting that creativity arises from the tension between conscious reality and unconscious drives) the *Cognitive* approach, (focusing on thinking abilities and knowledge as the basis of creative work). the *Social-Psychological* approach, (focusing on personality and motivational variables) and the *Confluence* approach, (based on the hypothesis that multiple components must converge for creativity to occur).

Urban (1992) in his paper on recent trends in creativity research and theory described a number of 'new' theoretical approaches to creativity. The psycho-economic theories and the investment approach, proposed, amongst others by Simon, (1988); Sternberg & Lubart, (1991); the catastrophe theory illustrated, amongst others, by Woodcock & Davis, (1978); the chaos theory, described by Briggs (1990); the "chance-configuration - theory" by Simonton (1988a,b) and Urban's (1992) "components model of creativity."

However, before theories are addressed, the creativity and intelligence debate needs to be explored. Although some creativity researchers asserted that creativity was ruled out of the domain of intelligence, a major volume of inquiry has been focused on the relationship between creativity and intelligence. Investigators like MacKinnon, (1961) Getzels and Jackson, (1962) Wallach and Kogan, (1965b) studied the relationship between these two concepts and their measures. Isaksen (1987) stated that it appeared that there was a basis for differentiating creativity from intelligence, but the exact relationship was complex. Runco & Albert (1986) argued that some intelligence was necessary for creative performance, but that only in the moderate and high levels of intelligence was creativity independent. Suggestions have been made that an IQ of 120 represented the minimum IQ threshold for creativity. (Barron & Harrington, 1981; Hayes,1989; Simonton,1976). Runco & Albert (1986) also proposed that intelligence may be necessary in order for an individual to recognise and select information that was worth remembering as well as necessary for actual memorization and information processing.

Lubart (1994) found correlations between intelligence and creativity to be variable across studies. As explanation of this he proposed that beyond an above average level general intelligence is essentially redundant. (Hayes,1989). Also, that above average intelligence enabled entry into fields that offered opportunities and rewards for creativity, but actual relevance of general intelligence to creative work was minimal once the person was in the field, (Hayes, 1989). Further, Lubart stated that other components such as personality and motivation contibuted to creativity in addition to general intelligence. The issue of measurement of intelligence was an additional concern. If highly relevant abilities were emphasized on a test, results could lead to a high correlation between test and creative performance. If less relevant abilities were emphasized this could lead to low correlations. Lubart suggested further research was needed to eliminate these issues. Feldhusen and Goh (1995) suggested that creativity was often defined as a parallel construct to intelligence, *"but it differs from intelligence in that it is not restricted to cognitive or intellectual functioning or behaviour"*. (p..231.)

Similarly the question of implicit or explicit approaches needed clarifying. Sternberg (1985a) asserted that generally theories of intelligence could be described as explicit or implicit.[1] . He explained that implicit theories *"exist in the minds"* of individuals and *"need to be discovered rather than invented because they already exist, in some form, in people's heads"*. (p 608.)

Runco (1990) stated that implicit theories *"are subjective views of creativity that govern our expectations and guide certain behaviors"* (p. 234). He argued that these "subjective views" can be used to evaluate the 'social validity' of psychometric tests. Runco (1984) evaluated divergent thinking tests with teachers' implicit theories of creativity. He suggested that judgments given by significant individuals can have more real world contextual relevance than purely objective examinations. Runco & Bahleda, (1986) stated that implicit theories may help make definitions of creativity more realistic and practical. Whilst Sternberg (1985a) suggested that the difficulties of implicit theories not being entirely operational and their tendency to describe rather than explain, made them inherently weak, Runco & Bahleda (1986) conceded that implicit theories were a complement to explicit theories rather than a replacement.

A central controversial issue in creativity research and theory is whether creativity is a general capacity that influences an individual's performance across many domains or a widely diverse collection of skills and knowledge, each contributing in only a single domain. (Bamberger, 1990). The argument of domain specificity [2] needs to be apprised. Those researchers who tended to focus on the domain-specific approach (Csikszentmihalyi, 1988, 1990; Gruber, 1981; Gruber and Davis, 1988), are contrasted with those who view creativity as a more general trait, a capacity which influences the individual's performance across many domains, (Amabile, 1983). Lubart (1994) noted the partial domain specificity of creativity. The search for the "Theory of Everything" was no less apparent in creativity research as it was in science. Baer (1991) considered that creativity was also struggling with the generality-specificity issue, while

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1. *Explicit theories are typically psychometric, usually collaborative and based on some psychological or scientific construct (e.g. Spearman's "g" or general intelligence). Implicit theories are conceptual rather than empirical, derived from individual's belief systems.*
2. *A tendency to focus on higher order creativity, that kind which leads to eminence in a field.*

Winner (1982) discussed creativity in the arts, and argued that *"any single theory designed to explain creativity as if it were one process, used alike by artists and scientists, was likely to be incomplete."* (p. 49.) Consideration must also be given to the psychometric evidence that single-factor theories cannot adequately represent human cognition. (Gardner, 1983; Sternberg, 1988).

2.2.1. Psychodynamic theories.

Early research into creativity, such as Freud's (1908) psychodynamic approach compared the imaginative writer to the daydreamer and poetical creation with the day dream. A strong experience in the present awakened in the creative writer a memory of an earlier experience from which there now proceeded a wish which found its fulfilment in the creative work. On the basis that creativity arose from the tension between conscious reality and unconscious drives, Freud (1910/64) proposed that writers and artists produced creative work as a way to express their unconscious wishes in a manner that was publicly acceptable.

Wallas (1926) in his analysis of stages in creative thinking identified four steps [3] in the creative process : preparation, incubation, illumination, and verification. His noteworthy reflection that, *"by the effort of observation and memorising a body of remembered facts and words which gives him [the creative man] a wider range in the final moment of association"*. (pp.92 -93.) The more 'units ' in the process of thought, the better chance of significant creative association. By the'art' of thought Wallas meant the development of greater skill and effectiveness through self-training of one's 'natural' thought process.

Similarly to Wallas, (1926); Hadamard's (1949) discussion of the phenomenon of insight, identified 4 distinct stages which were seen to occur in every documented case of scientific insight, consisting of preparation, incubation, illumination and

3. *It is interesting to note that Ford Harris (1992) describe it as Wallas seven step process adding (1) encounter to (2) preparation and (3) concentration to (4) incubation (5) illumination and (6) verification and finally (7) persuasion .*

verification. Most of the action in this theory occurs at the unconscious level.

The basic element in Freudian and neo-Freudian theories was the 'flexible ego' that permitted regression which facilitated fantasy and creative behaviour. Kris (1952) developed the psychoanalytic approach with concepts of adaptive regression and elaboration for creativity. The primary process of adaptive regression referred to unmodulated thoughts in consciousness which may stimulate creative thinking. Elaboration, a secondary process referred to the reworking and transformation of primary process material through reality-oriented, ego-controlled thinking.

Kubie (1958) continued the neo-psychoanalytic direction but explicitly rejected the unconscious in the creative process and claimed that unconscious conflicts had a negative effect on creativity because they lead to fixated, repetitive thoughts. Kubie stressed that the preconscious was the true source of creativity because thoughts were vague and loose but interpretable, and that the preconscious was able to scan experiences and memories, to find relationships at a speed impossible to achieve in the conscious system..

Supporting the psycho-dynamic approach, Mumford & Gustafson (1988) noted that access to primitive modes of thought has continued to play an important role in the creative process in research, (Arieti,1976; Barron,1972, Schaefer,1972 ; Suler,1980). This more recent research held that creativity represented the adaptive use of the unconscious by allowing unconscious ideas and associations to flow into consciousness, therefore providing a basis for integration and redirection of thought.

Martindale (1975) took his first clues for the physiological basis of creative thought from the psychoanalytic explanation of creativity which poses two kinds of thought processes, *primary-process thinking* concerning dreams, reveries, free associations and fantasies and *secondary-process thinking* which is logical analytic and reality oriented. He stated that some researchers believe that primary and secondary process thought belong to different hemispheres of the brain and that the right hemisphere is responsible for primary creative thought while the left controls

secondary logical thinking. However, Martindale felt that this explanation was not complete. His approach to finding the physiological basis for the progression from primary to secondary thought rests on the level of cortical arousal in the brain. He asserted that cortical arousal increases as a person goes from sleep to brooding states of reverie and day-dreams to alert concentration and finally to emotional agitation and panic. Martindale proposed that the degree of cortical arousal can be measured with electroencephalograms (EEGs) of brain-wave frequency. Alpha rhythms (8-13 cycles per second) go along with mental moods of complete relaxation, but are blocked by arousal and reaction to stimuli, and replaced by fast low amplitude wave patterns (30-60 cycles per second). Martindale suggested that primary process thought may occur both with high and very low levels of cortical arousal and secondary thought transpired with medium levels of cortical arousal. Martindale (1975) contended that most people produce alpha waves when they are relaxing and reduce alpha frequency when they are working on a problem but creative people produce less alpha when they are relaxing and increase their alpha frequency when they work on an imaginative problem.

Martindale (1975) studied alpha waves and creativity with groups of students. He asked the students to make up stories while he studied the effect of speech on EEG patterns. He found that uncreative students produced the same amount of alpha waves whether they were striving for creativity or not, but imaginative students immediately produced significantly more alpha when told to be original. Martindale described these results as *"stunning"* for *"it seemed as though the creative students were turning on an alpha switch in their brains."* (p. 50.) Martindale (1975) stated that creativity *"is not just a matter of having the proper quirks and curiosities but of having the right brain waves.* (p. 50.)

Osborn (1953) developed the technique of brainstorming to encourage people to solve problems creatively by seeking many possible solutions in a constructive and supportive atmosphere.

To Helmholtz (1891) and subsequently Whiting, (1958) creativity consisted of three

stages: saturation, incubation, and illumination. Saturation involved gathering data, facts and sensations to serve as the potential building blocks for new ideas. Incubation, occurring without conscious effort, involved arranging and rearranging ideas and materials to achieve new combinations. Illumination, marked the point of realizing a solution.

2.2.2. Gestalt theories.

Wertheimer (1945) proposed a Gestalt or 'Perception' approach. He suggested that traditionally there have been two approaches to the problem of creative or productive thinking. The first was to approach the main issues with traditional logic. Thinking was concerned with truth - whether deductive or inductive - with the emphasis put on rationality in each individual step in the thought process. The second approach was the classical formulation of associationism. Thinking held to be a chain of ideas - stimuli and responses or behaviour elements. The production of new ideas from the point of view of associationism, the ability to think productively involved the working of associative bonds which also depended on the number of associations an individual had acquired. Wertheimer pointed out that when describing the process of thinking in terms of formal traditional logic, the creative essential seemed to evaporate. Similarly with the association theory, if a problem is solved by sheer chance from mechanical repetition of drilled information, it would be questionable if an adequate picture of sensible processes could be built up. Wertheimer proposed a third formulation sharply opposed to both traditional logical and classical associationism. He argued that the thinking process proceeded by the structuring of Gestalten. Creative thinking was primarily a reconstruction of Gestalts or patterns that were structurally deficient. (Creative thinking usually began with a problematic situation which was incomplete, the thinker grasping the problem as a whole, then the dynamics of the problem itself, the forces and tensions within it, setting up similar lines of stress within his mind. By following this inner stress he arrived at the solution which restored the harmony of the whole.)

2.2.3. Cognitive theories.

Bruner (1957) stated that any individual in contact with the external world was confronted with masses of data, new data were seen as part of a related sequence of events, hence new datum was rendered meaningful by being connected with past data it resembled. This process of connection was called 'coding' and a set of related data, called a 'category'. According to Bruner, some people retained the capacity to make novel and unusual codings which manifested themselves as creative thinking. The more apparently unrelated data were linked, the more likely unusual data combinations were to occur. The kind of person who coded in this broad way was referred to as a wide categoriser as opposed to narrow categorisers who made fine discriminations between bits of input and who needed high levels of similarity before they could see relationships. Willingness to treat data whose connections were not immediately apparent would be favourable for creativity. Creative thinking looked to be related to the width of categorising. Creative thinkers were considered markedly broader in the width of categories enabling them to see data equivalences which were not apparent to more convergent individuals. This was empirically supported by Wallach & Kogan (1965).

Bartlett (1958) regarded thinking as consisting of high-level skills and demonstrated that these are similar to complex psychomotor skills. Similarly to Guilford, he distinguished thinking in 'closed systems' from 'adventurous thinking'.

Schachtel (1959) placed creative behaviour within a perceptual framework with his perceptual theory. He defined creativity as the ability to remain perceptually open to the world. Creativity was perceived as an expression of inner drives, the existential struggle either to remain capable of allocentric (object centred) perception or to seek security in the shared autocentricity (subject centredness) of familiar perspective. Creativity was signified by success of the first tendency over the second. The perceptual concept of 'openness to the world' is different from the psychoanalytic concept of regression to primary process thought, even in the service of the ego.

The critical difference is that where the psychoanalytic concept realises creativity as due to 'a drive discharge function'(tension reducing) the perceptual concept realises creativity as due to an openness in the encounter with the world, (tension seeking). According to Schachtel creativity manifested itself in mental flexibility, in intensity of interest and variety of approach, lack of creativity was the state of being closed to experience.

Mednick's (1962) general, domain-transcending theory defined creativity as involving the formation of associations between stimuli and responses which were characterised by the fact that elements linked together were not normally associated. He suggested that divergent people tended to link stimuli with highly unlikely responses and that in most people such S-R linkages would seldom occur except by chance, but in highly creative individuals they were fairly commonplace. Mednick (1962) defined creative thinking in associative terms and indicated three ways in which creative solutions might be achieved - serendipity, similarity and mediation. *Serendipity* referred to any chance contiguity of associative elements in the environment that led to a creative insight. A second route by which associations may have occurred was *Similarity* of associative elements or of the stimuli that evoked these elements, and *Mediation* of common elements typically through the use of symbols was the third process that lead to creative associations.
Mednick & Mednick (1967) developed the RAT. Remote Associations Test, as a means of assessing individual differences in creativity.

Koestler's (1964) main premise was that all creative processes shared a common pattern bisociation which was the connecting of previously unrelating levels of experience. All creative activity presupposed a structure of ordered habits of thought and behaviour, which gave coherence and stability but left room for innovation. According to Koestler, any pattern of thought or behaviour *(matrix)* was governed by its set of rules *(or code)* either inate or learned. At the same time it possessed a certain flexibility so that it could react selectively to a range of circumstances. When two independent matrices of perception or reasoning interacted with each other the result was "*either a collision ending in laughter, or their fusion in a new intellectual*

synthesis or their confrontation in an aesthetic experience." Koestler maintained that any pattern of ordered thought or action, any matrix, was governed by a code of rules, yet possessed a measure of flexibility in adapting to environmental conditions. This concept of matrices and codes of organised patterns of activity which showed flexibility and stability were applicable not only to the psychological structure but also to perceptual, motor, and cognitive activity and other activity manifest in organic life.

In Sternberg's (1988) three facet model of creativity, three basic aspects were interacting in creative activity. The first aspect [drawn on his triarchic theory of intelligence, (Sternberg, 1985b)] was purely cognitive, and included intellectual traits with relation to creativity, e.g. insightful thinking. The second aspect implied functions of intellectual styles, a kind of mental self government. The third aspect referred to personality traits which probably more than others contributed to creative achievements e.g. high tolerance of ambiguity and readiness to overcome obstacles. Sternberg stated that people were creative by virtue of a combination of intellectual, stylistic, and personality attributes. According to Sternberg, (1988) creativity was *"largely an attributional phenomenon."* (p. 145.)
"Creativity is a multifaceted phenomenon of which three critical facets would seem to be aspects of intelligence, style and personality." (p. 146-147.)

Finke and colleagues (Finke, 1990; Finke et al., 1992) continued the cognitive approach with fresh ideas and conceived a new term 'geneplore' to label their model of creativity, generate and explore being processes critical to their theory. They claimed two distinct phases in creative activity, a generative phase in which mental representations called preinventive structures are constructed and an exploratory phase in which the preinventive structures are interpreted for possible meanings and uses and potential creative ideas. The phases of creative invention may involve a number of mental processes i.e. retrieval, association, synthesis, transformation analogical transfer, and categorical reduction. Goal or product constraints may apply to either or both main phases and favour generation or exploration and interpretation. Support for the model has been derived from experiments on creative invention (Finke 1990) that use laboratory analogues.

2.2.4. Psychometric theories.

Guilford's (1950, 1977). studies of the Structure of Intellect led to one of the most popular cognitive theories of creativity - Guilford's theory of divergent production. According to Guilford (1956, 1977) creativity especially involved the divergent thinking facet of mental abilities. Divergent thinking referred to the ability to generate many different ideas in response to a problem. Divergent thinking was part of Guilford's (1967) broader structure of intellect model. Human cognition was organised along three dimensions, - thought processes or operations that could be performed, contents to which the operations could be applied and products that might have resulted from performing operations on different content categories. These combined to produce 120 different mental abilities, or factors. Under divergent thinking Guilford listed 11 different factors. Guilford and his colleagues developed several tests to measure divergent thinking. The tests were a convenient way of comparing people on a standard creativity test. The Guilford- style tests are often referred to as the psychometric approach to creativity.

Creativity as divergent production has been the subject of much research in assessment and theorizing, *(e.g. Crockenberg, 1972; Hattie, 1980; Heausler & Thompson,1988; Kagan, 1988; Kaplan, 1990; Kogan,1983; Mayer, 1983; McCrae, Arenberg,& Costa, 1987; Rose & Lin,1984; Runco 1986; Torrance,1972b, 1984, 1990,; Torrance & Presbury,1984; Treffinger, 1986; Wallace, Goldstein, & Nathan,1990; Wallach & Kogan, 1965b; Runco 1991; Baer, 1991; Milgram, 1990).*

Brown's (1989) work,, noted Guilford's (1950) definition as a set of traits that were characteristic of creative persons and Guilford's (1967) original conceptualization of divergent thinking has been retained in current creativity theorizing in four general categories fluency, flexibility,originality and elaboration. According to Isaksen & Treffinger (1985), for example, neither divergent (creative) nor convergent (critical) thinking in itself was sufficient for promoting effective thinking and problem solving; both sets of skills must apparently be used in harmony.

Torrance (1974) building on Guilford's work, developed the Torrance Tests of Creative Thinking (TTCT). These tests consist of several relatively simple verbal and figural tasks that involved divergent thinking plus other problem-solving skills. The tests can be scored for fluency, flexibility, originality and elaboration and an overall creativity index. (Torrance 1990). Torrance's (1966, 1972b, 1984, 1988, 1990) theory derived from the success of his tests of creativity. Continuing the cognitive approach, Torrance (1971) theorized that creativity was a combination of ability, skills and motivation. Relative to ability, Torrance proposed that we are born with abilities that tend to be specific to a domain. Since he viewed creativity as a skill, Torrance argued it was teachable. He asserted motivation is essential for creative behaviour. Torrance (1971) was sensitive to the fact that the life experiences of culturally diverse groups prepare them to be creative.

2.2.5. Miscellaneous theories, models and approaches.

Sinnott, (1959) a biologist, believed creativeness to be a characteristic of all living matter and that the ultimate source of creativity was found in the inherent creativeness of life. He described the brain as the biological basis of imagination, *"for making new gestalts or recombinations of sensory material"*. (p..29.) He writes of the higher levels of creativity in man, and of the *"novelties that could not have appeared unless there had been someone who could imagine a situation never yet experienced, who could picture in his mind something he had not seen."* (p .22.) Echoed in Nagy's (1988) definition.

I.A. Taylor (1959) sought to reconcile some of the apparent differences in opinion concerning creativity by suggesting that we think of creativity in terms of levels. He suggested five levels: 1. Expressive creativity, as in the spontaneous drawings of children. 2. Productive creativity, as in artistic or scientific products where there are restrictions and controlled free play. 3. Inventive creativity, where ingenuity is displayed with materials, methods, and techniques. 4. Innovative creativity, where there is improvement through modification involving conceptualizing skills.
5. Emergenative creativity, where there is an entirely new principle or assumption

around which new schools, movements can flourish. Taylor emphasized that many people had the fifth level in mind when they talked about creativity, which was actually rare, therefore he suggested that lower levels were usually involved in investigations of creative behaviour.

Piaget's (1962) theory of cognitive development related directly to the creative process. Piaget concluded that creative imagination was gradually reintegrated in intelligence as children aged and that the nature of the creative process was malleable - and changed as the child progressed through the developmental stages.

Mooney (1963) expounded 'four significantly different approaches' to the creativity 'problem' - the creative environment, the creative product, the creative process, and the creative person. [see also Rhodes (1961) and Brown (1989)]

Amabile (1983) described creativity as the result of intrinsic motivation, domain relevant knowledge and abilities and creativity relevant skills. Her (1990) componential model of creativity recognised elements or components in the social sphere which affected creative production and provided criteria for the judgement. [A theoretical conception similar to Czikszentmihalyi (1990)]

Gruber and his colleagues (Gruber, 1981, 1989, Gruber and Davis 1988) proposed a developmental evolving-systems model for understanding creativity. A person's knowledge, purpose and affect grew over time, enhanced deviations that the individual encountered, and lead to creative products.

Isaksen, Stein, Hills and Gryskiewicz (1984) presented a general morphological model for formulating research on creativity with three dimensions, the unit of analysis, principal contexts for research and process aspects.

Weisberg (1986,1988) tried to demonstrate that apparently sudden insights are not special processes but protracted ways of normal processes of perception, memory and problem solving.... *"that all solutions to problems are "creative" so long as they*

are novel and they meet the demands of the problem, then the capacity to think creatively must be a basic human capacity and not the exotic trait or skill envisioned by the 'genius' view." (1988 p..153.)

Necka (1986) proposed that creative giftedness consisted of three groups of components (1) the motive to create, (2) the ability to think originally and productively and (3) the skills necessary for efficiently carrying out a creative act. The triadic model of creativity and the new typology of creative talents derived from it, did not attribute creativity to a single agent or group of factors, or identify with intellectual abilities alone rather it was general and not domain specific and open to stylistic differences among creative individuals. Necka's triadic conceptualization of creative giftedness was largely speculative and required empirical support.

MacKinnon (1987) argued that the starting point of all studies of creativity was an analysis of creative products, followed by study of the other facets of creativity, the creative process, the creative person and the creative situation. MacKinnon (1987) after initially re-stating that creativity was a matter of problem solving and that *"the beginning of creativeness requires that one becomes aware of something that is wrong, or lacking or incomplete, or mysterious."* (p..124.) was unsure that the problem solving approach could fully explain the creative activities of the artist and this anomaly formed another critical issue in future investigations of creativity.

Walberg (1988). was an exponent of the Human capital theory. 'Human capital' referred to the skills motivation and creativity of the worker. Capital was defined as an asset that gave rise to income, whether pecuniary or 'psychic'.He suggested that it was useful to consider humans as capital investments or assets to themselves and society. He also suggested that creativity may be thought of as a *"constellation of attributes . . . and that Human capital theory offers a useful organising framework for thinking about such elements of creativity and learning."* (p. 342.)

Feldman (1988) proposed a three-phase model of creativity involving dreams. insights and transformations. According to Feldman's theory, the first aspect was that

the mind was capable of producing astoundingly new images, thoughts and ideas from what came into it , often nonconsciously. The second aspect was the conscious desire to make a positive change in something real. The third aspect concerned the results of previous efforts by other individuals called to changing the world or their environments. The artifacts of creative work were available to the person who desired to make further changes to the world.

Boden (1990. 1992) argued that there were two broad types of creativity which she labelled 'improbabilist' and 'impossibilist.' These in turn could be divided into psychological-personal and historical creativity. Improbabilist creativity involved generating new and valued products while working within an established rule system which defined a conceptual space of possibilities. Impossibilist creativity involved the transformation of conceptual spaces so that new ideas originated that were impossible within pretransformation spaces. Psychological-personal creativity involved the production of ideas new to the individual, whilst historical creativity involved producing ideas that had a subset of psychological-personal creativity. Boden focused on impossibilist psychological-personal creativity. Boden (1992) also used computational models to clarify how different matrices of thought (conceptual spaces) might be represented and joined.

Albert (1990) drawing from his longitudinal study in eminence proposed six guiding ideas about creativity summarised as :- (1) creativity is expressed through decisions not products. (2) knowledge of self and of one's world is the medium of creative behaviour. (3) creative behaviour is highly intentional. (4) Creativeness and personal identity are both emergent. (5) The latter two motivate each other and are mutually dependent, (6) Creative behavior engages individuals at the personal level of their identities and abilities hence there is an optimum fit with the environment for each individual. Albert (1990), [as did Amabile, (1990)., Runco,(1990)] *"explicitly equated the capacity to operate with creativeness as a freedom from proximal and developmental constraints and the enhancement of personal and social well-being."* (p. 255.)

Treffinger, Feldhusen and Isaksen (1990) developed a comprehensive theoretical model of productive thinking. Their model defined creativity as a set of cognitive processes that contributed to productive thinking or problem solving. Information and skills, motivations and dispositions, management and metacognitive systems formed the base for productive thinking. The next level of skills consisted of specific creative or divergent thinking abilities and critical thinking skills. which lead to complex methods of problem solving and decision making. Treffinger et al suggested that *'milieu, context press and environment'* operated psychologically through the individual creator or problem solver's motivations or dispositions.

De Bono's (1971,1985,1992) approach was primarily concerned with the development of creativity. His 'Lateral Thinking' as quite distinct from 'Vertical Thinking' [1] . was considered a deliberate process like logical thinking and closely related to insight, creativity and humour. Lateral thinking was described as generative, a habit, an attitude, and a way of using the mind. De Dono considered Lateral Thinking as an insight tool concerned with the generation of new ideas, with restructuring patterns (insight) and provoking new ones (creativity). De Bono saw a need to get away from rigid concept patterns, using Lateral Thinking to restructure concepts and to develop an ability for changing ideas. According to Sternberg and Lubart (1996), De Bono's emphasis was towards developing creativity rather than theory.

Baer (1993). discussed three kinds of creativity, derived from a meta-theoretical analysis of creativity by Johnson-Laird, (1988) who argued from an information-processing viewpoint. Baer's labels of "Real-time" creativity referred to spontaneous creative performance, without opportunity for revision, i.e. jazz. "Multi-stage" creativity referred to creative performance within an established domain allowing time for evaluation and revision. The multi-stage phase allowed a wider generation of ideas and selection of solutions. "Paradigm-Shifting" creativity referred to creative performances which resulted in fundamental changes in the nature of the functioning domain, i.e. changes in the way the domain itself was conceptualised or changes in

1 *The traditional sequential logical kind.*

available to those who later work and solve problems in that domain. Baer stated that it will likely prove impossible to draw firm distinctions between levels of creative performance but he thought that meta theoretical models such as Johnson-Laird proposed might be useful in analysing creative genius and everyday problem solving thinking.

2.2.6. Confluence theories.

In Confluence theories of Creativity multiple components [i.e. cognitive, personality-motivational and environmental] must converge for creativity to occur, a concept illustrated by Mumford & Gustafson, (1988), Gruber, (1974/1981), Lubart & Sternberg, (1995).

Mumford & Gustafson's (1988) emphasis in definitional issues was on creative behaviour, which was likely determined by a diverse interaction between the attributes of the individual and the attributes of the environment. Creativity thus being conceptualized as a syndrome involving a number of elements:- the processes underlying an individuals's capacity to generate new ideas , the characteristics of an individual facilitating process operation, and the translation of these ideas into action, the attributes of the situation conditioning the individual's willingness to engage in creative behaviour, and also the attributes of the situation influencing evaluation of the individual's productive efforts.

Csikszentmihalyi's (1988) systems approach highlighted the interaction of the individual, domain and field. These three systems jointly yielded the phenomenon of creativity (1990). An individual drew on information in a domain and transformed or extended it through cognitive processes, personality traits, and motivation. The field consisted of people who controlled or had prestige in a domain (art critics gallery owners etc.) evaluated and selected new ideas. The domain, a culturally defined symbol system protected and conveyed creative products to other individuals and future generations.

Gardner (1983, 1988) argued that "*cognition ought to be decomposed into a number of parts, modules or factors, with each operating according to its own set of principles.*" (1988, p. 300.) In this holistic approach to creativity, a multifaceted and complex framework, there are different zones of potential creativity. Gardner (1983) proposed a set of seven human intellectual competences or "intelligences" namely linguistic, logical mathematical, spatial, bodily kinesthetic, interpersonal and intrapersonal. Furthermore, Gardner (1988) advocated the extension of these seven domains and the modular view of intelligence that they represented to the understanding of creative thinking. Gardner (1993) conducted case studies that suggested the development of creative projects may have stemmed from an anomaly within a system (e.g. tension between competing critics in a field).

2.2.7. Interactionist theories.

Woodman and Schoenfelt (1989) proposed an interactionist model of creative behaviour. The model placed notable emphasis on the person or organismic components of abilities, motivations and cognitive styles and it used strategies that may have been fundamental aspects in the production of novel and useful problem solutions.

Brown's (1989) model comprised of a number of elements from Woodman & Schoenfelt model but went on to describe intervening variables and alternate conceptions such as trait theory or dispositions to creative behavior, creativity as an unconscious process, creativity as an aspect or component of more complex behaviour such as problem solving and creativity as associative or linking behaviour. Brown also highlighted the role of problem finding as an element of creative behaviour and the possible role of chance factors in creativity. He concluded that it was unlikely that there would ever be a 'g' factor or essence of creativity, and stressed that creativity was a complex multidimensional conception.

2.2.8. Linguistic theories.

Aleinikov (1994) conceived *'Creative Linguistics'*, linguistically based creativity. Creative Linguistics dealt with creative phenomena connected with language and speech, and explained the interconnected fields of creativity and language. According to Aleinikov, Creative Linguistics, produced a model of highly developed explanatory force which showed the identical structure of signs, language consciousness, speech acts, (activity) creative acts of speaking and interpreting and other communication phenomena. Aleinikov discussed brainstorming and said that language and speech based "brainstorming" turned out to be dependent on some linguistic parameters of phrases, which contained no *"idea squelchers"*[1] (Davis, 1981). Aleinikov's Creative Linguistics conversely, collected and selected words and phrases operating as *"idea boosters"* hence creative behaviour became more productive. To Aleinikov, creativity was existentially dependent on language and the creative power of society influenced the language and made it change very quickly. While fulfilling the call of society in dealing with reality an individual reflected reality in symbols and thus created. According to Aleinikov the individual was a creator - a *"Sozidatel"* and Creative Linguistics became *"Sozidolinguistics"*[2]. Aleinikov expanded his ideas with model analysis and concluded that in any creative act there existed five steps which could be drawn as a spiral of activities involving - innovation, social problems search, object-instrument search, communicative (verbal) search, and existential search. According to Aleinikov these steps existed in all creative acts.

2.2.9. Hemispheric theories.

Brain hemisphericity was another approach to creativity issues. Toepfer (1987) stated that the creativity field must give attention to relating its research data on pedagogic concerns about hemisphericity with the growing body of EEG and other data patterns of brain function.

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1 *Those possessing obvious and non-obvious evaluations and critiques.*

2 *In Aleinikov's work a creator is named "Sozidatel" and Creative Linguistics named "Sozidolinguistics".*

Arieti (1976) discussed the role of different cortical areas in creativity, stressing the temporal, parietal, and prefrontal rather than the sensory areas.

Sheng-Ying Lii's (1986) study in the pattern of hemispheric dominance in Chinese gifted students and its relationship to creativity, suggested that correlational findings showed that the correlation between RHS (Right Hemisphere Specialization) and verbal creativity was positive and significant and that between LHS (Left Hemisphere that it will likely prove impossible to draw firm distinctions between levels of creative performance but he thought that meta theoretical models such as Johnson-Laird proposed might be useful in analysing creative genius and everyday problem solving Specialization) and verbal creativity, negative and significant, while there was no significant correlation between IS (Integrated Style) and verbal creativity.
However, it was not concluded that the right hemisphere was the centre of creativity. In terms of process of creativity both left and right hemisphere were important. It was evident that although the functions of the left and right hemisphere were different, both hemispheres are necessary in the creative process.

2.2.10. Imagery and creativity.

Various theories in psychology have suggested that mental imagery could enhance creativity, (Arieti, 1976; Durio, 1975; Koestler,1964; McKellar, 1957; Singer, 1966). The basic assumption being, that the processing of sensory-perceptual experiences in imagery tapped a highly subjective, idiosyncratic, and fluid style of cognition that enabled the transcendence of conventional, reality-restricted thinking.

Speculation on the characteristics of a brain exhibiting creative imagination as processing information received via neuro-physiological pathways was offered by Eccles (1972) described as follows - *"The creative brain must first of all possess an adequate number of neurons, having a wealth of synaptic connections between them. It must have, as it were, the structured basis for an immense range of patterns of activity. The synapses of the brain should also have a sensitive tendency to increase their function with usage, so that they may readily form and maintain memory patterns.*

Such a brain will accumulate an immense wealth of engrams of highly specific character. In addition, this brain possesses a peculiar potency for unresting activity, weaving the spatio-temporal patterns of its engrams in continually novel and interacting forms, the stage is set for the deliverance of a 'brain child' that is sired, as we say, by creative imagination. (p. 40.) Eccles suggested that, by association one image was elicited by other images.

Khatena's (1987) work on creative imagination imagery proposed that *"much activity of the brain that relates to creative imagination has to do with imagery or the re-experiencing of images and their language correlates."* (p. 316.) In the function of creative imagination, intellectual abilities as well as emotive energy fields were involved. They operated in various ways to lead to incubation, creative imagery and illumination in the creative process. Khatena (1982). Khatena's (1987) MICIIM holistic model [3] was in keeping with a general systems approach to the study of the subject. The MICIIM consisted of three main dimensions Environment, Individual and Cosmic, significant to human functioning generally and imagery specifially. The creative imagination had much to do with imagery and its language correlates. Its complexity required a model that was at once multi-dimensional and interactive "a model that can explain imagery in terms of the whole person, whose sources of information, influence, and mental activity are the Environment, Individual and Cosmic." (p. 334.)

However, the links between imagery and language correlates were not without criticism, as Paivio (1971) pointed out, creative thinking in the verbal realm may be disrupted by attempts to induce imagistic ideation. Instructing subjects to use imagery may have little effect on creativity tasks which require verbal processes and may interfere with performance on these tasks.

2.2.11. Catastrophe theories.

The Catastrophe theory described by Zeeman (1977) and Woodcock & Davis (1978) used by Boles (1990) to explain creative behaviour as a particular form of problem

3 *The Multidimensional Interactive Creative Imagination Imaging Model*

solving behaviour which under certain contextual factors involved a catastrophic jump leading to a creative solution. A sort of jump was critical too, for the so-called idealistic interpretation of quantum theory applied to creativity as defined by Goswami (1988, 1989, 1990a, 1990b) McCarthy (1990). The creative act literally consisted of a *"quantum jump in the mechanism of the mind."* (p. 2.) Goswami (1990b). Simultaneously, Goswami considered the quantum approach in a much broader meaning by integrating the more mechanistically and the more organismically oriented creativity theories. The *'quantum theory of creativity'* became a theory of the developing and changing self.

2.2.12. Chaos theories.

The Chaos Theory [4]. has generally been described by Briggs & Peat (1989) Pagels (1988, and Rasband (1990) and adapted to creativity particularly by Briggs (1990) and Sterling (1991). When applied to the creative process, chaos theory accounted for the destabilising of equilibrium which produced something fundamentally new, the archetype of creativity Briggs & Peat, (1989). Recent neurophysiology and cognitive psychology described the brain with its neuronal network as a highly complex, non-linear, dynamic system with chaotic dynamics.

Freeman (1991) was convinced that chaos and chaotic fluctuations were fundamental for brain functions. The idea of a flexible and interactive memory system in easy flux over long term, short term and working memory, appeared useful in terms of creative thinking. The creative person must however have been capable of allowing such "chaotic" states and been capable of utilising them. In Feldman's (1986) coincidence theory creative products sometimes were the result of lucky accident or even of error, here chance similar to chaos theory was not meant to be absolutely accidental.

4 *Chaos meant a behaviour which occurred in complex, non-linear, dynamic systems. Internal and external factors made a dynamic system change continuously whereby cause and effect were not related in a simple proportional way. These non-linear systems could behave in an unpredictable 'chaotic' manner (chaotic dynamics).*

2.2.13. Chance-configuration theory.

Simonton's (1988a,b.) Chance-configuration -theory (after Campbell, 1960) in parts was closely related to chaos theory. Simonton (1988c) asserted that creativity involved the participation of chance processes both in the origination of new ideas and in the social acceptance of those ideas by others. Chance intervening in the process, product, person and persuasion sides of creativity. The creative process involved operations on mental elements which entered into chance permutations. These chance permutations may have been stable or unstable. The stable permutations were labelled configurations and retained for further information processing. The theory assumed that a large amount of possibilities for varying and combining mental-cognitive elements was available and that the occurrence of certain combinations could not be predicted.

2.2.14. Components model of creativity.

Urban (1992) designed a components model of creativity. The model was built from six components which all worked and functioned together for and in the creative process. The cognitive components were represented by divergent thinking and acting, general knowledge and thinking base, specific knowledge base and area specific skills. The personality components consisted of, focussing and task commitment, motivation and motives, openness and tolerance of ambiguity. All components working together as a functional system differentiated in detail by various subcomponents.

2.2.15. The psycho-economic and investment approach to creativity.

The psycho-economic and investment approach, used economic terms to try to explain the production of creative results, as the engagement of single persons and groups by means of implicit or explicit cost-effect-calculations or to transfer investment strategies to creative production.

Lubart and Sternberg (1995) proposed an Investment approach to creativity. According to investment theory, creativity required a confluence of six distinct but interrelated sources; intellectual abilities, knowledge, styles of thinking, personality, motivation and environmental context. (Sternberg and Lubart 1991,1992) *"the cognitive resources work together with the conative and environmental ones to form an individual's 'investment' in creative enterprise."* (p. 271.) In any number of domains a person may apply the six resources to initiate a project and bring it to fruition. For creative work, they proposed that the choice of domains, projects and ideas for those projects would involve a basic investment strategy of 'buying low and selling high'. Buying low meant pursuing ideas that are unknown or at least slightly out of favour but with growth potential, and linked risk-taking to creative performance. Selling high involved presenting one's work on to new projects when an idea or product became valued and yielded a significant return. The definition and judgment of creativity was also highlighted by the investment metaphor, the evaluation of creativity on both financial worth and creativity involved social consensus, the evaluation of observable products of creativity and on the continuum of creative performance.

Sternberg and Lubart (1993) stressed that creatively gifted people tended to use insight processes more often and more effectively than less gifted peers. They illustrated three basic insight processes. Selective encoding insight, involving noticing the relevant information to understand or solve a problem from a mass of haphazard data. Extraordinary selective comparison insight, enabled creative individuals to relate new information to old information in a way other people did not see. Selective combination insight, enabled creative individuals to put together facts or ideas among which other people did not see connections. Sternberg & Lubart (1996) proposed that three intellectual abilities were also particularly important, - synthetic ability to see problems in new ways, the analytic ability to recognise which ideas are worth pursuing and the practical-contextual ability to know how to persuade others of the value of those ideas.

2.3. Summary

In summary, a variety of often unrelated studies have resulted in a fair quantity of information about an arguably indistinct concept namely 'creativity'. The theories have some similarities, certain characteristics that can be validated and supported by previous or new research, which when examined may illustrate how the concept of creativity has developed and where it might be going. Although there is a basis for differentiating creativity from intelligence, the exact relationship appears very complex. There is a need to look beyond the boundaries of IQ to understand creativity. Confluence theories representing multivariate approaches seem to be describing the direction creativity research is currently taking.

The literature search into definitions and theories whilst giving an overview on creativity, only goes a small way to answering the question, *what is creativity?* The problem is a little like the blind men with the elephant, it depends on which bit you are looking at, it is too big a subject to see the whole close to. Creativity as problem solving ability seems only a small piece of elephant and rather dull grey at that, hardly capturing the imagination.

The definition which coruscated as the 'essence' of creativity , yet hardly seemed adequate for an answer to the question was Ford & Harris's (1992) *"Creative individuals see what everybody else has seen but think what nobody has thought."* Working with this definition in mind creativity seems as much to do with perception as cognition and certainly Schachtel's (1959) *"ability to remain perceptually open to the world"*, and the *"expression of inner drives"* are recognisable parts of the elephant. Bruner's (1957) *"width of categories'* and high levels of flexibility [also Koestler (1964)]. Kubie's (1958) swift access to a vast memory store of facts and ideas , Gruber's (1988) *"enhanced deviations that the individual encountered"*, further add to the elephant, piecemeal. Creativity in part, as 'the *processing of sensory-perceptual experiences tapping a highly subjective, idiosyncratic, and fluid style of cognition that enables the transcendence of conventional reality-restricted thinking,'*

seems a shade closer to the elephant. So much for a glimmer of process, yet to consider is the the product the person, and the press. Lefrancois's (1982) *"just as low intelligence is stupidity, so very low creativity is ordinariness"* may not be politically correct nowadays , but it certainly seizes interest. Redirected slightly, creativity as the *production of the extraordinary* has a 'feel' and 'direction' which compels one to seek elaboration. Similarly Nagy (1988) gives a tantalising glimpse of the creative person and press, *"When is a grain of sand more than a grain of sand? When it is viewed through the eyes of a creative person whose world is colored by different hues - pastels and fine shadings and rich tones that go unobserved by the rest of us."*

An exciting pink elephant has just come into focus ! There are many shades of pink and elephants come in all shapes and sizes, so how can creativity be assessed? - a question which becomes the subject of the next chapter.

Chapter 3

Creativity assessment.

Treffinger (1986)"*Just as there is no single, uniformly accepted theory of creativity, there is no single assessment instrument that is universally accepted.*" (p. 15.)

Torrance (1974) "*Since a person can behave creatively in an almost infinite number of ways . . . . . it would be ridiculous even to try to develop a comprehensive battery of tests of creative thinking that would sample any kind of universe of creative thinking abilities.*" (p. 21.)

3.1. Introduction.

Following the discussion of definitions and theories in the preceeding chapters; this chapter considers creativity assessment. It addresses general concerns and concerns with measurement.

3.2. General concerns.

The indispensable criteria of creativity are measures of real-life creative achievement. (Hocevar, 1981; Feldhusen and Goh, 1995). A primary concern in creativity assessment research has been the want of clarity regarding the purposes or goals for creativity assessment, it has been surrounded by confusion, mystery, and controversy. The recognition of creativity is not easy since it is difficult to verify and document objectively. However, the problem is more complex than merely recognizing and appreciating the most obvious instances of creativity. It has been argued by Crockenberg (1972), Khatena (1977), Rimm (1984), Torrance (1976, 1979), and Treffinger (1980), that the purposes of creativity assessment should extend beyond the effort to isolate or label highly creative people from their less

creative peers. Too much diversity within the subject itself has led to the inability to synthesise a single, general or unifying theory of creativity from which a definition could be derived as a foundation for a universal approach to assessment. As Dacey &. Madaus (1969) say the complexity of creativity itself *"mitigates against a universally acceptable definition."* (p. 58.) Consequently, as Treffinger (1987) succinctly states, it is not surprising *"that there are many options and few universals in the area of creativity assessment."* (p. 107.)

Treffinger, Renzulli and Feldhusen (1971) *"Given the existing array of ideas about creativity. . . it is not in the least surprising that there exists a number of tests, all purporting to be measures of 'creativity,' but differing in a number of ways. Each instrument mirrors the particular set of beliefs and preconceptions of its developer concerning the nature of creativity. Sadly, the theoretical rationale for such tests is often not sufficient to allow systematic tests of differential predictions."* (p. 106.)

3.3. Measurement concerns.

Research on creativity assessment involves fundamental measurement concerns, i.e. the development of instruments which are valid, *(clearly related to the constructs they purport to measure)* reliable *(accurate)* and useful. Treffinger and Poggio (1972) called for research on three major aspects of criterion-related validity: defining and using appropriate external criteria, especially for predictive validity; multi-dimensional and longitudinal studies; and consideration of developmental and cross-cultural perspectives. Hocevar & Bachelor (1989) preferred the term *nomological validity*, to construct validity where variables relate to each other in a logical way, measuring a multitude of constructs. Michael & Wright (1989) stated that a *"central area of concern does exist in the accuracy of inferences regarding the manifestation of creative behavior in relation to the context in which it occurs."* (p. 41.) They cited Fiske (1987) with regards to a number of questions that pertained as to how method effects can contribute to construct invalidity.

Hocevar & Bachelor (1989) argued that two forms of reliability are particularly relevant to creativity, internal consistency and interjudge agreement. Internal consistency is crucial whenever a group of items on a test or questionnaire are totalled to obtain a composite index. Creativity assessment may also be particularly susceptible to obtrusive effects on measurement, for example, motivational influences or factors involving the situation and setting or context for assessment.

Concerning usability, Treffinger and Poggio (1972) identified particular areas in which research was needed regarding usefulness and practical applications of creativity testing resources. These included studies of the effects of variations in test administration settings and conditions, test scoring procedures, scorer validity and reliability, and norms and interpretation guidelines.

Treffinger et al (1971) have stressed that the measures of most common creativity constructs have been based on plain quantitative rather than qualitative dimensions, where a direct numerical count of frequency of responses reflects a construct of originality. Such quantitative emphasis, according to Michael & Wright (1989) may overlook a small number of highly significant responses, *"Thus, the individual with the low quantitative score could be unfairly penalized in his manifestation of what would be judged truly original behavior."* (p. 35-36.)

Feldhusen & Goh (1995) In response to *"How can creativity be assessed given the complexity of its components?"* questioned whether creativity assessment researchers should *"limit their efforts to the assessment of cognitive processes such as thinking decision making and creating new ideas?. . . In fact most efforts to assess creativity have focused on persons and their cognitive abilities, personality characteristics, motivations or background experiences.* (p. 235.)

Amabile (1990) assessed creativity by having subjects create products and then having expert judges rate their creativity. Fairly high interjudge correlations have been found.

Taylor (1975) presented a theoretical model for creativity assessment that also focuses on product generation. In the Creative Product Inventory, based on his model, he suggested seven criteria for product evaluation: *generation* - the power of a product to stimulate further creation of ideas; *reformulation* - the extent to which it produces change, *originality* - the rarity or uncommonness of the product; *relevancy* - the extent to which it solves a problem or fulfills a need, *hedonics* - its popularity or impact; *complexity* - the intricacy of information involved, and *condensation* - the degree to which it simplifies or integrates ideas. Reliability with the inventory was high when trained observers were used.

Dacey (1989b) classified the following assessment approaches to creativity. Test oriented, e.g. Torrance Tests of Creative Thinking (TTCT). Personality oriented, or Product oriented e.g. Besemer & Treffinger (1981) and Besemer & O'Quin (1986,1987).

Runco (1990) reviewed several aspects of constructs underlying creativity and concluded that with present measures, ideational skill or fluency is the best indicator of creativity. He also discussed the shared variance between originality and fluency, pointing out that the assessment of originality was not reliable after fluency effects were eliminated from the originality scores, as did Hocevar (1979) and Dixon (1979). He pointed out that there may be meta cognitive components, evaluative skills, and problem finding or problem definition abilities involved in creativity.

3.4. Cognitive tests.

A survey of cognitive tests.

The assessment approach involving cognitive tests begins with Guilford (1950) who proposed that creativity could be studied in everyday people with a psychometric approach using paper and pencil tasks. One of these was the *Unusual Uses Test.* Many researchers adopted Guilford's suggestion and 'divergent thinking' tasks

became the main instruments for measuring creative thinking. The tests were a convenient way of comparing people on a standard 'creativity' scale.

Research, however has indicated that divergent thinking tests in particular are more reliable and valid in the gifted than the nongifted population (Guilford, 1968, Mednick, 1962; Runco, 1985, 1986; Runco & Albert, 1985)

In Hocevar's (1977) studies in the evaluation of tests of divergent thinking three major problems with the validity of the Guilford tests of divergent thinking were identified. The reliability and convergent validity of originality scores could be totally explained by the relationship of originality with ideational fluency, thus the conceptual distinction between them was not warranted. The relationship of divergent thinking with creative accomplishments and activities was neither strong nor consistent. Tests of divergent thinking were considered no more accurate than traditional measures of intelligence in predicting creative activity and achievement. Hocevar (1981) listed ten categories for techniques for the measurement of creativity. This was later revised to eight, Hocevar & Bachelor (1989).
The categories are as follows:

1. *Divergent thinking tests*
2. *Attitude and interest inventories*
3. *Personality inventories*
4. *Biographical inventories*
5. *Teacher nominations, peer nominations, supervisor ratings*
6. *Judgment of products*
7. *Eminence*
8. *Self-reported creative activities and achievements. (p. 53.)*

Getzels and Czikszentmihalyi's (1967,1975) research led to the conclusion that finding, identifying and clarifying problems, is a preceeding and more creative act than the more convergent problem solving, while Mackworth (1965) also proposed that problem finding might be the more important cognitive activity.

Another cognive test for measures of creativity was Mednick & Mednick's (1967) *Remote Associates Test (RAT)* which measured fluency in producing familiar but hard-to-retrieve associations, screening them, and moving on to new associations until an acceptable one was found. The RAT. was criticised by Buros (1972) on several points , poor convergent validity, poor discriminant validity, poor content validity and poor construct validity, thus illustrating the difficulties of constructing a cognitive test of creativity.

3.4.1. The Torrance tests.

On the basis of modifications and extension to the Guilford type tests a large number of creativity tests were devised at the University of Minnesota. *The Minnesota Battery, or Minnesota Tests of Creative Thinking,* Torrance (1962b) included tests of a non-verbal nature, with the advantage that the tests were considered as suitable for use with subjects of all ages. One of the earliest instruments for measuring creativity was the research edition of the *Torrance Test of Creative Thinking* (Torrance, 1966). When later developed these tests consisted of several relatively simple verbal and figural tasks that involved divergent thinking and other problem solving skills. The tests could be scored for fluency, flexibility, originality and elaboration although results were sometimes combined into a single creativity score for each individual. Test administration followed a standard procedure. Most other creativity tests were similar in form, content, administration and scoring to the TTCT.

The Torrance Tests have been subject to a variety of criticism because they were relatively knowledge free, distorted the meaning of creativity by using fluency, flexibility and elaboration and inappropriately used the same originality-response norms for many different samples. (Brown,1989; Hennessey & Amabile, 1988a; Mitchell, 1985.) Crockenberg (1972) summarised, "*while the validity evidence on the Torrance is abundant, it is also weak. While we cannot readily dismiss the Torrance Test, neither is it reasonable to conclude that it is a valid measure of the*

creative process." (p. 35.) Criticism of the Torrance Tests also came from Lissitz and Willhoft (1985) *"Our finding of the extreme sensitivity of the TTCT to experimenter -induced response sets leads us to conclude that even under conditions of rigorous control, studies using the Torrance Tests should be viewed with extreme caution. Not only may the results be artifactual, but the interpretation of creativity as a stable internal characteristic of a person is subject to suspicion."* (p. 10.) Arguably, the latter part of this criticism is relevant to all trait approaches and not just the TTCT. Torrance (1974) specifically discouraged the use of a composite score and recommended interpretation of the subscales scores *"in relation to one another."* (p.56-57.) i.e. scores derived from the same response data. Heausler and Thompson (1988) examined the structure of the TTCT when scored, using the revised scoring guide and concluded that the subscales do not yield discrete scores for fluency, flexibility, originality and elaboration, rather they yield just one general creativity factor. and suggested that users of the TTCT might best be cautious in accepting the view that subscales in the revised scoring system provide meaningfully different information. Hassan (1986) used factor analysis to study the construct validity of the TTCT and concluded that there was no validity for the factors proposed by Torrance namely fluency, flexibility originality and elaboration. Kanter's (1984) studies showed the TTCT to be ineffective in identifying creative artists or scientists. The controversy continued, Torrance and Safter (1989) reported on the long range predictive validity of the Just Suppose Test, which showed high levels of predictive validity for 64 subjects over a 20 year period.

Despite the criticisms there is no shortage of TTCT inspired research and there are arguments for and against various implications of the tests, but whilst being controversial the TTCT was and is a useful fore-runner to creativity research and assessment.

3.4.2 The Wallach-Kogan tests.

Building on Guilford's work, and on an associative conception of creativity

developed by Mednick (1962), Wallach & Kogan (1965) created the *Wallach-Kogan creativity tests.* The test consisted of three verbal tests, *Instances, Alternate Uses and Similarities.* and two visual tests, *Pattern Meanings and Line Meanings. (See Table 1.)* All tests were administered individually with no time limit, all recording of responses done by the tester, and tests presented as games. Scores were given for uniqueness and number of responses. Reliabilities of the tests were reported as very high, also good factorial validity and reliability were noted. The style of administration of the Wallach-Kogan creativity tests attracted some criticism. Nicholls (1970) has claimed that different testers or procedures always tended to get different results on creativity tests administered under game-like conditions because unlike test motivations, game-like conditions could not be easily sustained. Also, Hattie (1977) pointed out a major disadvantage of the game-like condition, that it was necessary to deceive childen in order to obtain test results, thus the ethical considerations implied by the Wallach & Kogan method were questionable.

A further criticism of the Wallach-Kogan tests has been that the scores reflected only the number and variety of responses, not the quality of the responses, echoing the previously mentioned argument of Treffinger *et al* (1971) of quantative rather than qualitative. Crockenberg (1972) thought that *"On either the Torrance or Wallach & Kogan tests a person may produce an idea that is novel and appropriate to the problem, but is utterly trivial because there are no quality standards."* (p. 40.) and as Crockenberg (1972) advised, that *"Perhaps creativity tests should be referred to as measures of fluency and originality as Torrance suggests, or as measures of ideational productivity or associational fluency in Wallach's terms."* (p. 42.)

Nevertheless, despite arguments and criticisms, cognitive tests have remained a popular form of creativity assessment, being brief, easy to administer and score, with objective, comparable, and numerical creativity scores.

3.5. The TCT-DP: a culture-fair test.

More recently, Urban & Jellen (1985; 1986), Jellen & Urban (1986) developed the *"Test for Creative Thinking - Drawing Production"* (TCT-DP). Defined as an assessment device to apply *"a more holistic and gestalt-oriented approach to diagnostics of creativity."* (p. 1.) Urban (1993). Jellen & Urban (1986) stated that *"The TCT-DP is a radical departure from ..... convergent tests, since it liberates the innovative mind from factual, problematic and/or punctilious reproduction of (academic) reality."* (p. 139.) The test considered not only divergent aspects but also quality, gestalt, composition, elaboration, risk-taking, unconventionality, affection and humour. For reasons of broad applicability and optimal culture-fairness the assessment instrument was by means of drawing production. The stimuli for the test were figural elements or fragments of an incomplete and irregular nature. The completed drawings based more or less on these fragments were evaluated by a set of categories which represented the theoretical construct of the device. Eleven key criteria constituted as a whole in the TCT-DP construct, as interacting factors they reflected a holistic concept of creative thought i.e. the total score for all criteria indicated the value of the creative product. The TCT-DP has two parallel forms, form A, & form B. Urban (1993) reported high reliability of scoring, (correlation = .89 -.97) and acceptable parallel test reliability, (r= .70). Stages for the development of creative abilities have been formulated and are seen in close relationship to the general cognitive development of children in that age range. Further details of the TCT-DP are given in *(Appendix 4.4)*

3.6. General concerns.

Referring to arguments concerning creativity tests in general, Crockenberg (1972) contends that reliability data suggests that there is much situational specificity in creative performance, that creativity tests simply sample behaviour under specific conditions and that one must not expect similar behavior under different conditions, are complications frequently evident to test users. In support of this

argument Hattie (1980) reported, *"A clear finding is that creativity tests administered under different conditions lead to differences in performance."* (p. 97.)

Amabile (1983) furthered the debate by stating that, it appeared many of the creativity tests assessed such narrow ranges of abilities that it was inappropriate to label a particular test performance as generally indicative of creativity.

Although there is evidence that creativity tests do assess relatively stable attributes and abilities, it is interesting to note that various social and environmental factors can influence test outcomes. [Recalling Lissitz and Willhoft's (1985) work with the TTCT]. Speller & Schumacher's, (1975) study found that a subject's scores on creativity improved if told they were taking a creativity test. In Manske & Davis's (1968) study it was established that specific instructions affected scores, e.g. study subject's originality scores increased when they were instructed to be original, their practicality scores increased if they were instructed to be practical and their total number of responses increased when they were instructed to be 'wild'. Testing environments may also influence test outcomes. Numerous studies have shown differences in creativity test scores under different testing conditions and different time constraints (Christensen, Guilford & Wilson, 1957; Mednick, Mednick & Jung, 1964; Nicholls, 1972; Wilner, 1974). Amabile, (1983) suggested that social and contextual factors may at times play a crucial role in performance.

Treffinger (1987) expressed a need for synthesis of many practical and technical issues such as test administration and scoring. Extensive research was necessary to expand norms for creativity assessment instruments, to investigate criterion referenced measures more thoroughly, and to stimulate new thinking about test use and interpretation. Much more needed to be done to demonstrate the validity and reliability of instruments for evaluating products based on creativity criteria.

Amabile (1983) advised that creative performance emerged from three necessary components, from combinations of innate skills, learned abilities, and task attitudes.

Any given creativity test might touch one or more of those abilities or attitudes but it is unlikely that a single test will concern all the elements of the three components in a general way. In attempting to predict creative achievement it is important to specify which domains and elements of creativity are assessed with any particular test. Amabile (1983) pointed out that the construct validity of many creativity tests has been seriously questioned by empirical work, (Bastos, 1974; Holland, 1968; Jordan 1975; Kazelskis, 1972) as had the convergent validity of different test procedures considered together. (Hocevar, 1981).

In summary, cognitive tests of creativity have been subject to criticism in that they measured only part of creativity, were too closely linked to intelligence and involved trivial levels of creativity. Traditional creativity tests gave mere quantitative information about a very restricted aspect of creativity.

3.7. Attitude and Interest Inventories.

Moving from cognitive tests for creativity and towards the 'person approach' are the Attitude and Interest Inventories. This approach is based on the assumption that a creative person will express attitudes and interests towards creative activities. According to Hocevar & Bachelor, (1989) some investigators suggested that creativity can be identified in terms of interests and attitudes. Attitude and interest inventories measure the extent to which people like, dislike, or are interested in a spectrum of activities that promote or involve creative work.

In the *'Group Inventory for Finding Interests' [GIFFI]* (Davis & Rimm, 1982; Rimm & Davis, 1976, 1980) subjects are asked to indicate their interest in a wide variety of activities. for example *'I like to invent things'*. Reliability and validity indices from several studies (Rimm, 1976; Rimm & Davis, 1980, 1983) using these inventories were found to be high. Similarly in the *'Preconscious Activity Scale'* (Holland & Baird 1968) individuals high on originality agreed with items like the following, for example; *'I often daydream about unsolved problems'*.

Khatena and Torrance (1976) designed a personality inventory specifically for identifying creative adolescents. *'The Creative Perception Inventory,'* with two subscales which were designed to identify the extent to which a respondent has interests, thought patterns, and personality characteristics that were considered to be creative. Amongst many attitude and interest inventories listed by Hocevar & Bachelor (1989), are Bassadur and Finkbeiner's (1985) measure of preference for ideation, the *'Creative Behavior Disposition Scale'* (Taylor and Fish, 1979). the *'Preference Inventory'* (Bull & Davis, 1982) the *'Childhood Attitude Inventory for Problem Solving'* (Covington, 1966) and the *'Creative Attitude Survey'* (Schaefer & Bridges, 1970).

A major problem with attitude and interest measures is the scattered item content that alludes to many domains of creative activity without satisfactorily measuring any of them. Also high scorers on these tests are not necessarily creative people. Davis and Rimm (1982) argued that *"The use of personality and biographical information to identify creative talent is not a new idea, but it is one which we feel is under-used. Many studies over the years have shown that creative persons . . . . show many common personality and biographical traits . . To be creatively productive, it is quite possible that a person must possess traits of independence, self-confidence, risk-taking, high energy, attraction to new ideas, curiosity, and visually artistic interests, attraction to complexity, and a better than average sense of humour. It is also not surprising that individuals who have a biographical history of creative activities and hobbies may be expected to be creative in the future as well."* (p. 56.) Davis (1975) proposed that biographic and personality inventories held considerable promise for creativity assessment at many age levels.

3.8. Personality Inventories.

Personality Inventories are another way to identify creative people through their personality traits. Using standard personality tests, responses to selected items are scored in terms of a *"creative-personality"* profile (e.g. Gough & Heilbrun, 1983)

Items from the profile may have been selected because they looked relevant to creativity or because they statistically distinguished high- and low-creative people. Gough's (1979) *Creative Personality Scale* includes representative adjectives such as , clever, insightful, individualistic, original, and self-confident. Omnibus personality tests with creativity subscales, are useful but limited because they tap only some of the components of creativity. Some specialized personality tests have also been developed to measure only creativity-relevant characteristics e.g. Cattell and Eber's (1968) *Sixteen Personality Factor Questionnaire* (Cattell & Butcher, 1968).

The *'Group Inventory for Finding Creative Talent' (GIFT)* (Rimm, 1976; Rimm & Davis, 1976) was developed in order to provide an easy to administer reliable and valid instrument for the identification of children with characteristics of creativity. It has been found to be reliable at all grade levels except kindergarten. Its validity has been established by relating inventory scores to outside measures of creativity. In studies the main validity criterion was a composite score consisting of teacher ratings of student creativeness and experimenter ratings of short stories and pictures. Rimm & Davis's (1980) five years of international research with GIFT have shown it to be *"useful as one vehicle for helping teachers become aware of the unique personalities and behaviors of creative students."* (p. 41.) Another finding from the research indicated that the high test scores of very culturally deprived students supported the hypothesis that high creativity does exist among impoverished and deprived populations. Rimm & Davis (1980) *"GIFT probably predicts creative behavior about as well as intelligence tests predict intelligent behavior."* (p. 45.) *"No one instrument is ideal for identification of creativity, but this brief easy-to-administer self report inventory can provide important assistance in finding highly creative children who might not be identified by typical selection procedures."* (p. 45.) Rimm & Davis (1980) stressed that GIFT should not be used alone but in combination with other methods, and Lubart (1994) pointed out that these briefer focused inventories frequently reveal their purpose to the testees which can lead to response bias.

3.9. Biographical Inventories.

The notion that an individual's present behaviour is determined by past experiences formed the basis for the use of biographical inventories in assessing creative talent. (e.g. Cattell, 1959; Ellison, 1960; Owens, Schumacher, & Clark, 1957). Many of these inventories were devised on an intuitive basis and refined through testing samples of individuals rated high on creativity and those rated low or average. Michael & Colson (1979) developed a 100-item questionnaire by examining the research literature and identifying biographical correlates of creative enterprise. Items generally represented the occurrence of events rather than feelings. *The Biographical Inventory: Creativity,* (Schaefer, 1969) includes 165 items grouped into five categories; family history, educational history, leisure activities, physical characteristics, and miscellaneous. The responses on these inventories were as Lubart (1994) pointed out *"still one or more steps removed from creative performance and the measurement of creativity is therefore weaker".* (p. 321.) According to Hocevar & Bachelor (1989) biographical and personality characteristics attitudes and interests, are best described only as correlates of real-life creative behaviour and not direct measures of creativity.
To assess the impact of press or environment on creativity, Amabile and Gryskiewitz (1989) developed the *Creativity Environment Work Environment Inventory (WEI)* to measure three basic aspects of a work organisation or environment: skill at management of innovation by local supervisors; motivation for innovation as it arises from the organisation; and resources for innovation, including materials and time. Developmental research indicated satisfactory reliability and validity for the WEI.

3.10. Ratings by others.

Ratings by Teachers, Peers, and Supervisors, tend to assess the person as a whole. Researchers vary considerably in the criteria they use when asking for ratings of creativity. The whole domain of teacher, peer, rating is encumbered with complex

issues. In Hunsaker's (1994) study, teachers saw giftedness as greatly varied but having the same common characteristics as creativity. However, when observing for nomination to gifted programs teachers focused on classroom performance to a greater degree than creativity, even though their personal conceptions were dominated by creativity. there was an interplay of official definitions and teachers' personal conceptions.

In Fryer & Collings's (1991) study into teachers' views about creativity, creativity was perceived mainly in terms of imagination originality and self expression. Only half of the sample of 1028 teachers and lecturers regarded divergence as synonymous with creativity. The distinguishing feature of teachers highly oriented to creativity was a preference for pupil centred learning.

In his study of Parents' and Teachers' ratings of the creativity of children, Runco (1989a) used the *Adjective Checklist [ACL]* (Gough & Heilbrun 1980), and the *Parental Evaluation of Children's Creativity. (PECC).* The study suggested that there was an overlap between parental conception of creativity and the *"implicit theory"* of teachers. There was sufficient evidence that the parental conceptions of creativity differed from that of other groups, the parental ratings differed from the ratings given by teachers. Socially valid measures for parental ratings of the creativity of children were intended to complement conventional measures, not replace them (Runco & Schreibmannn, 1987). However, the question of whether parental ratings predict real world creative performance still needs to be addressed. Considering peer rating, in Runco's, (1991) study where children were evaluating ideas given by other children, there was significant relationship between divergent thinking and evaluative skill. The results of multivariate analyses using divergent thinking test scores and evaluative scores implied that the association between evaluative ability and divergent thinking has some generality. Hocevar & Bachelor, (1989) concluded that peer nominations, supervisor ratings, and teacher nominations were often inadequate indicators of creativity due to the rater's inability to discriminate creativity from other traits. Also these methods did not guarantee that the raters would have the knowledge and intention to actually

consider criteria that had bearing on real-life creativity in making their decisions. Lubart (1994) pointed out that person-centred creativity judgments were subject to halo-effects correlating highly with other positively valued ratings by the same judge and were very subjective and often based on a single judge's opinion.

Eminence ratings are valued as an extension of the concept of ratings by peers or supervisors. Eminence ratings represent a field's or society's judgment of a person's accomplishments as a whole. Eminence is particularly useful for studying creativity over large time frames and obtaining relative rankings of historical cases of creativity. (Simonton, 1984). Eminence ratings have a tendency to account for more than just creativity and are often unavailable for contemporary creators. Although most researchers treat creativity as a normally distributed trait the argument that it is limited to a very small segment of the population is a worthwhile consideration (Hocevar & Bachelor, 1989).

3.11. Assessment by products.

The judgment of 'creative' products is considered one of the most central measures of creativity. Creative products, those ideas which can be expressed in an observable form are fundamental to the definition of creativity. The judgments are based on tangible work that is subject to examination by independent observers.

Concerning the objective analysis of products, Ghiselin (1963) inferred that it should be possible to analyse objectively the *"intrinsic quality"* of products to determine whether they are creative. There were no specific methodological guidelines however. Products that did not lend themselves to mathematical description were difficult to assess with clear cut quantification. Another problem with judged products is that they represent only a limited behavioural sample of the individual, unless it is also possible to examine a portfolio of naturally produced work from each individual.

According to Amabile (1983) conceptual definitions have to be directly tied to assessment procedures, *"Nearly all current definitions of creativity are conceptual rather than operational and were not intended to be translated into actual assessment criteria."* (p. 30.) The creativity assessment technique used in Amabile's program of research is grounded in a consensual definition of creativity - an explicitly operational definition that implicitly underlies most subjective assessment methodologies. The consensual definition is based on the creative product. Amabile (1983) suggested that we must *"somehow quantify our notions of what makes a creative product and specify objective means for assessing those qualities..."* (p. 26.) because of the difficulties in making strictly objective assessments of creative products, she concluded that *"the assessment of creativity simply cannot be achieved by objective analysis alone. Some type of subjective assessment is required."* (p. 27.)

Amabile (1982a, 1983) conducted extensive research on judging products for creativity with consensus techniques. 1 Several judges view a set of products and rate them for creativity using numerical scales. Each judge works alone, The judges' individual ratings for each piece of work are averaged together and the composite score is used. The judges can be peers or experts. They can use their own personal definition of creativity to guide their ratings or use specific guidelines from the researchers. Judges' ratings are affected by both the relative quality of the products in the set and by the judges absolute standards for creativity. When multiple judges are used, the combined products ratings show high reliability (Amabile, 1982a, 1983; Lubart & Sternberg 1995)

Getzels and Csikszentmihalyi (1976); Jackson and Messick (1965); and Sobel and Rothenberg (1980) discussed the criteria by which products should be judged, agreeing that the major responsibility for assessing the creativity of a product is placed on the values and experience of the judge(s). Subjective judgments of products are fraught with problems particularly, what do judges mean when they call something creative? Lewis and Mussen (1967) found that teachers, when

1.. *Consensual because the evaluations of creativity are based on a consensus of experts in whatever domain is being accessed by the tests.*

asked to comment on their creativity ratings of children's art said that 'original art' is contemporary, abstract and spontaneous while art with 'artistic merit' is old representational, dull and mainly pleasing. Many subjective assessment procedures fail to differentiate between the creativity of the products and other constructs such as technical correctness or aesthetic appeal. Hocevar & Bachelor's (1989) report indicates that *"Judges fail to discriminate creativity in writing from the technical quality of writing."* (p. 69). Directly subjective assessment methods often suffered from unreliabilty or from sampling techniques that made them sensitive to individual differences. Lubart (1994) suggested that a major problem with judged products was that they represent a limited behavioural sample of the individual.

In an effort to identify what attributes of the product contribute to its creativity, Besemer & Treffinger (1981) formulated a theoretical model, the *Creative Product Analysis Matrix CPAM.,* proposing that groups of related attributes cluster along three different but interrelated dimensions, novelty,(degree of originality) resolution, (degree to which the product resolves the problem implied by its creation) elaboration and synthesis, (stylistic attributes of the finished product). Besemer & O'Quin (1987) found that elaboration and synthesis do not load consistently together as a separate dimension. Selecting a variety of products, they formulated a judging instrument based on CPAM called the *CPAM Adjective Checklist.* (to which in the light of their 1987 findings, they proposed modifications). Besemer & O'Quin (1986) introduced a new version of the judging instrument based on the CPAM called the *Creative Product Semantic Scale.* (CPSS) which they proposed was an important step toward the systematic study of creative products.

3.12. Self reporting.

Self reports of creative activities and achievements involve asking individuals what their creative achievements have been. To assist reporting, several checklists were developed covering different domains (Hocevar & Bachelor, 1989). Richards,

Kinney, Benet and Merzel (1988), formulated the *Lifetime Creativity Scales* which uses a structured interview to gather information on vocational and avocational creative accomplishments. Self reports of creative performance could be useful indicators towards long term natural creative behaviour. Unfortunately they could also be subject to serious reporting biases. Hocevar & Bachelor (1989) considered assessment of creativity through the analysis of creative products or through the administration of an inventory of creative activities and accomplishments the best of the currently available assessment strategies. Pickard (1979) *"Creativity is an essentially qualitative thing and requires a mode of assessment which can respect its qualitative dimension. Because the development of knowledge takes place in every day situations items for assessment could be drawn from these contexts."* (p. 97.)

3.13. Summary.

Certainly there is sufficient indication that the discriminative use of a variety of assessment approaches concurrently will give a holistic and perhaps more reliable perspective concerning the creativity of individuals and their products. With reference to Amabile's (1983) counsel, care must be given to choose approaches where conceptual definitions are directly tied to assessment procedures. Both objective and subjective means of assessment are valuable. By implication the study of creative persons and their products involves countless variables, the assessment of creativity surely must be analogous to making order out of chaos. However, one thing is self-evident, the creative person and product whether formally assessed or not, once encouraged, tends not to hide its light under the proverbial bushel, but shines brightly with its own exclusivity amongst comparably duller things.

Once recognised pink elephants are easy to spot in a crowd.

Table 1.

Examples of items used in tests of creativity

1. Ingenuity (Flanagan, 1963)

a. A very rare wind storm destroyed the transmission tower of a television station in a small town. The station was located in a town in a flat prairie with no tall buildings. Its former 300-foot tower enabled it to serve a large farming community, and the management wanted to restore service while a new tower was being erected. The problem was temporarily solved by using a____.

b. As part of a manufacturing process, the inside lip of a deep casting is machine threaded. The company found that metal chips produced by the threading operation were difficult to remove from the bottom of the casting without scratching the sides. A design engineer was able to solve this problem by having the operation performed _____.

---

2. Unusual uses (Guilford, 1954)

Name as many uses as you can think of for:

a. a toothpick
b. a brick
c. a paper clip

---

3. Consequences (Guilford, 1954)

Imagine all of the things that might possibly happen if all national and local laws were suddenly abolished.

---

4. Fable endings (Getzels and Jackson, 1962)

Write three endings for the following fable : a moralistic, a humorous, and a sad ending.

THE MISCHIEVOUS DOG

A rascally dog used to run quietly to the heels of every passerby and bite them without warning. So his master was obliged to tie a bell around the cur's neck that he might give notice wherever he went. This the dog thought very fine indeed, and he went about tinkling it in pride all over town. But an old hound said . . . .

---

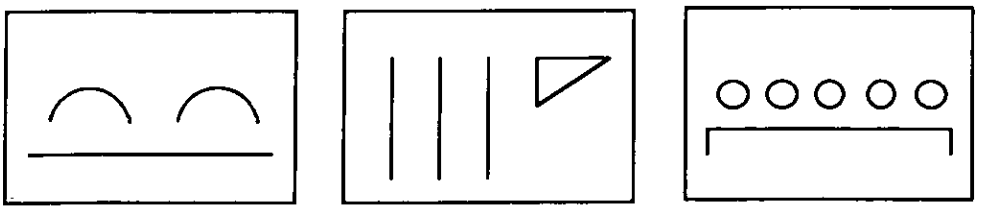
5. Product improvement (Torrance, 1962b)

The subject is presented with a series of objects such as children's toys or instruments used in his particular occupation and asked to make suggestions for their improvement.

---

6. Pattern meanings (Wallach & Kogan, 1965a)

The subject is shown a series of patterns of geometric forms (like the samples shown below) and asked to imagine all the things each pattern could be.



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7. Remote associations (Mednick, 1962)

Find a fourth word which is associated with each of these three words:

a. rat ---- blue ---- cottage
b. out ---- dog ---- cat
c. wheel ---- electric ---- high
d. surprise ---- line ---- birthday

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8. Word association (Getzels and Jackson, 1962)

Write as many meanings as you can for each of the following words:

a. duck
b. sack
c. pitch
d. fair

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9. Drawing (Getzels and Jackson, 1962)

Draw a picture in the space below to illustrate the title - 'PLAYING TAG IN THE SCHOOL YARD'. You can draw whatever you like as long as is seems appropriate.

Hilgard, & Atkinson (1967) p. 390.

Chapter 4.

Creativity and children.

There are a number of qualities [1] not possessed by the young child which are considered essential to creative thought but because the developing child has rarely been a subject of studies of creativity, the relationship to creativity of some of these qualities lacks adequate analysis.

With young children the ability to think creatively appears to be linked to a number of factors, such as conceptual knowledge, age, play, environment, and intrinsic motivation. Behind each of these specific factors lie the general issues of learning and the universality of creativity in children. Creativity apparently requires a foundation of conceptual and strategic knowledge (Alexander, Willson, White, & Fuqua, 1987; Gelman, 1987; Sternberg & Lubart, 1991). Knowing something about the concepts under thought (conceptual knowledge) and having cognitive and metacognitive strategies required to generate original ideas or products (strategic knowledge) have been described as prerequisite to creativity. It can also be possible that a child's faulty concept formation, providentially produces viable and or original constructs.

Anderson (1959) considered the creative process as development which was characterized as a goal oriented and constructive process of positive change. Already acquired schemes or structures had to be given up by process of differentiation in order to come to new and higher forms by new integration. According to Bruner & Olson (1978) the mastery of any act depended on both the acquisition of knowledge required for choosing between alternatives and the acquisition of skills or procedures for utilizing that knowledge in attaining some goal. Nowak-Fabrykowski (1992) too, suggested that creative ability built upon the process of learning and required abilities of independent and critical thinking.

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[1] *for example, cognitive flexibility, breadth of attention, fluidity of thinking, critical thinking skills, multidimensionality,*

It would appear that one of the key issues for consideration should be, how high an order of cognitive mental functioning is deemed necessary for creative operation and whether children could meet this level. There is some debate relating to this issue. According to Flavell (1986) many three and four year olds do not respond differentially to appearance and reality, and as Lavatelli (1970) stated, think in concrete not abstract or metaphoric terms.

Pickard (1979) stated that a child's constructions of reality are qualitatively different from those of the theoretically mature adult, so too, she said, are his/her reconstructions. Pickard argued that true creative thought was not possible for the child because unless reality could first be constructed it could not be reconstructed. Also the quality of the reconstruction would be dependent upon the level of initial construction of it. Thus, according to Pickard, the ability to be creative, to reconstruct reality, was dependent on the ability to understand or construct it in the first place. As Pickard pointed out the four year old interpreted reality in ways significantly different from the sixteen year old. This was due to a lack of experience and cognitive maturity which would enable the child to construct reality in a qualitatively different way. If understanding was secure there was a greater chance of playing around with ideas and of producing new ones. However, she noted that within the structure imposed by the limits of cognitive development individual differences in construction did occur.

Necka (1986) in discussing whether children were creative or not differentiated *'childlike'* creativity. On the nature of creative talent he noted that " *a child's creative talent is incomplete: high levels of ability are not balanced by mature motives and field related skills."* (p. 138.)

In contrast to the notion of creativity as high-level functioning which excluded young children, there was a belief that creativity could be facilitated in the early childhood period. (Tegano, Moran & Godwin, 1986). As Urban (1991) put it *"Every child might be described as creative, because all children have the need for newness - a central motive for human development."* (p. 177.) Amidst the chaos and flow of a child's daily life moments of creative insight and change occurred, these were significant

for his/her development. According to Russell (1956) childhood and creativity belonged together inseparably, since learning, including all processes of change which lead to new forms of behaviour could be seen as a creative process.

Urban (1991) proposed that in Piagetian terms the assimilation and accommodation processes of the very young child and the first acquired schemes and plans were creative achievements. He asserted that the initially more or less undirected but later directed explorative and curious activity which was natural and proper for every normal child could be seen as the root of creativity. As Nowak-Fabrykowski (1992) puts it *"Learning also requires transformation of reality in novel ways and incorporation of cultural symbols and conventional knowledge into personal world."* (p. 268.)

Focus on creativity with preschoolers stemmed from a realisation that the roots of mature creativity can be traced back to early childhood. (Harrington, Block, & Block, 1983). Dacey (1989a) proposed that the period (0 to 5yrs) was one of the peak periods of creative growth across the lifespan. He argued that the first year and a half of life was the most crucial due to the amount of development during that time with regards to the microneuron growth in the brain.

Many developmental theorists pointed to the ages of four to seven years as a highly creative period. Piaget (1962) said that the preoperational stage was characterised by intuitive thought. Children engaged in decentering developed transductive reasoning and learned to associate and reverse events. As Piaget suggested, "Concrete active interaction" with the world, built the conceptual foundation of the child's mind. To understand the abstract qualities of the world children required contact through their senses and the opportunities to master their environment.

Podyakov (1990) in his study of preschool children, asserted that in the process of acquiring and mastering something a child interpreted a new knowledge and a new ability through his/her own understanding of the world and enhanced it with personal skill, a process which was unique and unrepeatable. A new creative knowledge transformed itself with each child and took on its own nuance and its own qualities.

Podyakov maintained that in this process obvious existing individual differences in children were apparent. He reported that, some preschool children showed a certain real creativity whilst mastering new knowledge and skills. The children posed the adult with a mass of questions which developed in them the actualisation of previous skills, allowing them to witness and think about new skills from quite unexpected areas. Also the profound application of new and already acquired skills from the establishment of original interesting guesses could be seen, (guesswork examples which were not pre-programmed by the contents of their development). These processes appeared to be the basis of those unexpected acts of creativity which were conceived and realised by the children instantly. Podyakov continued, the creative process was considered a particular form of qualitative transition from that which was familiar, to the new and unfamiliar. In children this transition realised itself in the process of various forms of searching for action directed towards solving new (and for the child), unusual problems. The more diverse and varied the attempted solutions the more flexible and original the investigative action, the greater the possibilities of achieving a new and unusual result in the final analysis. During this process the child acquired new material which served as the basis on which original concepts, ideas, pictures and structures etc. would be built.

The relationship between play and the creative process was considered critical for the child's development. (Hogan, 1988). Torrance (1964) noted that the first manifestations of creative behaviour included experimenting manipulating and constructing with objects ;also early drawing production expressing feelings and experiences; and early language, curiosity and questioning.

Constructions and products which were new and original for the child were more or less the incidental result of playful action. Matthews *et al* (1980), Saracho, (1986), identified creativity as a component of children's play. Certain aspects of play were closely related to dimensions of creativity, including the use of materials and construction, role taking and a child's initiation of activities (Saracho, 1992).
Enger (1989) asserted that fantasy play was critical to maintaining human uniqueness and vitality because through play children applied their power to make symbols.

Singer (1973) found that in three and four year old children creativity developed best when they played different types of imaginative games. In the developing child, perception became increasingly conscious, concise and intentional and play became more goal and gestalt oriented and the contents and products of creative behaviour changed. The child learnt that certain kinds of products were more socially rewarded and accepted than others. For a product to be creative it needed (by consensus) two components, originality/novelty and usefulness/significance. Given that these two criteria were prerequisite for a creative product, the question was, whether children could be truly creative. Thurstone (1952) pointed out that even though a discovery may have already occurred, if it was new to the thinker then it was a creative act.

For Engel (1993) "*Although* ....(children).... *need not invent a genuinely novel technique, the experience of discovery or exploration must be apparent in their activity.*" (p. 310.), and in this way children could demonstrate a number of creative acts that involved creative processes. However, creativity was viewed or expected to be original for a child when the comparative base was that same child. Although children could generate original and useful products they were not usually at such a sophisticated level to contribute to an area. If age norms were taken into consideration then it was feasible to talk about children being creative and study their creative processes.

Gardner's (1989) case study approach revealed that children experienced change in the creative mode in fits and starts but these moments had a traceable history. The strands of experience leading up to creative insight or change came from many aspects of the child's life which were both external and internal (Goldsmith 1992, Zimmerman, 1992)

Ghiselin, (1952) maintained that because traditionally, creative activity was thought to be intrinsically motivated and personalized from the depths of one's unique self, it was not predictable, imitative or trained behaviour. Contrastingly, Torrance (1965), Bloom (1985), Montessori (1964) argued, what any child could learn, almost all children

could learn, given the appropriate conditions of learning. Torrance (1971) claimed that creativity viewed as a skill was teachable and suggested (1981) that educators must cultivate creativity especially in the early years.

Accordingly, it would seem wise to create an environment conducive to creative processing. It was noted by Hogan (1988) that in order to develop creativity there was a need for a stimulating and enriched environment, but as Cropley (1983) pointed out, the risk that socialising authorities could inhibit creativity also needed consideration. Furthermore since creativity required effort on the part of the individual the task should have some intrinsic motivation or hold personal interest. (Amabile, 1983; Hidi, 1990; Sternberg, 1988). This interest would help to sustain involvement and motivate the individual to overcome difficulties with problem solving.

Nowak-Fabrykowski (1992) said that *"Being able to create is to fulfill some of the following relationship between the symbol and the referent: find a way to do some action, find an attribute of an object or event, evoke an image or an idea, discover representations for an object or behaviour, discover new meaning(s) and new referent(s)".* (p. 271.) Children can fulfil this relationship through observable events in play and learning situations but in order to fully understand children's creativity it would seem reasonable to better understand the child's world: in terms of the child's vocabulary, ideas symbolically expressed, and his/her own way of creation.

The understanding of the nature of creativity as manifested by children is essential in order to recognise and assess it in children, which leads us to the next chapter.

Chapter 5.

Creativity assessment - with particular reference to children.

The previous chapter looked for the 'essence' of creativity in children and recognised the need to understand the child and his/her world. The 'essence' of creativity for children is developmentally different from that of adults, hence there should be methods of assessing creativity in children that are sensitive to these differences. Searching the literature it is found that much of the research into creativity has assumed explicitly or implicitly an adult model. There have been few studies of the development of creative thought, notwithstanding the work of Feldman (1980, 1982), Feldman & Benjamin, (1986), and Winner (1989) who looked only at the development of artistic creativity.

The recent work on creativity assessment with children, as with adults, indicates a growing trend towards qualitative assessment, (Urban.1991; Podyakov 1990; Hennessey & Amabile 1988a) advocating the use of real life measures of creativity, to assess real-world creativity. Dudek (1992) too, stressed the importance of studying real world creativity and the importance of longitudinal studies of creative individuals.

The increased attention to the type of criteria used to measure creativity, more specificity to the variables being investigated,are especially evident in current ideas on assessment. The notion that creativity may be too abstract a criterion was supported by (Runco 1989b) who found that when judging the artwork of children, professional artists disagreed more about creativity than originality, technical skill and aesthetic value.

Creativity assessment with children requires special consideration, if only, based on Elkind's (1980) observation that it is extremely difficult to really understand children's thinking levels when an adult can function at cognitive levels above those of the child. He stated that it is almost impossible for adults to understand how a child

processes information when the adult is automatically functioning above the child's maximum cognitive level. If, as Elkind (1981) says, children are "cognitive aliens", it implies that either we get better at understanding children or we continue to rely on quantitative objective measures which may or may not fit the developmental aspects. Elkind's metaphor 'cognitive aliens', was supported by Runco & Vega's (1990) proposition that adults may have difficulty judging the ideas of children because children think in a manner which is qualitatively different from that of adults. In their study evaluating the creativity of children's ideas the results indicated that teachers were no better than parents or other adults at evaluating the ideas of children.

Shuttleworth (1939) suggested that children demonstrated great differences in average mental age growth during particular time intervals in their lives, while Epstein (1974, 1978, 1979, 1981) related the physiological growth of the brain to previously known information about the mind's capacity to grow in its ability to process information at progressively more difficult stages. Epstein's data suggested that the brain grows in a stage-wise manner. Special mind and brain growth periods were described as 'phrenoblysis.' He estimated that as many as 85% of children may experience this pattern of stages in physiological brain growth. Epstein's concern was to identify the implications of such scientific data for developing educational strategies which might enhance teaching and learning for children. Epstein proposed that the relationship between brain and intelligence development in humans might explain the developmental learning stages established by Piaget.[1] Many researchers (Lubeck & Bidell, 1989; Dacey, 1989a; Burns, 1989) have argued that creativity can be integrated within Piaget's general framework.

Conversely, Pickard (1979) argued that children cannot be creative.When creativity was interpreted as the reconstruction of reality, it was an ability considered beyond the reach of the child. Pickard maintained that to construct and reconstruct reality with

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1 *Piaget concluded that creativity which he referred to as creative imagination is gradually reintegrated in intelligence as children age. During the developmental process the creative imagination increases. An ability to evaluate a situation from a myriad of perspectives was a necessary factor in the creative process. The nature of the creative process changed as the child progressed through the developmental stages. However Piaget was unable to account for how creative changes came about.*

an understanding of the processes involved, the individual would have to be Piaget's formal operational thinker.

In contrast to the notion of creativity as high-level functioning which excluded children, Engel (1993) proposed the following useful guidelines, *"Children can be considered to be engaged in a creative process when they use materials (including language) to express a feeling, image, experience, or idea. Although they need not invent a genuinely novel technique, the experience of discovery or exploration must be apparent in their activity."* (p. 310). This perception was supported by Feldman (1988) and Gardner (1989) who argued that creativity was an aspect of experience available to most children under certain conditions.

Toepfer (1987) stated that there was a need to ascertain the reality of cognitive limits to creativity, such that *"The use of creative problem solving activities appropriate to cognitive levels of individual children during their concrete operational developmental stage could become very helpful."*(p. 271). On the other hand, Brooks (1984) observed *"the notion that knowledge can be acquired via incremental skill or subskill acquisition, the sequence of which is pre-identified and imposed through adult logic applied to children's constrictions, ignores the primacy of the child's point of view. Yet it remains a preeminent foundation of our educational system."* (p. 24.) Brooks and Fusco (1984) specified that the child's point of view must be central to professional decisions regarding curricular adaptations, questioning techniques, and testing.

The notion of the child's point of view in terms of symbolisation is expressed by Nowak-Fabrykowski (1992) who reported that fantasy imagination and freedom given to children optimises their abilities to create and to use intrapersonal and extra personal information in developing their symbolic abilities that are crucial to learning. An understanding of symbolisation and the creative function that symbols play in the child's process of thinking is a major factor that may help teachers in understanding the process of learning in children, and therefore assessment. *"Teachers may help more effectively if they better understand the child's world; in terms of the child's*

vocabulary, ideas symbolically expressed, and his/her own way of creation." (p. 271.)

In the art of young children, Lark-Horowitz *et al.* (1973) pointed out that in drawing, children use their symbols. They create graphic language and use it their own way. This gives rise to the assumption that each child creating a picture affixes a special meaning to its lines and shapes. The symbolic picture expresses inner vision and evokes shapes, often meaningful only for the author. We need to tap into the inner vision to understand the child's point of view.

Podyakov (1990) states the case for a return to the developmental approach in the analysis of the creative process *" that a child in the process of acquiring and mastering something interprets a new knowledge and a new ability through its own understanding of the world,. These processes appear to be the basis of those unexpected acts of creativity which are conceived and realised by the children straight away, impromptu, in a breath."* (p.16-17.) The 'impromptu' moment is also recognised by other researchers, for example, Engel (1993) states that *"When a young child experiences an artistic insight or a burst of creativity it may be more fleeting than those of adult artists. Yet amidst the chaos and flow of a child's daily life moments of creative insight and change occur."* (p. 309.) Engel (1993) also suggests that the internal characteristics and external conditions which lead to creative 'bursts' vary from one child to the next, and by *"Compiling detailed portraits of these conditions and characteristics and the creative transitions they lead to as they occur in everyday life may help us to recognise and facilitate creative development in all children."* (p. 317.)

The question of how to assess this 'impromptu' moment of creativity in the young child is alluded to as Podyakov continues, *"The creative process is a particular form of qualitative transition from that which is familiar to the new and unfamiliar. . . During this process the child acquires new material which will serve as the basis on which original concepts, ideas, pictures and structures etc. which will be built. connected to this, one of the basic 'lines' of problem solving activity lies in the sturdy of children's investigative action.* (p.17-18.) According to Podyakov, the study of these

investigative actions, i.e.. the child's experimentations, characterised by the general intention to acquire new knowledge or to create a new product , a construction, drawing, story etc. is one of the new directions for research into creativity. Podyakov (1990) suggests that we can use child-centred and child-generated products to assess creativity in early childhood. The ideas also hold promise for assessment with older children.

In Franklin's (1989) *"convergence of streams"* the coming together of seemingly diverse or unrelated circumstances and processes may also characterise the interesting changes in children's creative work and may be a profoundly generative way of describing development in general.

Gruber (1988) asserted that great insights and important creative changes occur over time; but in the life of a child the experiences and interest contained in a shorter time may converge and shift in ways that produce meaningful change.

Podyakov (1990) suggests that the 'creativity' of children is always saturated with *'bright positive emotions.'* The varying forms of children's creativity is closely linked with a special class of emotion. Podyakov says that in every definite occurrence of the interaction of creativity and emotions is formulated a qualitatively unrepeatable unity, which determines the novelty and originality as the creative process and the end result.

The importance of affect or 'emotions' was supported by Russ (1993) in her studies of affect and creativity. She stated that affect is important in the creative process. Openness to affect states has been found to be related to divergent thinking and transformation abilities. In addition, she noted that induced positive affect states facilitated wider associations. Children who could permit primary process material (i.e. oral, oral aggression etc.) to surface in fantasy and play, in a controlled fashion, should be better divergent thinkers and more flexible problem solvers than children who have less access to primary process material. Dudek (1975) also found that primary process expression on a drawing task related to divergent thinking, while

Amabile (1983) stressed the importance of positive affect in intrinsic motivation and Dansky and Silverman (1973) found that children who played with materials over time provided more novel responses to the objects. They concluded that play assists children to develop their creative thinking.

Saracho (1986) suggested that identifying the discrete play variables which were strongly related to cognitive style could help to identify optimal environments for young children's play, intellectual development and creativity. Zimmerman (1992) suggested that the teacher not only has an idea of a child that affects the child's self-image but may determine which possibilities, activities, and materials are available to the child. These in turn determine the potential for creative activity.

Daugherty and Logan's (1996) study supported previous research that specific qualities reflected in private speech significantly predicted creativity measures in young children. Private speech was defined as overt self-talk that developmentally occurred during the pre-school years. (Vygotsky, 1962) It is speech that *" is a dialogue to self which guides and directs the behavior of the child* and *reflects characteristics and qualities of thought processing in young children."* (p. 9.) The subjects, were children aged from 5 to 13 years. old. The TCAM (The Torrance Test of Thinking in Action and Movement) was administered to each individual child. Verbal responses were accepted and recorded in detail. The tasks elicited a profusion of private speech. Each private speech utterance was coded into categories - task-irrelevant speech, non-facilative task relevant speech, task-relevant speech, coping/reinforcing speech and solving speech. Daugherty & Logan (1996) stated that the results supported previous research which suggested that specific qualities reflected in private speech significantly predicted creativity measures in young children. Solving speech strongly predicted fluency, originality, and average creativity abilities. Task related speech played a more significant role in predicting creativity attributes. As creativity scores increased, the semantic content of private speech became more oriented towards task execution. Private speech that monitored problem solving processes was apparent among children who scored higher measures of average creative abilities.

According to the authors the current findings indicated that private speech assessment is a viable tool for examining creative thought development and processes during the pre-school years.

Hennessey & Amabile (1988b) proposed story-telling as method of assessing children's creativity. They stated that not only should assessment methods identify creative children but should also be *"useful revealing the creative performance of all children."* (p. 235.) Assessment methods should be straightforward and reliably scored and allow for considerable flexibility in children's responses. When assessing differences in creativity arising from sources other than particular skills it is desirable to use tasks which rely less heavily on those skills. Hennessey and Amabile (1988b) reported that *"it seems unlikely that a general method of assessing novelty or appropriateness can be devised to satisfy the broad conceptual definition proposed by creativity theorists."*. (p. 237.) It may be prudent to rely on explicitly subjective judgments of creativity by observers familiar with the domain in question. If such judgments were shown to be reliable then they could be accepted as reasonable measures of creativity. (Amabile, 1982a)

Hennessey & Amabile (1988b) developed a method of assessing children's verbal creativity which relied on the subjective judgment of appropriate observers. The method involved the task of story-telling, an enterprise most children could do well regardless of their level of verbal skill development. The children's stories were transcribed and rated on creativity by teachers. Their studies demonstrated the practical use of the story-telling method of assessing children's creativity. A procedure of approximately ten minute duration elicited stories from children which were later rated on creativity with a high degree of interjudge reliability. Because the story-telling task was open ended and the scoring based on the subjective rating of stories *'relative to one another,'* the technique moves creativity assessment away from the sphere of IQ testing. Hennessey & Amabile found no correlation between rated creativity and children's age, (ages 5 to 10 years.) which makes the story-telling technique appear especially valuable in social developmental studies in children's creativity.

The match between the story-telling technique of creativity assessment and the definition of creativity as a novel and appropriate response to an open ended task, makes story telling similar to children's everyday activities. As Hennessey & Amabile *say "The story-telling technique of assessing children's creativity is useful for research into social-environmental creativity influences and for within-child or within-classroom comparisons, all within a theoretically sound methodology."* (p. 246.)

Alexander et al (1994) investigated the creative problem solving of young children. (Kindergarten - second grade) seeking to establish a context that would be promotive to creative processing for young children and then investigate children's performance within that context. Children were asked to provide endings to unfinished stories containing "ill-structured" problems, (i.e. a character trapped and in need of rescue) in a supportive risk-free context. Their responses were scored for fluency, elaboration, flexibility, originality, effectiveness, and realism. The authors felt that giving young children incomplete stories was a feasible way to examine their creativity. There was suggestion that the nature of the story task did not significantly alter the child's creative behaviour and that individual differences in creativity are quite evident even among young children. They did find however that the children offered realistic solutions to the story problem regardless of the nature of the text. The authors offered Galda's (1990) conclusion that fantasy was a more difficult genre for students to process than realism, as interpretation of this phenomenon.

Londner's (1991) was another qualitative research study to gain insight into the processes and means employed during creative thinking involving sixth grade students. Subject's verbalisations during the administration of the Torrance Test were used as data for analysis. The students were encouraged to talk aloud their thoughts as they completed open-ended tasks. (TTCT - picture completion). The transcribed protocols were taken and examined to discover surfaced process variables, namely content-bound linking, association shifting, story weaving and vantage. Content-bound linking was when the subject made an initial association with the presented line stimuli as either an already completed object or part of an object. Association shifting, a process variable category described as a subject demonstrating multiple

associations as to what the incomplete figure or evolving drawing could be. Connection-making was based upon shifts of association seemingly derived from visually made linkages. Story Weaving was described as a subject making a story up about his/her evolving drawing. connection-making involved in interweaving of elements drawn together by emotions, intentions, judgments or wishes. Vantage, a process variable, was noted in addition to the others, evidenced either by verbal protocol methods or by researcher observations noted during subject task engagement, subjects physically turned the test booklet around, sideways or upside down to gain a different vantage point for line/drawing association making.

According to Londner, the findings of the study suggested that subjects who were judged to produce more original products on figural completion tasks demonstrated process variables of connection making different in kind from subjects who were judged to produce less original figural completion products. The story weaving process was interpreted as reflecting the drawing together of elements in connection making which were integrated into picture content. The subjects who demonstrated process variables of story weaving most frequently produced more original end products. The process variables of Story Weaving, Association Shifting, and Vantage were more frequently revealed by subjects scoring above the mean. Content Bound Linking was most frequently revealed by subjects who scored below the mean. Londner also suggested that the study supported protocol analysis as a feasible methodology to gain insight into the creative thinking process.

Palmer's (1992) study used the connoisseurship and criticism model of qualitative evaluation developed by (Eisner, 1979) to monitor creative thinking abilities in children. Researchers (as observers) wrote criticisms to illuminate the complex processes and interrelationships within the classrooms of sample schools. Palmer maintained that the connoisseurship model could provide an increased insight into and understanding of classroom interaction, organisation of the curriculum for environmental education and processes that affected the development of divergent thinking abilities. It also provided a qualitative approach to understanding classroom life. The written criticisms of observers provided a wealth of data associated with this

focus.

Already mentioned previously is Rimm and Davis's (1983) GIFT inventory for identifying creativity, which has been found to be reliable for children at all grade levels excluding kindergarten. This *'characteristics approach'* provides a self identification procedure. If used in combination with other methods it provides objectivity and a normative frame of reference.

The limited view of creativity tests in the past motivated Jellen & Urban (1986) and Urban & Jellen, (1985, 1986) to address the various qualitative subcomponents of creativity and the qualitative changes during the developmental process, by the development of the Test for Creative Thinking-Drawing Production They regard the TCT-DP as a *"radical departure from these types of convergent tests, since it liberates the innovative mind from factual, problematic and/or punctilious reproduction of (academic) reality."* (p. 139.) The TCT-DP purported only to test creative thinking that manifested itself as a drawing production. Their stated objective was to consider not only divergent quantitative aspects of thought but also aspects of quality, content gestalt and elaboration. Jellen & Urban (1986) asserted that the TCT-DP allowed students of most age and ability groups to interpret and to complete *"what they conceive to be significant for the development of a creative product."* (p. 138.) In Urban's (1991) study the TCT-DP was administered to 272 children between 4 and 8 years of age. Qualitative analysis results identified six developmental stages of creativity closely related to general cognitive development, which are outlined in detail in *(Appendices. 4.4 and 10)*

Silverman (1985) describes Feuerstein's (1979) Learning Potential Assessment Device (LPAD), as a cognitive assessment model designed to measure cognitive processes during problem solving. During LPAD assessment, priority is placed on the determination of the specific types of thinking abilities children demonstrate in mastering cognitive tasks, rather than just on the solution itself. Results of dynamic testing produce an index of the individual's modifiability through experience rather than an estimate of his current functioning The LPAD uses a *'test-teach-test'*

procedure. This combines inferential questioning with direct training in a context of problem tasks that are interrelated and of increasing complexity. The process of assessing a person in the act of learning provides considerable insight into the ways in which that person attempts to learn and solve problem tasks. Torrance (1972a) *"Motivating and facilitating conditions certainly makes a difference in creative functioning but differences seem to be greatest and most predictable when deliberate teaching is involved."* (p. 203.) Although not designed for the specific role of creativity assessment , the LPAD gives valuable diagnostic information about cognitive processes involved with problem solving and creativity.

The urgent need for new measures to assess children's creative abilities and products accurately and effectively was noted by Hargreaves, Galton, & Robinson.(1996) *"It has been apparent for some time that standardized tests are inadequate for the real-life assessment of children's creative work in the curriculum but, at the same time, there are increasing demands for the development of valid measures of children's progress in arts education."* (p. 200.)

In Hargreaves, Galton, & Robinson's (1996) study where teachers evaluated children's products from activities which were operationally defined as either structured or unstructured in each of three art forms, visual art, music, and creative writing. The findings demonstrated that when teachers were given the opportunity to clarify their ideas and the ambiguities in the language used to describe children's work they were capable of substantial agreement about the quality of different pieces of work from different pupils and apparently made these assessments in unidimensional evaluative terms. Also, the more explicitly teachers defined the end-product of the activity which they set, the more rigorous they seemed to be in assessing the quality of the work.

Despite the advances made in assessment of creativity, a great deal of promotional work may still need to be done if Ford & Harris's (1992) contention that *"parents still prefer their children to be labeled 'intelligent' rather than 'creative."* (p. 196.) is true.

Chapter 6.

Children's art.

6.1. Drawing.

A standard method of creativity assessment can involve drawing production, e.g. "The Man-Drawing Test" (Goodenough, 1926, Harris, 1963). Torrance's (1968) "Circles Test" and particularly Urban & Jellen's "Test for Creative Thinking-Drawing Production" (TCT-DP) which is the focus of the main study. (Urban and Jellen, 1985, 1986, 1993) Therefore it would seem relevant to include a chapter that looks at children's art and drawing development.

From long experience in schools it has been noted that most young children like to draw, often from intrinsic motivation, it is not surprising therefore that examining children's drawings can divulge interesting information. Winner and Gardner (1981) stated that drawings have been studied from clinical and cognitive perspectives to give insight into and to assist the understanding of children's affective lives. From a cognitive perspective, drawings have been used to shed light on the inner child, as a measure of intelligence (Goodenough, 1926; Harris, 1963). as a means of determining a child's conception of space, as indications of personality structure (Altschuler and Hattwick, 1947), as reflections of the child's concepts (Piaget, 1963) and to reveal the child's cognitive strategies such as planning and sequencing (Freeman, 1980; Goodnow, 1977). Recently however, children's drawings have been studied for their intrinsic value and aesthetic properties such as those regarded in adult work.

Wilson and Wilson (1979) claimed that interactions among factors of biology, culture, skill mastery, and personal disposition influenced child development in art. Wilson and Wilson (1979, 1982, 1984) studied children's drawings in many contexts and concluded that reliance merely on innate factors can explain only a very early phase of graphic development. Visual realism, they asserted was a stylistic option

predominating in western cultures. Wilson and Wilson (1984) suggested that researchers should be aware when observing children's art, particularly in view of the children's attempts being *"to model after the images of others"* (p. 25.) However it is where children's art parts company with modelling *'after the images of others'* that the creativity researcher becomes interested.

The work of Bloom (1985) studying how the talents of young people developed, relied on retrospective interpretations. Zimmerman (1992) too, hypothesised that graphic development might be better understood by interviewing artistically talented young adults who were still close to their childhood creations yet mature enough to have insight into their past artwork and were able to discuss it. She documented the graphic development of a talented art student through his accounts of reactions to his own spontaneous art work. Several sources of data were used, audio-taped interviews, art work, etc. Content analysis was used to discover themes and their meanings and a comparative analysis was used to interrelate themes that appeared in his graphic development. It had its limitations because it was a case study of the graphic development of one individual, comparative studies would be needed with results of other studies before generalisations could be drawn about the characteristics of art works and their creators. Content analysis and connections to a theme have tremendous importance when drawings are used for creativity assessment (particularly with the TCT-DP).

Zimmerman (1992) believed that ability to depict the world realistically was only one indicator of artistic talent, an idea that was also supported by Gardner's (1983) "spatial intelligence". Other ways to depict visual narratives included using theme and variations, humour, puns, paradoxes, metaphors and deep emotional involvement. Personality factors also played a part in determining which artistic skills, knowledge and understandings were developed. Graphic development when viewed from a multifaceted perspective included family background, culture, skill mastery and personal disposition.

Winner (1989) suggested that children's drawings are studied because of what they

reveal about children's ability to represent and because of the strategies they use to represent in a graphic medium. (Freeman, 1980; Goodnow, 1977). This notion is usually accompanied by the belief that a striving for realism is natural and universal. When children's drawings are viewed as glimpses into the child's representational skill, the young child's drawings are seen as less developed than those of the older child. Drawings are not just representational but reflect aesthetic skill. However, as Winner points out, when children's drawings are seen as a window on the child's aesthetic sensitivity, the simple playful drawings of very young children may seem more advanced than those of older children who have *" sacrificed invention for convention"*. (p. 200.) Winner (1989) elaborates further, with regard to the effect of cultural influences on artistic development, that generally preschool aged children are allowed to invent their own graphic equivalents for objects. Only after an initial period of play and invention are children taught the cultures' rules for graphic representation. The extent to which the adult artist's ability to go beyond established procedures draws upon the early period of play and invention, before the imposition of convention. This is an issue which may have some bearing on potential creative ability. (A conviction shared by Singer, 1973; Engel, 1993).

On a more general note, Rosenblatt & Winner (1988) suggest that development in the arts involve not one unified course of growth but rather three separate and distinct lines. Perception, which proceeds linearly and is not marked by stage like properties. Production, which follows a U-shaped curve and is clearly defined into characteristic stages. Reflection which entails thinking about the process of making, and the final product utilises the ability to reflect about one's goals, decisions, and solutions, as well as about the influences of the works of others on one's own work. Reflective skills are found to develop late: not until adolescence and seem to progress linearly with age, but also mirror the development of more general knowledge and conceptions of the world.

6.2. Drawing development.

It is generally agreed that children's drawings change legitimately with age and

substantial consensus has been reached in working out a description of the sequences of drawing development. The order, timing, and nature of the sequences may differ amongst groups of non-western, disadvantaged or gifted children.

6.2.1 Symbolising through scribbles.

Between the ages of 1 and 2 years children begin to scribble with whatever tools they can get their hands on. Even very early scribbles have been shown to be experiments in representation, although scribblers rely on gestural rather than pictorial representation. The symbolic status of early scribbles is revealed if the child is observed or overheard in the action of drawing. Usually by the age of three or sometimes earlier scribbles symbolise pictorially. Children often begin to make a gestural scribble and then notice it looks like something The scribble is then named and further elaborated.

6.2.2. Early pictorial representation.

Children's early pictorial drawings begin to proliferate around age four and are schematic and generic. Children invent simple visual equivalents for objects and do not attempt to show much of the object's actual visual qualities, "*the child draws what he knows, not what he sees,*" Luquet (1927)

Typically, children select the most salient features of the generic form of an object and depict these features using simple geometric forms, circles, stick lines, squares, dots. These basic shapes are joined where the features of the depicted object join. Forms are built up out of units rather than depicted with a single fluid contour line. Moreover the figures are general and depict whatever the child chooses to draw.Drawings produced during the preschool years are playful and inventive, spontaneous, fanciful, non stereotyped and aesthetically appealing. Children at this age are unconcerned with realism and appear to play with form and colour simply for the visual effects yielded. They are not governed by the goal of visual realism. Each object or part is

accorded its own separate bounded space even at the cost of realism (Goodnow, 1977). Children invent visual equivalents for objects rather than mimic adult schemas. The qualities of playfulness and inventiveness in the years from four to seven make this a period of significant development. (Gardner, 1980; Rosenblatt and Winner, 1988; Winner, 1982) Children of this age become deeply involved with drawing. They draw often, and for extended periods in intense concentration.

6.2.3. Late childhood and adolescent drawings: Convention and realism.

During the middle elementary school years children enter a "conventional" or "literal" stage and they become governed by the efforts to draw realistically or to mimic adult conventions of drawing such as those of cartoons and caricatures (Gardner, 1980; Lowenfield and Brittain, 1970; Luquet, 1927). Their drawings appear more literal-minded and rigid and stereotyped. The child at this age (10 years) seems dominated by the goal of drawing things the way they look or the way they look in pictures. At this age children show a heightened interest in mastering adult techniques (e.g. perspective, shading, foreshortening), and educators begin to step in and correct the child's drawings and model adult schemas for representing the world as it appears. Some have noted that the child's new interest in mastering the rules of realistic representation is accompanied, at least at first by a decline in inventiveness, and playfulness. (Gardner,1980; Ives, Silverman, Kelly, and Gardner, 1979; Winner and Gardner, 1981). The child is in the process of mastering skills and techniques. Children in middle childhood become less interested in drawing and draw less and with less intensity than do preschool children. To the extent that if children do draw with interest this activity usually occurs at home (Wilson and Wilson. 1977).

Drawing ability and drawing activity level off in the preadolescent years for most children. It is only the child with exceptional interest and ability who continues to draw and develop in drawing during adolescence and beyond. To the extent that techniques of realistic depiction are held up as the ideal endstate, then children's drawings must be seen to improve linearly with age. But to the extent that

inventiveness and play with form are held up as the ideal, then children's drawings may be seen to decline in quality after the onset of the school years.

6.2.4. Development of drawing in the artistically gifted child.

By the time they have reached four or five there is no problem in identifying very artistically gifted children (Gordon, 1987; Winner and Pariser, 1985). These children are precocious in their ability to draw realistically (Gardner, 1980; Gordon, 1987; Hurwitz, 1983; Pariser, 1985; Wilson and Wilson, 1981). The first sign of precocious realism in gifted children's drawings is that, in place of static schematic figures built up out of geometric units, forms are captured by a confident, fluid contour line that seems to capture the movement of the figure (Clark and Winner, 1985; Gordon, 1987. Pariser, 1985). Once the children have begun to draw, the ability to capture the contour and the movement of forms is accepted as the earliest sign of precocity in drawing. Early drawings by the gifted also tend to be richer in decorative detail than those of non gifted children (Clark and Winner, 1985; Gordon, 1987).

In one very important respect, however, early drawings of the gifted are similar to those of ordinary children: They are free, imaginative, inventive and expressive. Hence, although precocious realism and an interest in decorative detail are signs of giftedness in drawing, early drawings by the gifted have the same quality of 'richness' as do drawings by ordinary children of the same age. Gifted children draw more than average children do, and their drawings tend to be programmatic - developing a thematic focus. During the middle childhood years children become intensely involved in mastering conventions of realism. Thus gifted children enter a 'conventional' stage like ordinary children with the same decline in inventiveness. (Clark and Winner, 1985; Pariser, 1985). Gordon (1987) suggested that the childhood art of artists becomes more faltering and less spontaneous and less self assured during the middle childhood years.

Winner (1989) stated that the difference between gifted children and others is that

the gifted children arrive at the conventional stage earlier, achieve much greater levels of skill, and usually do not lose interest in drawing during adolescence. Furthermore inventiveness and playfulness returned in full vigour in the adolescent and adult years. Winner (1989) said the research suggested that children skilled in drawing have some unusual visual abilities that differentiate them both from the non gifted and from children gifted in other domains.

6.3. Conclusion

In conclusion, the high esteem and profile held by the researchers in the field for the cognitive and affective perspectives of children's art work is encouraging, especially considering that drawing production will provide the principal raw data to assess creativity. This study's directive is not towards identifying and analysing gifted artists, but rather to use drawing as a natural activity for the child, gifted or otherwise in giving insight into creative abilities.

The effect of cultural influences on artistic development,and cultures rules for graphic representation, particularly those which may have some bearing on potential creativity, are issues which excite exploration but are beyond the scope of this study. Although, it has to be regarded as too simplistic to perceive 'creativity' as manifested in drawing production, as merely the product of those individuals who have not *'sacrificed invention for convention'* nor attempted *'to model after the images of others'* the consequences for creative development in enabling individuals to explore and go beyond established procedures cannot be ignored.

Chapter 7.

The Research Studies.

7.1 Aims of the studies.

The literature about creativity reviewed in the previous chapters suggests that creativity is a very complex, nearly elusive phenomenon. However, Chapter 1., has shown that despite the difficulties of defining creativity, few doubt its existence. Chapters 2 - 5., have shown that despite the difficulty of establishing a theoretical basis, there are practical ways of assessing creativity and the consequences of establishing best practice are considerable, especially in children. Chapter 6 has shown that art can be a means of assessing creativity in children and that the TCT-DP is a recently developed culture-fair test, the usefulness of which needs to be established and which can be used to answer questions about the assessment of creativity in primary school children.

As Ford Harris (1992) succinctly put it, *"Creative individuals see what everybody else has seen but think what nobody has thought"*. (p. 192.) If only for this one glorious precept, creativity is a vitally important component in children's education since self expression is essential for growth. It can be argued that our society with the assistance of its schools often stifles children's ability to see *"beyond the norm"* and to defy the *'status quo'*. Concern for the preservation of *'self expression'* within the school curriculum prompted the general aim of the studies to:

- **raise an awareness of creativity in the primary school, and to promote its survival in the National Curriculum.**

The more tangible and specific aims of the studies in support of the general aim were to:

- **explore and implement a standardised culture-fair screening procedure for assessing creativity in the primary school, in order to establish a viable support for teachers in the identification of creative individuals.**

- **evaluate teachers' ideas about creativity and if and how successfully they assess it.**

Hunsaker (1994) argued that the whole domain of teacher rating is encumbered with complex issues, not the least, the interplay with official definitions and teachers' personal conceptions. Fryer & Collings' (1991) study indicated that in Britain, creativity is seen as mainly relevant to the creative arts.

Fryer & Collings (1991) suggested that teachers in this country may be unaware that creativity tests exist or that teachers regarded the available tests as inadequate. Related to this was the aim to:

- **create an awareness that testing can be relevant to the identification of creativity.**

Common to teachers is the experience of the interaction of many complex factors when children are asked to perform a task, involving concentration, comprehension, motivation and application amongst others, suggesting that it seemed relevant to explore the effect of alternative verbal instructions to the TCT-DP, so another aim was to:

- **explore the effects of alternative instructions.**

Hattie (1977) reported that Christensen, Guilford and Wilson (1957) found that asking subjects to 'be clever' enhanced performance compared with neutral instructions, yet subjects who were disposed toward making clever responses did so whether or not they were explicitly instructed to do so. Furthermore, Dentler and Mackler (1964) found that when compared with a formal condition, a psychologically safe condition, in which the tester presented himself as friendly and pleasant , increased originality. Hattie (1977) suggested that high and low stress did not significantly alter creativity scores, whereas a controlled or neutral situation raised scores. Hattie (1977) cited Ward et al's (1972) studies, which provided information as to the ordinal positioning

of subjects after altering instructions, suggesting that changing instructions merely added a constant to individual scores.

Crockenberg (1972) stated that reliability data suggested that there is much situational specificity in creative performance, that creativity tests simply sample behaviour under specific conditions and that one must not expect similar behaviour under different conditions. Hattie (1980) proposed that creativity tests administered under different conditions lead to differences in performance.

The confluence theories of creativity illustrated by Mumford & Gustafson (1988) amongst others, proposed multiple components, cognitive, personality, motivational and environmental needing to converge for creativity to occur. Story-telling is arguably a relevant medium to engage these multiple components in a 'real' and meaningful way, so an additional aim was to:

- **explore story telling as an supportive subjective assessment method for verbal creativity, employing an open-ended task similar to children's everyday activities.**

Amabile (1983) suggested that both objective and subjective means of assessment are valuable. Pickard (1979) advised that the qualitative dimension should be explored when assessing creativity.

Chapter 8

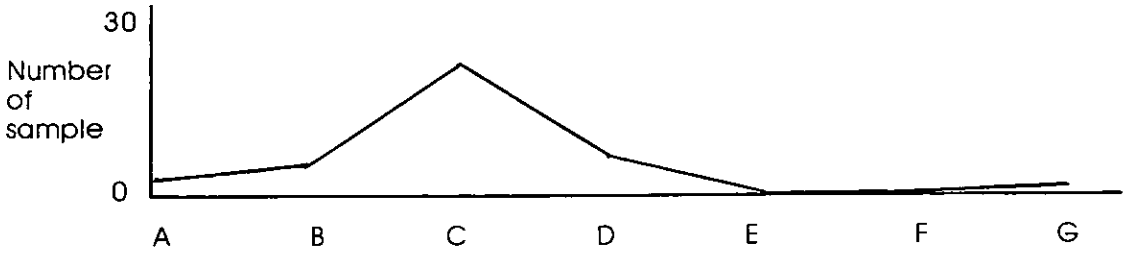
Pilot study

8.1. Assessing the suitability of the TCT-DP.

A pilot study investigating the suitability of the TCT-DP as a measure of creativity was conducted prior to the main programme of research, because the TCT-DP was relatively unknown as a measure of creativity in English primary schools and no previous research data could be obtained of its use in such schools.
In the pilot study, 29 (Year 6) children aged 10 to 11 years were given the TCT-DP, both forms, A & B. The combined raw scores were classified by age group.
Considering that the TCT-DP was a test of drawing production there were initial worries that children who were not good at drawing (by their own admission) might be disadvantaged. A questionnaire asking the subjects to rate themselves on drawing ability was also given. *(Appendix 2.1)* shows the raw data. *(Appendices 2 2. & 2.3.)* respectively show the protocol analysis and a copy of the questionnaire. Verbal, talk aloud, protocols were taken with a sub sample (n=16). Examples and their respective testsheets are seen in *(Appendices 2.4.1., 2.4.1 .1 and 2.4.2., 2.4.2 .1.)*

The resulting raw scores, compared with Urban's (1993) norm tables for German students from age 4 to 16 years, showed that 5 of the sample of 29, scored 'above average', (percentile ranks 76-90) and 1 of the sample obtained a 'phenomenal' score, beyond the upper limit of the norm sample, (this was an exceptional pupil !) 17 of the sample scored 'average', (percentile ranks 26-75) and 6 'below average' (percentile ranks 11- 25). 2 of the sample scored 'far below average', (percentile ranks 0-10.) Apart from the skew caused by the 'phenomenal' score the results suggested a normal distribution. *(see Figure 1. the graph below).*

Figure 1. Graph showing distribution of TCT-DP scores in the **Pilot Study**



* TCT-DP Classification scheme for achievement groups (Urban, 1972)

Interestingly, of the 6 high scorers, all were considered *'bright'* by their class teacher. The results of the drawing questionnaire (with a reduced sample n= 21) indicated that all six above average scorers on the TCT-DP rated themselves highly as good drawers. Only 3 of the sample rated themselves as poor at drawing, of these, 2 scored average and 1 below average on the TCT-DP.

Only 2 of the sample said they seriously did not like drawing, and scored at average and below average levels on the TCT-DP respectively.

8.2. Verbal protocols

The pilot sample (n=29) generated 16 verbal protocols in the 'talk aloud' mode. The children were encouraged to talk aloud when drawing during the TCT-DP.

As expected. the children with observed greater language facility produced the more detailed protocols and were also some of the high scorers on the TCT-DP. They were described as 'bright' by their class teacher. Their protocols were highly descriptive and the figural elements (the lines, dots etc. on the TCT-DP testsheet) were assimilated into the 'story' picture. The protocol produced by a statemented child with learning difficulties was manifest as short and basically in monosyllables. The TCT-DP score was below average.

The pilot verbal protocols generated qualitative data which gave some insight into the manner in which children tackled the TCT-DP testsheet. In general the high scorers on the TCT-DP used the elements holistically and incorporated them (with no verbal identification of the elements) into their 'drawing' as their ideas developed and were revealed. Their verbal protocols were interactive and involved the observer (researcher) in dialogue. The majority of protocols of medium to low scorers identified the elements and described what the drawer was doing with them. The essence was on developing the elements as 'something' in the drawing and then incorporating these elements into a perceived (holistic) whole. Two children identified and used separate elements only and their drawings were not holistic. For example, the transcript *(Appendix 2.4.1)* with an exceptionally high score on the TCT-DP was a holistic, very detailed description which involved dialogue with the observer, the scene the child was creating seemed 'real ' to him, he was engrossed in his own creation, the elements on the testsheet were used not for their own sake but were caught up in the whole drawing. He used all of the elements with evidence of boundary breaking (drawing outside the frame). By contrast in example *(Appendix 2.4.2)* the transcript was short, matter of fact, identified and used only given elements, and the resulting TCT-DP score was average.

The verbal protocols proved interesting, it was thought that asking children to talk aloud whilst they were working on the TCT-DP would not result in enough useful data as many children are reticent to express themselves in this way. The use of verbal protocol transcripts could prove to be potentially useful in providing qualitative data in the main study.

It was found that the the TCT-DP was simple to administer, and fairly straightforward to score after some initial training and because it produced a range of scores which generally matched pupils' and teachers' expectations, it was deemed suitable for the main study.

Chapter 9.

Study 1: Identifying creative children.

9.1. Aims

The specific aims of the study were to:

• Identify 'creative' children by asking class teachers' to rate children in terms of their perceived creativity. To this end an interview/questionnaire was used to obtain teacher views on and criteria for 'creativity' and to secure a list of creative children.

• Identify 'creative' children using the TCT-DP *

A sample of 279 children aged between 7and 11 years was used The sample was tested with either Form A,(n=139) or Form B, (n=140) of the TCT-DP following the TCT-DP Instructions from the test manual (Urban, 1993) *(see Appendix 3.1)*

• Correlate TCT-DP and IQ scores as measured by Raven's Matrices in order to establish whether creativity correlates with intelligence. A sample of 56 Year 6 children was used.

• Investigate TCT-DP scores for children from a single year group (Year 3) in two different classes, (n=46) in order to ascertain whether the local classroom environment (i.e. the influence of a particular teacher) can affect levels of creativity.

• Investigate gender/ethnic differences in TCT-DP scores.

• Re-test sample (n=35) of high/medium/low scorers on TCT-DP identified from * above, with other form, taking verbal protocols, in order to examine and compare the verbal protocols between these groups.

• Measure IQ scores, using Raven's SPM and CPM, in order to make between-group comparisons.

9.2 Sample

The study was based in a junior school situated on an extensive council estate on the edge of Blackburn. There is an unusually large degree of unemployment in the area and many who are employed are in low paid work. Most of the children come from the large council estate, and many from single parent families. 87 children are on the Special Needs Register of which 19 are Statemented.

The sample consisted of N= 279 children aged from 7 to 11 years. Children were taken from 11 classes as follows:

(* 19 children were 'Statemented' as having Special Needs, as indicated below.)

Class/Year

1 Y6- n=30; 10-11 years. (3 *)

2 Y6- n=27; 10-11 years

3 Y6- n=22 (n= 9 aged 10-11 years, n=13 aged 9-10 years) (2 *)

4 Y5- n=28; 9-10 years (2 *)

5 Y5- n=26; 9-10 years (2 *)

6 Y4- n=27; 8-9 years (3 *)

7 Y4- n=27; 8-9 years..(1 *)

8 Y4- n=17; 8-9 years (2 *)

9 Y3- n=18; 7-8 years (1.*)

10 Y3- n=28; 7-8 years (2 *)

11 Y3- n=29; 7-8 years.(1 *)

9.3 Materials

The following Standardised measures were used:

• The "Test for Creative Thinking - Drawing Production " TCT-DP] Urban & Jellen, (1993) Form A and Form B *(see Appendix 4.1, 4.2) (Obtained from Prof. K.K. Urban at the University of Hannover, Faculty of Education, Institute for Special Education, Arbeitsstelle HEFE, Bismarckstr. 2, D-30173 Hannover, FRG.)*

Test Manual

•The 'Test for Creative Thinking - Drawing Production' (TCT-DP) Manual. K.K. Urban & H.G. Jellen + *(address as above)*

• Raven's (1956) Coloured Progressive Matrices, Sets A, Ab, B. *(Published by H.K. Lewis & Co. Ltd, London WC1E 6BS.)*

• Raven's (1956) Standard Progressive Matrices, Sets A,B,C,D & E. *(Published by Oxford Psychologists Press, Lamboume house, 311-321 Banbury Road, Oxford 0X2 7JH England.)*

Test manuals:

• Guide to using The Coloured Progressive Matrices sets A, Ab, B. Revised Order 1956. *(Published by H.K. Lewis & Co. Ltd, London WC1E 6BS.)*

• Raven Manual Standard Progressive Matrices (1992 Edition) by J.C. Raven, J.H. Court & J. Raven. *(Published by Oxford Psychologists Press.)*

The following Non-standardized measures were used:

• An informal interview of class teachers, was conducted with the use of a questionnaire, which was designed to elicit information from teachers about their views on creativity and to identify creative children in their class. The questionnaire consisted of thirteen questions some with multiple choice answers from which the teachers had to select their responses.

(A copy of the questionnaire can be seen in Appendix 7.1)

• Concurrent verbal protocols were taken with a selected sample of children, during the TCT-DP. Selection of sample was based on a scoring criteria for high/medium/low scores obtained in the blanket test of the TCT-DP. (*The transcribed protocols can be*

seen in Appendix 8)

Other materials included:

- a dictaphone for audio-taping protocols.

9.4. Procedure.

The procedure adopted for the study involved various stages, as follows:

- **Questionnaire/interview with teachers about *"creative children in my class".***

A questionnaire for teachers inquiring about their thoughts on creativity and children in their class had been prepared. However, due to acute workload and pre-inspection hype, staff did not need extra work so the intended self-recording questionnaire was now seen as unsuitable. It was used during a short (approx. 5 minutes) informal interview with the teachers involved when the questions were put verbally and the teacher's replies recorded by the researcher. *(see Appendix 7.2)*
Six teachers participated in the questionnaire/interview.

- **Identifying 'creative' children using the TCT-DP.**

All participating children were allocated an identification code for the purposes of recording results. The children were tested in their class groups, with the class teacher present. Instructions were given by the tester (researcher) as per manual *(see Appendix 3.1)* Eleven classes in four year groups (Years 3 to 6) participated over several weeks in the testing. Half the sample were tested on form A and half on form B, these were allocated to complete class groups, (e.g.,class 6A - form B, class 6W - form A). All scripts were marked by the researcher. All class teachers were informed of their class results.

- **Retesting the parallel form of the test.**

A random subsample from the whole school (control) were retested on the other form, in small groups with standard test instructions. (n=31)

- **Assessment of IQ using Raven's Matrices.**

The Year 6 (age 11+) children were tested with the Raven's Standard Progressive Matrices, as an untimed 'capacity' test, in class groups, with their class teacher present. The procedure was as in the Raven Manual (1992) edition, pp. 28-30.

- **Retesting of high/medium/low scorers on the TCT-DP with other form, taking verbal protocols.**

A subsample (n= 35) of ages ranging from 8.3 to 11.6 years, comprising of 12 high scorers, (with mean TCT-DP raw scores of 30+), and 13 medium scorers, (with mean TCT-DP raw scores of 21-29), and 10 low scorers, (with mean TCT-DP raw scores of 0-20), were retested on, the other TCT-DP form and a concurrent verbal 'talk aloud' protocol was taken.

IQ scores from the Raven's Standard Progressive Matrices were already available from the Year 6 in the sample and the IQ scores were obtained for the others, using the Raven's Coloured Progressive Matrices, which were more suitable for the younger children in the subsample. Testing was in small groups, with instructions as in the Guide to using the CPM (1956) pp. 15-17. The scores were converted using Table SPM III p. 39, Raven Manual , (1992).

Verbal Protocols were recorded as informally as possible with a discrete micro-cassette recorder, the children were encouraged to talk aloud and say what they were doing whilst they were drawing. If there were any long periods of silence the children were reminded gently to keep talking. The audio-tape was transcribed into a script and analysed. *(see Appendix 8).*

9.5. Results.

9.5.1. Distribution of grades and reliability checks.

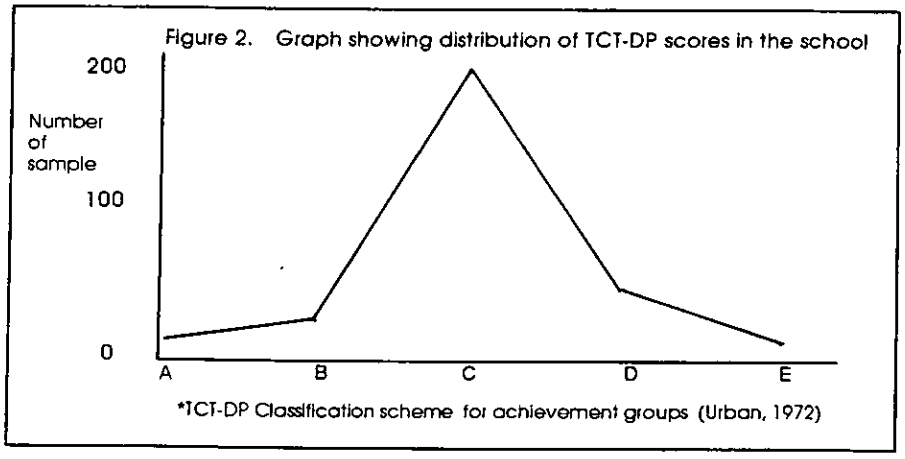
The distribution of grades obtained by the blanket test of the whole school (n= 279) with the TCT-DP are illustrated below in the graph *(Figure 2.)*
For the complete table of results see (*Appendix 6.1*)

**The classification scheme differentiates into seven achievement groups. The distribution of the scores in these groups are based on the results of the norming investigation, (n -total = 2286).*

TCT-DP: Schema of the Screening Classification for German students (Urban, 1992)

A = Far below average:	*lowest 10%, percentile ranks 0-10, or T-scores < =37*
B = Below average:	*percentile ranks 11- 25, or T-scores 37- 43*
C = Average:	*middle 50%, percentile ranks 26 -75, or T scores 44- 56*
D = Above average:	*percentile ranks 76- 90, or T scores 57- 63.*
E = Far above average:	*percentile ranks 91 - 97.5, or T scores 64- 70.*
F = Extremely high above average:	*upper 2.5%, percentile ranks 97.5 - 100, or T scores >70 (>X=2s)*
G = "Phenomenal":	*beyond upper limit of norm-sample*

Figure 2 : Distribution of TCT-DP scores in the school.

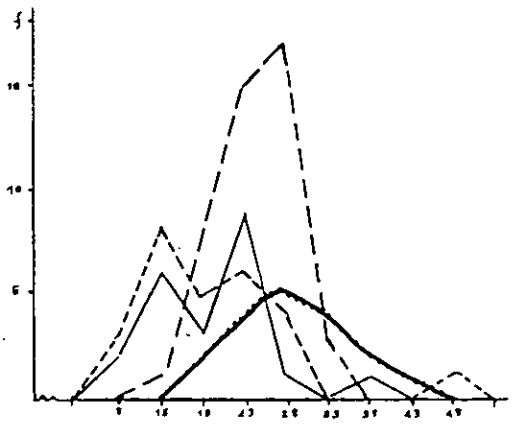


The graph *(Figure 2)* above, shows a normal distribution of scores classified by age group, which was not expected. The school, owing to the poor socioeconomic background of its pupils normally under-achieves in formal tests, hence a skew to the normal distribution was expected. In (*Figure 3)* below, Jellen & Urban (1986) reported

a one peak distribution of TCT-DP scores in an 'Academic Secondary School' (*Key:GY* ▬▬). Although not in a comparable school, this slightly skewed distribution is similar to (*Figure 2),* the normal distribution found in this study. Urban (1993) aspired to optimal culture-fairness for the TCT-DP. The results of the blanket test may be a reflection of the success of this culture fairness.

Figure 3 : A classified distribution of TCT-DP scores. Jellen & Urban (1986) (p. 147)

FIGURE 3
A CLASSIFIED DISTRIBUTION OF TCT SCORES



KEY: SS ▬ (Special School for the Learning Disabled or Ger.: "Sonderschule")
HS --- (Comprehensive School or Ger.: "Hauptschule")
GY ▬ (Academic Secondary School or Ger.: "Gymnasium")
MP _ _ (SMPY Mathematics Project or Ger.: "Talentsuche Mathematik")

No details are given for the axes (*Fig. 3)*

Reliability of scoring.

The reliability of scoring check with a correlation value of r= 0.960 was considered secure. Urban, (1993) obtained a similarly high correlation for the reliability of scoring for six different, shortly trained scorers. (r = 0.95 - 0.99.)

Reliability - Test- retest.

The test-retest correlation was also satisfactory, r= 0.668, and statistically very significant, (p< 0.005). Urban (1993) reported similar correlations (r= 0.64 - 0.77) between the forms A and B with a large sample (N=1100).

9.5.2. Teachers' views on creativity and their identification of creative children.

From the interview and questionnaire identifying creative children, the replies to the questionnaire (Appendix 7.2) suggested that 3 out of 6 teachers found it fairly easy to identify creative children in their class, although one teacher expressed difficulty. The teacher expressing difficulty was a mathematician who might be reticent to subscribe to 'certainties' in any case.

A criterion used to identify creative children, chosen by all six participating teachers was:

- the type and style of work the children produce.

Another criterion chosen by the majority (4 out of 6) was:-

- the kind of questions the children ask in class.

Two other elements quoted were:-

- good at art *and* good at design.

It is not uncommon for 'art' and 'design' to be equated with 'creativity', particularly in the primary school. This view was supported by Fryer and Collings (1991) whose study also indicated that in Britain, creativity was seen as mainly relevant to the creative arts.

Opinions varied as to whether teachers found creative children different to teach. Some teachers, (3 out of 6) altered their teaching strategies to accomodate creative children, particularly for any perceived difficulties creative children might present, i.e., increased demand for unusual resources, and coping with 'awkward' questions.

The problems teachers said they encountered when teaching creative children were:-

- they (creative children) challenge teachers' (knowledge).
- they impose financial burdens, by requiring specialist or unusual resources.
- there is a constant need to provide open-ended activities.

Although teachers said that the personality of creative children varied, a set of traits were collectively identified from the Teachers' questionnaire/ interview.
These traits are listed in *(Table 2)* below.

Table 2: Traits teachers listed for creative children.

Traits teachers listed for creative children	
• initiative and inspiration (3)	• possessing an extra 'spark' (1)
• better behaved, show more effort (1)	• inquisitive, curious (2)
• talkative (1)	• seeking information (4)
• imaginative (2)	• less predictable (1)
• do not like boring work (1)	• good at problem solving (1)
• dreamy (1)	• good at art, writing and poetry (3)
• not suffering fools gladly (1)	• able to be critical (1)
• confidence in using initiative (1)	• ability to think (2)
• ease with which they apply themselves to varied tasks (adaptable) (2)	
• use own ideas and use different methods when working (2)	

(-) numbers of teachers who identified each trait (full details can be seen in Appendix 7.2)

In summary, the traits suggested a confident, easily adaptable, imaginative, child who could use his/her initiative and was good at problem solving, art, writing and poetry. The teachers' comments about children recognising differences in creative peers would seem to suggest that other children find it as easy or even more easy than teachers to spot creative children. At an age when peer pressure is towards conformity any individual differences can be very apparent.

There has been much research on aspects of the creative personality. Guilford (1963) used methods of factor analysis to identify traits such as fluency, flexibility, originality, elaboration and redefinition as important aspects of creative ability. MacKinnon

(1965) and Barron (1963) amongst others, suggested that the following traits characterised (adult) creative individuals, independence of thought and action, a willingness to recognise their own irrational impulses, valuing and possessing a good sense of humour and a preference for complexity and novelty. Heene (1980) suggested that the creative personality is capable of a high degree of perseverance, toughness and tenacity, self-discipline, self-control and self-confidence. Torrance (1965) reported that grade school children who scored high on creativity had a reputation among other children for having 'silly' or 'naughty' ideas, and were considered as 'wild' by their teachers. These reputations diminished by later elementary grades suggesting peer disapproval and teacher devaluation. Freeman's (1994) studies with children and subsequent follow-up studies with young adults suggested that *'creatives'* (those who took their greatest pleasure from creativity) felt themselves to be more empathic, more communicative, livelier, more imaginative and more fun than *'achievers'* (who chose measurable achievement as their greatest pleasure). Many of these traits are reflected in the teachers' list (Table 2).

Eleven teachers were asked to identify and list the children in their class perceived to be creative, before administration of the TCT-DP to the whole school. Prior identification of children as creative by teachers was unrelated to knowledge of the TCT-DP. (The TCT-DP as a creative measure was largely unknown by teachers before the interviews).

Although it cannot be assumed that the TCT-DP was measuring the criteria by which the teachers were judging children as creative the results of the TCT-DP provided valuable comparisons.

After the TCT-DP, the children who were previously identified by their teachers as creative were listed with their raw scores and classification grades. See table *"Teachers identifying creative children in their class". (Appendix 7.3)*
Three of the children identified as creative by teachers fell below grade C, (average creative ability). From the teachers' list identifying creative children, 5 (attaining grade E) and 16 (attaining grade D) were included. Not included (identified) in the

teachers' list were 5 children (attaining grade E) and 29 children (attaining grade D) from the whole sample (N= 279) [many were borderline D]. The grades D and E represented above average and far above average levels of creativity as measured by the TCT-DP. Table 3, below shows these data, and expected frequencies for a Chi-squared test.

Table 3: Teachers identifying creative children in their class.

Table 3: Teachers (n= 11) identifying creative children in their class.

	Correctly identified		Incorrecly identified	
	Actual (observed) frequency and (Expected frequency)			
TCT-DP Grades A,B & C	195	(173.419)	29	(50.580)
TCT-DP Grades D & E	21	(42.580)	34	(12.419)

N= 279

X^2 = 2.685 + 9.207+ 10.936 + 37.502 = **60.33** *df* = 1, a value of 10.83 is required for significance with $p < 0.001$

The Chi-squared test seems to show that high scorers (those attaining grades D and E) were harder to identify than low scorers (those attaining grades A, B and C). ($X^2 = 60.33$; df=1; $p < 0.001$). This would seem to suggest that teachers need to use a test. It may arise because of conservative strategies, i.e. teachers assume that children are not creative and this default is hard to overcome (Smith, 1996). Nevertheless, the teachers do better than chance, with 21 out of 55, high scorers (Grade D & E) identified correctly and 195 out of 224 low scorers (grades A,B & C) identified correctly.

Chi-squared tests were also used to look at individual teachers' scores *(see Appendix 7.3.1)*. The results can be seen in *(Table 4)* below.

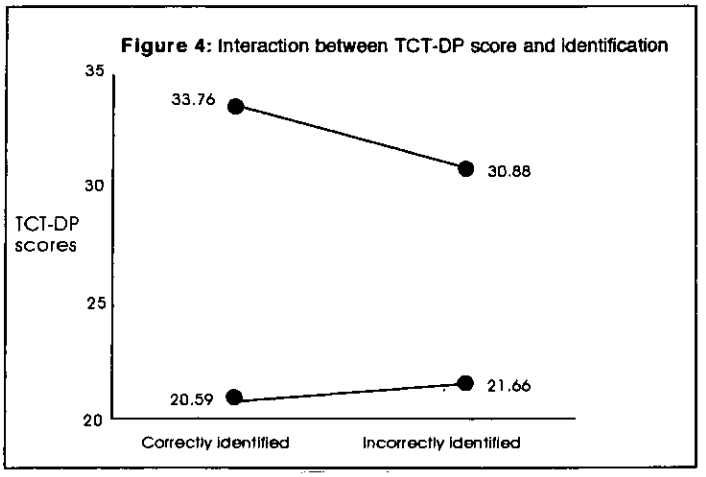
Table 4: Individual teachers identifying creative children in their class.

Teacher	X^2 value	Significance p<
1	0.5658	> 0.20
2	5.5125	0.02
3	15.607	0.001
4	12.980	0.001
5	0.1416	> 0.20
6	5.8910	0.02
7	3.1400	0.10
8	12.32	0.001
9	0.2328	> 0.20
10	8.112	0.01
11	6.75	0.01

These results indicate that the majority of teachers, 7 out of 11 have significant results and 1 other is very close to a significant result with p< 0.10. Three teachers (identified in Table 4 as numbers 3, 4 and 8) with highly significant results appear to be conservative in their choice of creative pupils. *(see Appendix 7.3.1)*

An ANOVA on the data from the teachers' list *(Appendix 7.3)* found a significant interaction between score and identification ($F_{1,1,} = 4.82$; p= 0.029). Post-hoc analysis *(see Figure 4, below)* showed that the difference (13.17) between the high and low scorers who were correctly identified was significantly greater than the difference (9.22) between the high/low incorrectly identified scorers. This suggests that it is easier to identify high scorers: the higher their score, the easier it is to identify them, and that the identification of low scorers is not a function of their score.

Figure 4: Plot of the interaction between TCT-DP score and identification



The teacher of a Year 6 class (n = 22) whose curriculum interests were particularly in creative writing and art, correctly identified all four high scorers (grade D and grade E) in her class. The average misidentification error across the other ten classes was 0.125, [i.e. in a class of 29 children, 3.625 were misidentified (1 in 8)]. Most unidentified high scorers (grades D and E) were in the lower age group classes (Years 3 & 4). The average misidentification error in Year 3 classes was 0.197, and in Years 4 to 6 it was 0.082. One of the least experienced teachers in the school, teaching a Year 3 class, (n= 29) had a misidentification error for high scorers (grade D and E) of 0.206, [i.e. 5.97 children in a class of 29]. On the whole Year 3 teachers had a higher average misidentification error. The TCT-DP was administered very early on in the school year so teachers had only short-term knowledge of their pupils particularly in Year 3. This may have had some bearing on their judgment. Also, by Years 4 to 6 children's reputation would have been established and known to teachers in subsequent year groups.

With the results in general, in only a few cases did TCT-DP grades present surprises, where teachers felt that the scores were unrelated, in their opinion, to the creative performance of the individual in the classroom. Some teachers felt enlightened by the scores of certain children and said they would be interested to follow these individuals

on. The TCT-DP then, is much more accurately able to identify creative children than the subjective responses of teachers. Being objective the TCT-DP precludes the need to 'get to know' the children.

9.5.3.: TCT-DP vs. IQ.

In the evaluation of TCT-DP scores vs. IQ for Year 6 a problem arose with statistical analysis because of the type of data obtained by the SPM (Raven's Standard Progressive Matrices) which was numerical when raw data and converted to percentile points and then grades, when standardised. However a number of attempts obtaining correlations were made. First by using TCT-DP scores vs. IQ raw scores, and second using the TCT-DP scores vs SPM grades [based on percentiles] (i.e.grade 3- = 2.75, grade 3+ = 3.25). No significant correlation was found between TCT-DP scores and IQ raw scores (r_s= 0.178, n=56, p> 0.05), nor between TCT-DP scores and SPM grade (r= 0.111, n=56, p> 0.05). These correlations suggest that there is no evidence to reject the hypothesis that the IQ scores and TCT-DP scores are independent. The TCT-DP appears to measure something different from conventional intelligence, supporting Urban's (1993) finding that there was no correlation of the TCT-DP and the IST 70 ('intelligence-structure test').

9.5.4. Between class comparisons.

Class data proved interesting *(Appendix 6.2)*. When the raw data from the blanket testing was examined for two of the Year 3 group classes (3W and 3P) there was a difference in the average raw scores of 18.6 and 24.4 for 3W and 3P respectively. A two sample 't' test for 3W vs. 3P indicated that the children in 3P scored significantly more highly than those of 3W (t= -3.20; df= 44; p< 0.01). Investigations into the feeder classes from the infant school from which the children had recently moved revealed

that neither 3P or 3W had children predominantly from one previous class, and apparently they had a variety of teachers previously. The children had not been with their current teachers for more than a few months. However, 3P was a smaller class with an experienced class teacher whose interest and organisation encompassed 'creativity'. How much the TCT-DP scores could have been affected by the different teaching styles in so relatively short a time is difficult to assess. The TCT-DP scores of the Y4 classes who had these teachers in Year 3, in the last academic year were looked at to see if they could provide any insight. The mean raw TCT-DP scores of these classes were 4C= 20.94, (previously 3P) 4S= 22.6 and 4J= 23.18 (previously 3W). These mean differences being too marginal to even necessitate a 't' test could not be reasonably attributable. All the other classes in the same Year groups showed comparable mean raw TCT-DP scores. (See *Table 5,* below). Comparisons were made only between classes within the same year group.

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Table 5: Mean TCT-DP scores for each class.

Year	Class	Mean score (TCT-DP)
6	6W	23.7
6	6A	25.2
6	6D	26.9
5	5C	22.7
5	5L	23.0
4	4J	22.6
4	4S	23.1
4	4C	20.9
3	3P	24.4
3	3W	18.5
3	3G	20.14

9.5.5. Asian children and gender.

During the pilot study, the class teacher involved remarked that he had noticed that the Asian girls seemed to be more inhibited in art lessons than Asian boys and he

wondered if the drawing tasks demanded by the TCT-DP would highlight an ethnic / gender difference. The pilot sample was much too small to give any indications.
In the main study with a slightly larger sample, (10 girls and 16 boys) the mean raw TCT-DP scores for the girls was 21.10 and, for the boys was 21.3, which a one-way ANOVA found not to be statistically significant ($F = 4.26$; $p = 0.934$) There was thus no significant difference between Asian boys and girls scores in this sample.

The difference in the TCT-DP mean raw scores of 21.23 (n=26) for the Asian children and of 21.53 (n=26) for non-Asian children in an age (school year) /class/ gender matched sample, was investigated statistically. The correlation between Asian TCT-DP raw and non-Asian TCT-DP raw ($r = 0.8236$; $n=26$; $p=<0.005$), ($rs = 0.7834$; $n=26$; $p=<0.005$) indicated that there was no significant difference between the scores of Asian and non-Asian children in this sample.

9.5.6. Verbal protocols.

The verbal protocols in the talk-aloud mode taken concurrently whilst the children were drawing resulted in transcripts of varying lengths, these being dependent in many cases on the child's apparent verbal fluency and vocabulary development. The (Spearman Rank) correlation between length of protocol (total number of words) and TCT-DP score ($r_s = 0.455$; $n=35$; $p=< 0.01$) indicated that there was a significant correlation between the length of protocol scripts and scores on the TCT-DP. This was supported by the means of total numbers of words of protocol scripts in each group. The high and medium scorers on the TCT-DP produced longer protocol scripts than the low scorers on the TCT-DP. (See *Table 6* below)

Table 6: Mean number of words in protocol groups.

TCT-DP protocol group		Number of words in protocol (mean)
High (raw score = 30+)	(n=14)	143
Medium (raw score = 21-29)	(n=12)	156
Low (raw score= 0-20)	(n=9)	59

The vast discrepancy in the length of protocol scripts and between the TCT-DP high/medium and low scorers required a closer examination of the verbal transcripts. These suggested that the low scoring TCT-DP protocol group generally made very simple short statements describing what they were doing with/to the figural elements, whilst the high and medium scoring TCT-DP protocol group generally used more descriptive language to explain their drawing. Concerning the quality-quantity distinction, it would appear from these results that least quantity produced least quality. The questions of if and in what way the production of creative ideas are related to a facility with language are interesting and are discussed below.

The 35 verbal protocol transcripts were analysed to develop coding categories. See *(Appendix 8.1.1 - 8.1.6)* for data from the coding process. *(Appendix 9.2)* for the results, and *(Appendix 11)* for the coding system. References to figural fragments was the most obvious common element. In contrast there were some transcripts which took a different approach and reflected the character of a "Gestalt" composition. The figural fragments interacted, to reflect a "holistic" concept which resulted in the drawing in 18 children, a further 4 were semi-holistic in that their drawings based around the fragments had only tentative links when viewed as a whole. The pilot protocols (n=16) gave evidence of the "gestalt" approach in a very small number of exceptionally creative Year 6 children. The current protocol sample (n=35) was also relatively small, consisting of children with ages ranging from eight to nearly twelve.

Nonetheless, in comparison to the pilot, the results in Study 1. were a little disappointing, in that the potential hinted at in the pilot protocols was not sufficiently evident here.

However, the simple encoding on the strength of the transcript involved:

1. verbal reference to figural fragments and their subsequent use.

2. identification of a holistic, semi-holistic, or non-holistic approach, using evidence from transcript and test-sheet.

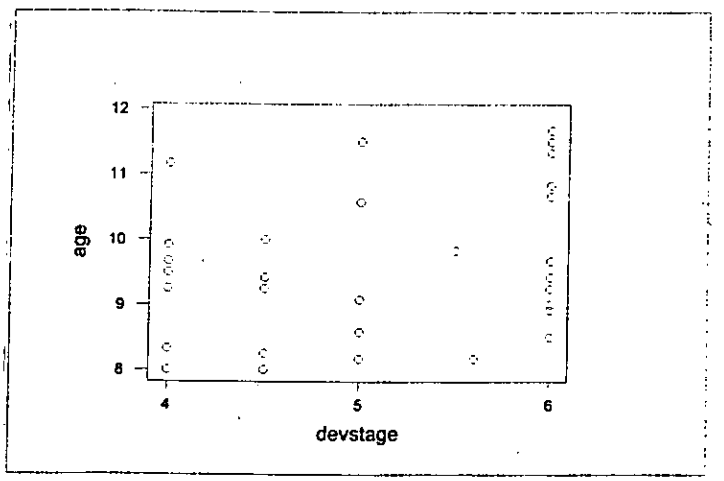
The transcripts did not yield further data that could be usefully encoded, and a breakdown of the scoring for figural composition and interpretation provided few clues.

(see Appendix 9.2 for Protocol analysis TCT-DP scripts verbal.)

Statistical analysis of the somewhat limited, coded data gave the following results:

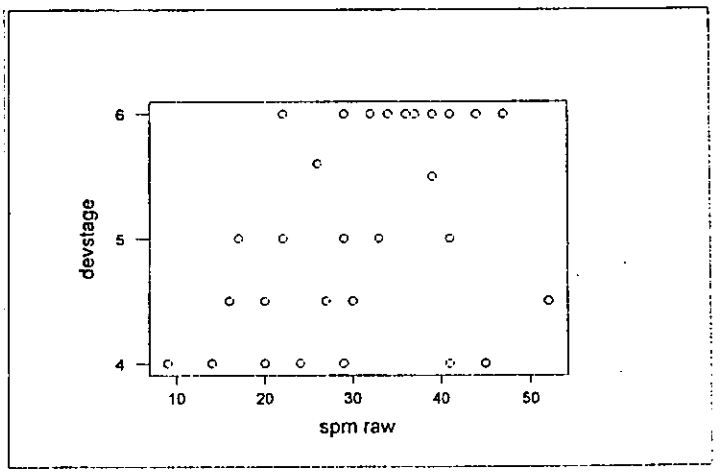
The correlation between age and developmental stage was non-significant (r= 0.317; n=35; p< 0.10). The graph of age vs. developmental stage (*Figure 5. below*) confirmed that there is no clear pattern to be seen in the data. There was almost a significant correlation and a one-tailed test could almost have been used, which would have resulted in a significant result.

Figure 5: Age vs. Developmental stage.



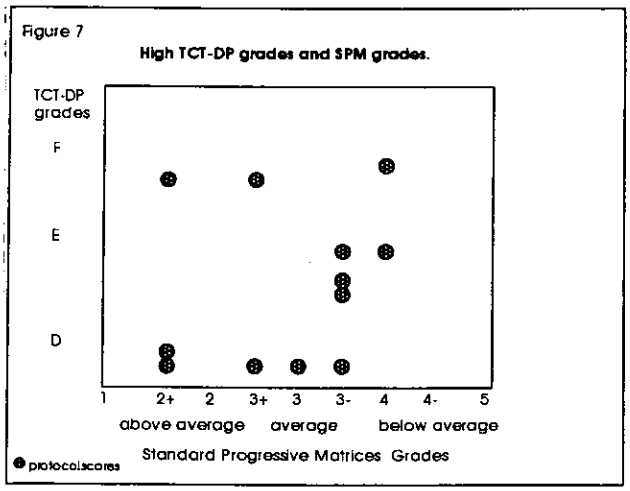
The correlation between IQ (SPM raw) and developmental stage was significant (r= 0.386; n=35; p=< 0.05) There was a correlation between SPM (raw) and developmental stage. *(see Figure 6 below)*

Figure 6: IQ (SPM raw) vs. developmental stage.



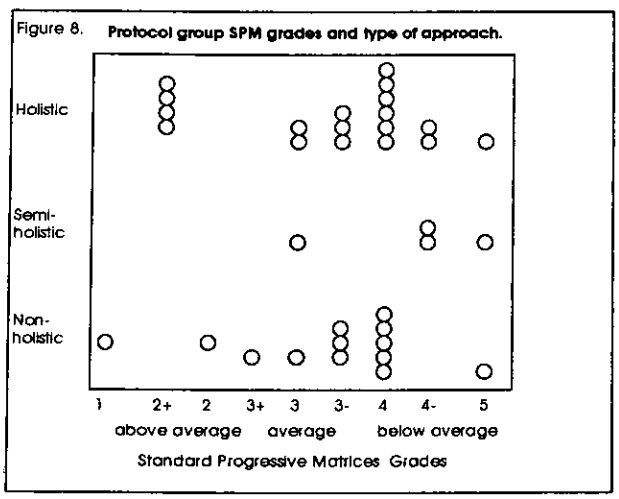
(Figure 7). below, is the graph of TCT-DP high grades (D, E and F) and SPM grades from the 'protocol group'. It shows the spread of intellectual ability achieving these grades (12 of the sample of 35 achieved high grades) ranging from *"definitely below average in intellectual capacity"* to *"definitely above the average in intellectual capacity"*. This supports Urban's (1993) findings, albeit in a very small sample (n=12) that low academic achievers do not necessarily have low creative potential, and that high academic achievers do not necessarily display high levels of creativity.

Figure 7: High TCT-DP grades and SPM grades.



From the raw data, not all pupils with high SPM scores produced holistic drawings so a statistical analysis was done to check this. The correlation between IQ (SPM raw) and. holistic was not significant ($r = 0.203$; $n=35$; $p < 0.10$). Although this provided no evidence that there was a correlation and albeit the scores in *(Figure 8)*, below indicate a spread of holistic approach across the SPM grades, the result is in the right direction and would have been significant had a 1-tailed test been applied.

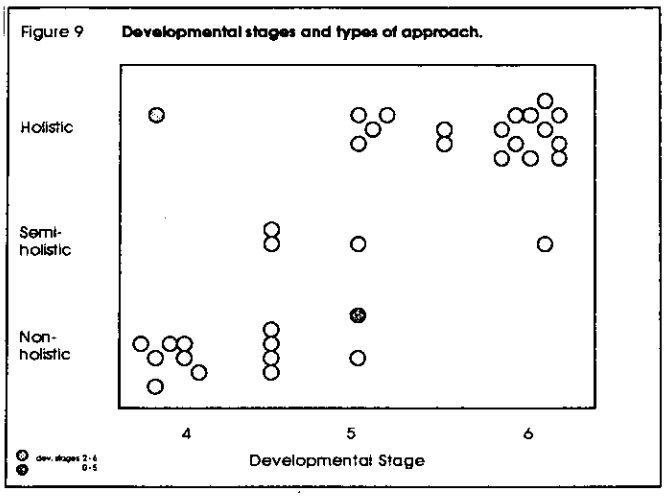
Figure 8: Protocol group SPM grades and types of approach.



The correlation between developmental stage and holistic approach was significant

(r= 0.851 n=35; p< 0.001). This provides extremely strong evidence that there is a strong correlation between Urban's developmental stages of creativity (Urban 1991) and a holistic approach to the drawings.*(see Figure 9 below)*

Figure 9: Developmental stages and types of approach



(some children's drawings fell between developmental stage descriptors, i.e. between 4 and 5 & 5 and 6)

A strong correlation was expected. The descriptions of the developmental stages, 1 to 6. (Urban 1991), *[see Appendix 10.]* suggested that the development of creative abilities evolved towards a holistic composition as the high stage of creative achievement. The advanced holistic approach in evidence in the verbal protocols and drawings of the exceptionally creative individuals identified in the pilot, was not so unequivocally represented in the main study, but was reflected to some degree in 12 out of 35 of the sample who achieved (Urban's) developmental stage 6.

9.6 Discussion.

9.6.1 Distribution of grades and reliability checks.

The results were surprising in that the blanket test of the TCT-DP with the whole school

population produced a normal distribution. The school generally produces a negatively skewed distribution in standardised tests. The SAT (Standard Assessment Task) scores are below average and similarly other tests used in school (e.g. 'The Primary Reading Test ') are skewed towards lesser ability. This is considered to be due in part to the poor socioeconomic background of its pupils and the low levels of expectation. This blanket test result is encouraging as it suggests the TCT-DP achieves some degree of culture-fairness, in the sense that the TCT-DP is measuring something other than academic achievement and conventionally understood intelligence, (Jellen & Urban, 1986). The importance of careful selection of measurement criteria is also illustrated by Torrance (1971) who identified a large number of creative positives occurring frequently among disadvantaged children including the ability to improvise with commonplace materials; fluency and flexibility in non-verbal media. Correspondingly, Hickson and Skuy (1990) suggested that the identification of talent among disadvantaged children can been seriously hampered by the nature of the selection criteria which fails to give them an opportunity to perform in a gifted manner. Bruch (1971) also, found that disadvantaged students had differential strengths in certain areas of Guilford's Structure of Intellect model, especially in areas of figural strength, in divergent operations and in product transformation. The relative lack of correlation with general ability and performance measures indicated by the blanket test results may have much to do with the evaluation criteria of the TCT-DP, which aim to recognise and value qualitative traits of creative achievement rather than mere quantitative fluency. The nature and ambience of the test, being user-friendly and relatively non-threatening and with its aim for a high degree of culture fairness offers some freedom from the general expectation of the culturally and socioeconomically disadvantaged to failing 'yet another test'.

Reliability of scoring and test procedure.

The TCT-DP proved to have a satisfactory correlation for level of interrater scoring reliability (r= 0.960). The operational descriptions of the evaluation criteria in the Manual are clear and unambiguous, and after some experience with scripts became

obvious. Marking of scripts after an initial training took only a few minutes for each. The scoring guide on the reverse of the test sheet proved invaluable. A summary of scoring instructions was compiled in an A4 format which greatly assisted the scoring process. *(see Appendix 4.3)* The verbal instructions to testees were direct but seemed just a little stilted which was attributed to their translation from the original German: in part this problem and also the perception that the children generally required a higher level of motivation promoted the need for 'alternative' instructions. *(see Chapter 10.)*

Reliability - test-retest.

The test-retest correlation of r= 0.668 was satisfactory in this study. Brocher (1989) who used the TCT-DP in his study on creativity training with intellectually gifted students reported a very high re test reliability for the control group, with a correlation of r= 0.81 after 8-12 weeks.

9.6.2. Teachers' views on creativity and their identification of creative children.

The failure to present the Teacher questionnaire as intended serves to highlight the constant onslaught teachers in primary schools experience on their time. It became clear that without intervention the questionnaire would have been pushed to the bottom of an already diabolical workload due to an impending "inspection" and likely forgotten. The short interview using the questionnaire as a proforma obtained data in the least amount of time and effort for the teacher, and ensured a return for the researcher. Despite this only six teachers managed to participate.
The participating teachers showed an interest in the TCT-DP and asked to try the test for themselves. One teacher also volunteered to produce a verbal protocol script.
The pressures of the National Curriculum, SAT results and Inspections tends to push 'creativity' into the realm of a special item. It is not overtly built into the curriculum and its promotion was largely due to a personal teaching style, which went against the

school ethos of conformity and control. Despite these pressures, the teachers interviewed valued creativity and made a fair attempt at identifying creative children in their class. As the results indicate the TCT-DP proved to be a useful tool in helping teachers with this identification.

Fryer and Collings (1991) who explored teachers' views on creativity (in Britain) reported that what best distinguished teachers highly oriented to creativity from those much less oriented to it is a preference for a pupil-oriented approach to teaching. This they said indicated possible links with an underlying value system linked to person orientation. Almost all the teachers they interviewed expressed anxiety about the introduction of the National Curriculum especially with regard to testing. Concern was expressed about the extent to which the National Curriculum would encourage rote learning in preference to creativity development. Interestingly, they found that three-quarters of teachers from a sample of 1028 thought test scores were not useful for assessing pupils' creativity, but almost all found pupils' ideas or questions really helpful. Pupils' work and behaviour were viewed as highly relevant by the majority of teachers. Contrastingly, (in the USA), Colker (1983) found indications that teachers relied on achievement data and showed overwhelming dependence on IQ for identification decisions to gifted programs, with their own recommendation second, (differences in the locus of accountability and official procedures within their schools may be relevant factors to account for this). Fryer and Collings (1991) also found that teachers in Britain were reluctant to see testing as relevant to the identification of creativity, and surmised that teachers may be unaware such tests existed or regarded the available tests as inadequate. The existence of the TCT-DP was certainly unknown to the teachers in this study prior to the research.

Despite the tremendous value of professional insights, the subjective identification of creativity can be susceptible, not in the least to Klumb's (1983) findings that high achievement tends to be specifically defined by teachers as outstanding performance on classroom learning tasks, thus possibly diverting the focus of creativity, masking or even ignoring it. Hunsaker's (1994) suggestion that more infusion of creativity into the total curriculum is needed before teachers can use it

successfully in gifted identification procedures, is a salient idea with which it is easy to concur wholeheartedly.

9.6.3. TCT-DP vs. IQ.

The indications towards the independence of TCT-DP and IQ scores were most encouraging particularly if only to allay any suggestion that this was merely another test that 'bright' children could excel in, and in which disadvantaged children failed. Investigators like MacKinnon (1961) and Wallach and Kogan (1965b) who studied the relationship between creativity and intelligence, suggested that there was a basis for differentiating these two concepts, but that the exact relationship was complex. Getzels & Jackson (1962) reported "weak correlations" between creativity and academic achievement. Urban (1993) affirmed the *"established fact"* that there was only a moderate positive correlation between IQ and academic achievement. Tannenbaum (1983) noted that correlations between creativity and intelligence ranged from near zero to moderately positive. Lubart (1994) reported the following basic findings concerning general intelligence and creativity,

(i) that creative individuals tended to be above average on general intelligence, often with IQs above 120. (Barron & Harrington, 1981; Hayes, 1989),

(ii) that the correlation between intelligence and creativity is quite variable across studies,

(iii) that typical correlations tend to be weak (Barron & Harrington, 1981).

Lubart estimated a median correlation of approximately (r= 0.20) based on a survey of research findings, against which the figure of (r= 0.111) found here compares favourably. Fox (1981) reviewed 14 studies of the relationship between creativity and intelligence in children 6 - 13 years of age and concluded that there was little relationship between creativity and intelligence. The consensus of opinion would suggest a low to moderate correlation between creativity and intelligence. Interestingly, Fryer and Collings (1991) reported that most teachers (in Britain) perceive creativity as something quite different from intelligence. Only 6 per cent

regarded the two concepts as *"essentially the same"*.

Urban (1993) suggested that the TCT-DP measured something different from conventionally understood intelligence and involved risk-taking, unconventionality, and imagination. Urban also suggested that TCT-DP might contribute to the culture fair identification of creative potential and the results in this study support this view.

9.6.4. Between class comparison.

Although the general ethos of the school was towards formal work, with desks in rows facing the blackboard, certain teachers did not conform completely to these constraints and operated selectively a more laissez-faire approach within their classroom. The children in these classes were encouraged to develop independence and self-help skills and did considerably more practical work, arguably activities that might be considered precursors to 'creative' enterprise. In one such class, 3P the children scored significantly more highly than those in the parallel class of 3W. The observed differences in teaching styles were subtle, and manifest as teacher attitude to the value of creativity that underpinned the whole ethos of the class. Unfortunately, the timing of the study and subsequent data collection was too early in the academic year for the teachers' personal teaching styles to have been appreciably effective on their current classes since the children had not been in those classes or indeed the school for very long. A check with the feeder school could offer no further insight. In other parallel classes of the same Year group. The results of mean TCT-DP scores for the other classes *(see Table 5)* did not reveal obvious discrepancies which warranted further investigation.

The variables in observed teaching styles did not result in appreciable differences in mean class scores with other Year groups, i.e. Years 4, 5, & 6. Perhaps the over-riding school ethos of formality held precedence.

The importance of teaching style to the development of creativity was supported by Amabile(1983) who stated that creativity might best be maintained and enhanced by classroom teachers who encouraged independence and self-direction in children, and that classrooms which included some relatively unstructured instructional time with individualised and self-directed learning in an informal atmosphere, were more likely to promote creativity than strictly traditional classrooms. Fryer and Collings (1991) reported that the vast majority of teachers in their study said that building the confidence of pupils, encouraging them to ask questions and having a creative teacher, assisted in creativity development.

Sternberg & Lubart (1993) proposed 'new directions' for educating creative giftedness which included:

- encouraging children to find, define and redefine problems rather than solve presented ones.
- teaching flexible use of knowledge, encouraging rule-making and broad styles of thought.
- teaching children to tolerate ambiguity when seeking creative solutions to problem.
- encouraging perseverance and risk-taking in their work,
- teaching children to focus on tasks rather than personal rewards
- changing classroom environments to encourage and reward students' creative work.

Elements of Sternberg & Lubart's (1993) 'new directions' were detectable in some of the teaching styles and approaches used by the teachers in the sample.

Torrance (1972a) on the other hand, stated that the most successful approaches to teaching children to think creatively would seem to be those that involved both cognitive and emotional functioning, provided adequate structure and motivation and gave opportunities for involvement, practice and interaction with teachers and other children. He concluded that creative functioning was best served when deliberate teaching was involved.

It would appear from both the results obtained here and from other studies that the rampant return to "formal" education may not bode well for the creative potential of children in state schools.

9.6.5 Asian children and gender.

From experience in observing and talking to children during the study, Asian children frequently discussed ideas and characters from video games they played at home. The drawings and art work of Asian boys particularly, appeared to take on the ambience of 'macho' cartoon-like themes. A teacher at the school remarked during the 'pilot' study that he was aware of an inhibition manifested by Asian girls during art lessons, in that they were reticent to express themselves in creative art work in a way Asian boys were not. However the results with the small sample (n=26) did not reveal any significant differences in TCT-DP scores between Asian boys and girls in the school. Perhaps the TCT-DP allows free expression in a non-representational way, so that Asian girls could be expressive in a way which could not be given an obvious, clear interpretation. In the TCT-DP the figural elements if used in a non-representational way, were so done by Asian boys and girls alike. The TCT-DP evaluation criteria does however, give merit to creative non-representational drawing. There is scope for further study in ethnic/ gender differences and the TCT-DP, and particularly qualitative analysis of content and theme.

9.6.6. Verbal protocols - transcripts.

The verbal protocol analysis methodology was useful for qualitative data but coding to produce data for quantified analysis proved very difficult. Ericsson & Simon (1993) stated that 'thinking aloud' protocols could reveal in remarkable detail what information is being attended to by subjects whilst performing their tasks. The disclosure of this information could provide an orderly picture of the exact way in

which the tasks were performed: the strategies employed, the inferences drawn from information, and the accessing of memory by recognition. This only holds good if the subject chooses or is able to disclose such information, and children are remarkably reticent for a whole host of reasons, not the least that they are frightened they might say something 'wrong'. Russo, Johnson and Stephens' (1989) studies revealed substantial reactivity attributable to generating a concurrent protocol. They suggested that there may competition for processing resources between the primary task and verbalisation. Although Wickens (1987) suggested that processing and responding may draw on some common resources and Brooks (1968) stated that there was considerable evidence for noninterference between spatial and verbal processing the translation of a pictorial to an oral mode may require some of both resources. In this study 24 out of 35 children who participated in generating verbal protocols made gains , some substantial, in raw TCT-DP scores over their original scores in the blanket test. This appears to be positive reactivity. Further studies would be needed to explore this aspect of protocol generation before conclusions can be drawn.

Aleinikov (1994) suggested that creativity is *'existentially'* and *'conductionally'* dependent on language. Since the verbal protocols relied on language, the investigation of links, if any, between language development and the development of visual imagery as used in drawing production would have been interesting particularly in retrospect, but was outside the design of this study.

The talk aloud protocol transcripts supported by the test-sheet gave some insight into how each child tackled the drawing task and also to their stage of development suggested by (Urban,1991) and manifested largely in how they viewed and used the six figural fragments given on the test-sheet. Although the holistic approach can be evident from the drawings alone, the transcripts provided further evidence in support of "gestalt" composition. It was generally supposed that the developmental stages of Urban (1991) could be seen in close relationship to the general cognitive development of children in that age range: hence the older the child, the more likely the higher the developmental stage as proposed by Urban (1991). Winner (1989) states that it is generally agreed that children's drawings change appropriately with

age, and general consensus has been reached in working out a description of the sequences of drawing development. However, the order, timing and nature of sequences may differ for different groups such as disadvantaged or gifted children. The correlation between age and developmental stage in this study surprisingly did not quite support a relationship between these two variables ($r= 0.317$; $n=35$; $p< 0.10$) A larger sample may have been statistically more satisfying.

In contrast to the results obtained in this study, and more in line with what was expected, Rosenblatt & Winner, (1989) suggested that older children who would be expected to be more capable of (Piagetian) concrete operations, and of associating given abstract elements with their perceptive knowledge, could interpret these abstract elements to create something concrete and perceptually bound. It was expected that older children might be more able to associate the abstract elements within the test to produce developmentally more mature drawings. Urban (1991) suggested that unconcrete completion or supplementing of elements (which was an attributable factor to a low developmental stage, i.e. stages 1 & 2) may be found for all age groups, but mostly for the four to seven year old. Only two children in the protocol sample showed tentative evidence of such low developmental stage, (tentative, because the drawings produced exhibited criteria from both early and later stages of development which made them difficult to categorise conclusively). Both children were over 8 years of age.

The Acting Headteacher of the participating school mentioned that from his observations the children in the school appear noticeably physically and emotionally less mature than their peers from schools in more affluent areas. Similarly, all the Year 3 teachers remarked regularly on the comparative physical, emotional and cognitive immaturity of the new pupil intake. Depressed emotional, physical and cognitive maturation levels due to socioeconomic environmental factors might well in part, account for older children producing developmentally less mature drawings. However, this should not necessarily be detrimental to creativity, as Winner (1989) noted, by not *"sacrificing invention for convention"* the creative child's drawings may appear less conventionally mature than the equivalent aged uncreative child.

There is suggestion from the verbal protocol transcripts that some children lacked confidence with the task and were over faced by not 'knowing what to do' with the figural fragments, in terms of 'perceived correctness', thus giving a poor reflection of their true capabilities. From experience, it is known that some children exhibit a reluctance to tell you what they are doing in case they are wrong. The low scoring group would be less confident of the task and possibly worried more which further reduced their verbal output. These considerations could be held to be true with all formal testing within the school.

The inconclusive results of the statistical analysis of IQ (SPM raw) and developmental stage best reflects the uncertainty in making a hypothesis about expected results with these variables. There seems to be an argument either way. On the one hand IQ correlating with drawing development might be seen as reflecting the acquisition of higher order thinking required for generating complex holistic drawings, but alternatively, the TCT-DP correlates hardly, if at all with measures of intelligence (Urban, 1993). Consequently the TCT-DP may be concerned with a structure of thinking, closely involved in generating drawings i.e. recognising and perceiving information, creating and interpreting figures (as described in the developmental stages) which may not be so closely differentiated by conventional measures of intelligence.

Chapter 10.

Study 2: The effect of alternative instructions.

10.1 Aim.

A set of alternative instructions were devised with the aim of providing greater motivation for drawing production. In the 'alternative' instructions for the TCT-DP the subjects were asked to make their drawings as interesting and as imaginative as possible. *(see Appendix 3.2).* Hattie (1977) reported enhanced performance when subjects were asked "to be clever" as compared with neutral instructions.

10.2. Sample.

A sample of 33 randomly selected children chosen from those children of the original sample of 279 who had not been used in the test-retest condition.

10.3. Procedure.

The sample was retested on the alternative of the TCT-DP to that which they took originally. They were tested in small groups with the modified instructions. (See *Appendix 3.1)* for the original instructions and *(Appendix 3.2)* for the modified instructions.

10.4 Results.

The original vs. alternative instructions results were complex. The correlation ($r = -.0377$) between the grades of children using the two sets of instructions was almost non-existent. The reason for the very weak correlation here appears to be that the alternative instructions affected the children's scores in different ways. Some children scored higher, some were the same, and some scored lower, but the mean score from the original instructions was 23.29 and that from the alternative instructions was 28.42. The difference was significant ($t = 2.78$; $n=33$; $p<0.05$). There was a difference

between scores in favour of the alternative instructions. The 't' test suggests that the alternative instructions produced generally higher scores, but the correlation indicates that there was no linear relationship between the original and alternative scores.

When the original vs. alternative instruction raw data was examined closely [see Anomalies Alt. Ins. in *(Appendix 9)*], it was found that 8 of the 9 'low' scorers (original raw score 20 and below) made gains in points with alternative instructions (two children with gains of 15 points each). Of the 'high' scorers (original raw scores 21+) only approximately half (13 out of 24 children) gained points. Perhaps the alternative instuctions boosted the 'low' scorers, who might have more gain to make. It may be more difficult to significantly increase an already relatively 'high' score. It is however, slightly worrying that alternative instructions might be a hindrance as well as a help, considering the fact that some children lost points with the alternative instructions (11 out of 24). The highest losses (of 9 points and above) were to 3 boys from different classes in Years 3 and 4 (aged 7- 9 years) and 1 boy in Year 6, with nothing obvious to account for the loss in scores. The sometime 'whimsical' nature of children can perhaps only be appreciated by teachers well aware of it ! However, the susceptibility of the 'high' scorers to the wording of the instructions is worrying.

10.5 Discussion.

The effect of alternative instructions proved to be perplexing. The results clearly indicated that higher scores overall were obtained with the alternative instructions. However, the result of some children scoring higher, (gains of up to 25 points), and some the same, are not as much of a surprise as the lower scores (losses of up to 12 points) which are puzzling. The difference in wording of the alternative instructions served basically as a reminder to children, to make their drawing as interesting and imaginative as possible, with the view to providing encouragement and motivation. To some children the task may have been seen as 'familiar' - a repeat performance, since the test sheet was merely the other form. Perhaps they may have felt confident enough not to pay particularly close attention to verbal instructions. It is also possible

that some children may have found the repeat drawing task boring. Discussion with the Acting Head Teacher concerning these results proved interesting in that he considered the susceptibility of even the most able (pupils) to produce variable performance with no discernible cause is quite common in his long experience in the school. However, the reliability check ($r = 0.668$) on the TCT-DP proved otherwise. Perhaps the TCT-DP is very susceptible to instructions, but not in a predictable or fully systematic way.

11.4 Procedure.

The children were shown an adapted story book containing only pictures, and were asked to think up a story to accompany the pages. They were allowed to look through the picture book before they began their story. They were then asked to go through the book again telling their story aloud. The stories told were recorded by a discretely placed micro-cassette recorder. The procedure took approximately fifteen minutes. Instructions for story-telling can be seen in *(Appendix 12.1)*
The audio tape was then transcribed into a script and rated for creativity by three independent raters familiar with the product domain, i.e. experienced teachers.

11.5 Results.

The judging criteria were taken from Hennessey & Amabile, (1988b) *(see Appendix 12.2)* and consisted of rating stories in defined categories on a scale of 1 to 10, in the manner an experienced teacher would approach story marking in the normal course of events. *(Table 7)* below shows the balance of agreement between three independent judges.

Table 7: Judges' total scores for stories.

Story	1	2	3	4	5	6	Total
Judge 1. (total scores)	43	55	46	41	52	29	266
Judge 2. (total scores)	66	76	63	53	69	52	379
Judge 3. (total scores)	27	36	29	28	30	22	172
Total	136	167	138	122	151	103	

The data was also ranked and the rankings are shown in *(Table 8)* below

Table 8: Rank order for separate and combined judges

Story		1	2	3	4	5	6
Rank order	J1.	4	1	3	5	2	6
	J2.	3	1	4	5	2	6
	J3.	5	1	3	4	2	6
	(combined judges)	4	1	3	5	2	6

The judges clearly used different base-lines for marking, but the integral pattern of scoring was similar. *(see Appendix 12.3.)*. The total scores ranking was in full agreement for 3 out of 6 stories (ranking 1,2 & 6) and only differed by 1 rank place for one of the stories, and 2 rank places for another. The differences between the raw scores for children ranked 3, 4 or 5 were also much smaller than those for children ranked 1, 2 or 6.

11.6. Discussion

The sample was small, (n= 6), owing to the unavailability of children to participate due to pressing needs of the school curriculum, and the headlong rush towards the end of term and the academic year, but the results were interesting nevertheless

Considering the judging criteria, the nine categories *(see Appendix 12.2)* were reported by all three judges as relevant and straightforward and easy to use, but the choice of the picture-book was difficult from the offset. If a familiar book was chosen the danger would be a mere retelling of the story, rather than the creative use of the imagination. If the pictures were however, too unfamiliar or not self-evident or not stimulating enough the children would find them off-putting. Galda's (1990) research in which one of the conclusions was that fantasy was a more difficult genre for students to process than realism, makes the choice of storybook even more

critical. The child's skills in verbal fluency and vocabulary development, could be considered as salient components to this type of assessment, and possibly contributing factors to the quality of data. Although the results showed consistency between the teachers, it is felt that further research is needed before recommending this technique for measuring creativity.

Hennessey & Amabile, (1988b) stated that the open-ended nature of the storytelling task and the scoring based on the subjective rating of stories 'relative to one another' made this assessment procedure useful for within-child and within-classroom comparisons. In their studies of story-telling as a technique for assessing children's creativity. Hennessey and Amabile (1988b) found that there was essentially no correlation between rated creativity and children's age (ages ranged from 5 to 10 years), [an aspect which could not be studied here]. For this reason, they suggested the story-telling technique appears to be particularly valuable in social/ developmental studies of children's creativity.

Alexander et al. (1994) suggested that asking young children to respond to incomplete realistic and fanciful stories which posed problems was a viable way to examine their creativity. Their results indicated that children strongly preferred a more realistic story to a fanciful one, but this preference did not result in significant differences in creative processing. They found that children's performance improved with age and experience but their solutions to problems tended to remain ineffective and unoriginal. As in this study, pink elephants are few and far between.

The story-telling technique appears to have potential within its theoretically sound methodology and begs exploration. With a larger sample and a careful choice of story pictures this is potentially a rewarding way of assessing creativity, although practicalities of time consuming audio-taping, subsequent transcripts and teacher marking time have to be taken into consideration.

Chapter 12.

Conclusion.

The results of the studies suggested that although there can be much confusion as to what creativity is, teachers valued those qualities, i.e. confidence, adaptability, imagination, problem-solving ability and use of initiative, which they listed as characteristics of a creative individual. There was some indication that a few teachers taught with these characteristics in mind, fostering the spirit of creativity arguably despite some considerable constraints put upon them not to do so. The results of the Chi-squared tests suggested that teachers were able to identify creative children in their classes with varying degrees of accuracy but not as accurately as with the use of an objective test. The TCT-DP was introduced as an objective measure to help identify creative children, it demonstrated to be relatively simple to administer and evaluate. The results, furthermore, suggested that the TCT-DP was reliable, viable across the junior school age-range, independent of IQ and culture-fair, particularly proving to be suitable in a school with obvious socioeconomic disadvantages. Taking verbal protocols proved useful in looking at individual differences in approach to the TCT-DP and was used as a research tool. The second study concerned with the effect of alternative instructions gave ambivalent results with supposition that perhaps the TCT-DP is very susceptible to instructions but not in a predictable or systematic way, it would be interesting to research this further. The third study concerned with the story-telling technique, although labour intensive, appeared to have potential as a subjective method of assessing creativity within theoretically sound methodology, but it was felt that further research is needed before recommending it to teachers.

Concerning the study as a whole, it is easy to get into a 'pink' haze about creativity as there is no dearth of complex notions about the subject, even in definition. No apologies are made for the lengthy 'theories' chapter as it serves to illustrate the vast amount of research which has and is being done. In fact, much of the literature is

exclusively from the USA. The absence of British literature on the subject was initially quite challenging and didn't get much better the more one looked. In Britain creativity is seen as mainly relevant to the creative arts and indeed the new Government initiative is just so linked. Yet there has been no raised awareness for creativity in our schools. On the contrary it has been arguably, positively discouraged by the National Curriculum and the 'back to basics' campaign. The USA which gives creativity a much higher profile both in education and industry, has criticism from such as Sternberg & Lubart (1996) who regard creativity as a neglected research topic. Podyakov's (1990) 'New approaches to creativity,' served to illustrate the high value Russia puts on creativity. Similarly the hemispheric research in Taiwan has educational implications for Chinese education. So what hope for our shabby 'pink elephants' ? Creativity certainly needs a higher profile to attract the attention of educators and researchers in Britain. Weisberg (1993) proposed that creativity involved essentially ordinary cognitive processes yielding extraordinary products - not so far from psychology fundamentals, so why has it been so unapparent in our education system? The answer may be that it hasn't been unapparent in the classroom it just has never been made a fuss of.

Creativity was perceived by teachers in Britain as comprising of 'originality,' 'imagination' and "self expression." (Fryer & Collings, 1991) This view was supported with similar perceptions of creativity by teachers in this study, and by some teachers in their working practices. Palmer (1992) puts this subtle intrinsic approach to creativity in the classroom into focus by stating, *"Whether consciously or unconsciously, it would seem apparent from the accounts of "creative" classroom life that these teachers actually encourage creative thought processes insofar as they support and facilitate the development of ideas in new directions, and making of connections that are not immediately obvious, and the building on to the novel ideas of others. They do not readily supply solutions or give away outcomes."* (p. 26). In the USA creativity is taught. Torrance (1981) suggested that educators must cultivate creativity. Torrance viewed creativity as ability, skills and motivation and believed that when children were taught creativity they learned to perform creatively. Creativity as problem solving (finding, defining and redefining) is still the 'new direction' in the USA.

(Sternberg & Lubart,1993). Divergent thinking tasks became the main instruments for measuring creative thinking.

Long experience working with teachers in Britain suggests that generally, creativity is regarded as intrinsic, coming from within the child, and requires to be nurtured by the experience of discovery or exploration. The idea that creativity can be 'taught' with problem solving exercises has never been entirely convincing, and problem-solving 'divergence' type tests similarly. Fryer and Collings (1991) reported that only half their sample *(N=1028)* regarded 'divergence' as synonymous with creativity, and three quarters of the teachers thought test scores were not useful for assessing pupils' creativity. Far from having a simplistic mystical approach many teachers are aware of the complex combinations, cognitive and personality elements that make up creative individuals and react intuitively to their creative needs. This capacity to teach intuitively is arguably being undermined by constraints of the National Curriculum and the inflexibility of OFSTED Inspection. Creativity, because it has only a hidden agenda in Britain is often at the mercy of classroom practice and teacher awareness.

It is given that a rich associative network of knowledge fosters creativity but there are different approaches to imparting knowledge, the presentation of dry isolated facts which serve only to discourage creativity and conversely, the lively classroom, where ideas are tossed about and one idea leads to a creative other. Brown (1988) illustrates the dilemma, *"The more education you get, the more the inventive spark is educated out of you".* (p. 79.) Could it be that OFSTED Inspectors are briefed to snuff out the spark before it takes hold ?

Freeman (1994) makes the point, *"If pupils* (and teachers) *have a drive to be expressive and to think for themselves, it is likely that they will be distressed by a school's rigid structure. . . . . It is unreasonable to ask pupils* (and teachers) *to behave creatively, and yet not display some reaction against the system and some difference from their fellows."* (p. 19.) Conformity and repression are the enemies of creative activity, yet vision and independent-mindedness are not always valued by many who are in control of educating children. The shabby "pink elephants" are in danger of

becoming shabbier.

Despite the pressures, most teachers think creativity can be developed. (Fryer and Collings, 1991) There is much current research (USA) being done with this in mind, with guidelines and instructional materials for developing creativity (Sternberg & Williams, in press). Brainstorming, synectics,and creative problem solving feature in creativity training programs and focus largely on cognitive procedures that can be generally applicable to the generation of new ideas. Such training programs have not been so readily available to teachers in Britain, and indeed, if their prescribed use is not written into the National Curriculum who dares to use them ?

There are however other means for creativity enhancement, the social-psychological means that are less audacious in creativity-repressed times, and commonplace to many teachers. Positive examples include choice, where children are given choice about materials to use in their work they exhibit significantly higher creativity than children who had the choice made for them. Also reward, classroom environments should value, encourage and reward students' creative work. Stimulation is important since physical environments that are perceptually stimulating can enhance creativity, as does play and fantasy. Amabile (1983) put it in a nutshell, *"creativity may best be maintained and enhanced by classroom teachers who encourage independence and self-direction in their children."* (p. 198.)

This study set out to find ways to reliably assess the creative abilities of children in the primary school, bearing in mind the views of teachers, the pressures and constraints they are under and with an inside knowledge and some understanding of how the British classroom functions. A suitable creativity test had to be flexible and "lively' enough to capture the interest of teachers and children alike. It had to be discrete and justifiable and for some, even disguiseable! It had to be culture-fair to meet the needs of the school. It had to be measured against teachers' own judgments (i.e. how did it perform against their subjective assessment of creative children ?). It had to be quick, easy to score and most of all had to justify teachers' and researchers' confidence in it, with regards to validity, reliability and sound methodology.

The TCT-DP was the most suitable creativity test that was available which fulfilled the required criteria. In performance it met expectations of scoring reliability and test-retest reliability, also appropriateness and teacher approval. Jellen & Urban (1986) stated that creative thinking in the context of the TCT-DP meant productive thinking in an innovative, imaginative and divergent sense via drawing production. It's advantage they claimed was that it freed the innovative mind from the factual, problematic reproduction of academic reality. It had the potential to assess what teachers valued. In practice, children and teachers enjoyed working with it. The TCT-DP performed well alongside teachers' own subjective assessments, and any surprise results provoked much thought and reflection. The TCT-DP testsheet scripts which were generated in the study still have a wealth of information yet to be analysed that went beyond the scope of this study. It is a fascinating instrument and was of extraordinary use for the assessment of creativity in children participating in this study.

Story-telling with its sound methodology also has much potential as a method of assessing creativity. Story-telling as a technique can be considered appropriate to the needs of educational practice and research and measures what teachers confidently see as creativity. As an open-ended task story-telling allows flexibility in childrens' responses and is a task that is appropriate across a wide age range. Story-telling as a method of assessing creativity had only a tentative exploration in this study, but it warrants further investigation.

These two methods of assessing creativity have the satisfying advantage that they both end up with a product (possibly a highly creative one), a unique drawing and a story, both of intrinsic value and worthwhile experience. The child has a product to account for his/her labours and teachers have a product to assess one against another or in the case of the TCT-DP against normative data. These methods of assessment are attuned to real life in the classroom which cannot always be said of much assessment already commonplace in education.

Those who take a stand and aim to provide creative education or a creative way of life need the support of research in Britain which is closely relevant to the system of

education in which they function. What are the pertinent home grown 'new directions' for creativity that can be offered to them? There is scope for much more work and further studies. Those who are nurturing our 'pink elephants' in a habitat that may be disappearing fast, need and deserve creative support.

" I will put Chaos into fourteen lines
And keep him there; and let him thence escape
If he be lucky: let him twist, and ape
Flood, fire, and demon --- his adroit designs
Will strain to nothing in the strict confines
Of this sweet Order, where, in pious rape,
I hold his essence and amorphous shape,
Till he with Order mingles and combines.
Past are the hours, the years, of our duress,
His arrogance, our awful servitude:
I have him. He is nothing more nor less
Than something simple not yet understood:
I shall not even force him to confess;
Or answer. I will only make him good."

Edna St Vincent Millay

From *'Mine the Harvest'* (1954)

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Appendix 1.

Definitions of creativity in chronological order.

Watson (1928) *"How the new comes into being: One natural question often raised is: How do we ever get new verbal creations such as a poem or a brilliant essay? The answer is that we get them by manipulating words, shifting them about until a new pattern is hit upon."* (p. 198.)

Wertheimer (1945) creativity is the *"process of destroying one gestalt in favor of a better one"*

Rand (1952) creativity is the *"addition to the existing stored knowledge of mankind."*

Stein (1953) *"Creativity is that process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time."* (p. 311.)

Rogers (1954) *"My definition of the creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other."* (p. 139.)

Harmon (1955) *"any process by which something new is produced - an idea or an object, including a new form or arrangement of old elements."*(p. 42- 52.)

Ghiselin (1955) *"The creative process is the process of change, of development, of evolution, in the organization of subjective life."* (p. 12.)

Lee (1957) The creative process can be defined as ability to think in uncharted waters without influence from conventions set up by past practices.

Keep O.A. (1957) creativity is *"the intersection of two ideas for the first time."*

Bartlett (1958) *"adventurous thinking"* defined as *"getting away from the main track, breaking out of the mold, being open to experience, and permitting one thing to lead to another."* (p. 103.)

Guilford (1959b) defines creativity in terms of a very large number of intellectual factors, *"including the abilities of fluency, flexibility and originality as well as sensitivity to problems."* (p. 178.)

Rhodes (1961) *"The word creativity is a noun naming the phenomenon in which a person communicates a new concept (which is the product)."* (p. 216.)

Mednick (1962) after Poincare *"To create consists of making new combinations of associative elements which are useful . . . Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart"*. (p. 220-221.)

MacKinnon's (1962) definition of creativity also emphasises the end product or response, creativity being *"a process extended in time and characterised by originality, adaptiveness, and realization."* (p. 485.)

Selye H. (1962) basic discoveries or creative contributions *". . they are true not merely facts but also in the way they are interpreted, they are generalizable, and they are surprising in the light of what was known at the time of the discovery."* (p. 402.)

Hudson (1967) *"'Creative' . . . is an adjective with widespread connotations ."* (p. 119.)

Nicholls (1972) Creativity can best be thought of in terms of accomplishments, *"achievements that are original and make a meaningful contribution to culture."* (p. 717.)

Lefrancois (1982) " *just as very low intelligence is stupidity, so very low creativity is ordinariness."* (p. 264.)

Amabile (1983) *"A product is viewed as creative to the extent that it is both a novel response to an open ended task. a product or idea is creative to the extent that expert observers agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated."* (p. 31.)

Young (1985) described creativity as a *'honorific'* term (p 77.) because of the difficulty associated with finding a universally accepted definition *"Creativity is those attitudes by which we fulfill ourselves . . Creativity is the actualizing of our potential . . . . . It is the integration of our logical side with our intuitive side . . Creativity is more than spontaneity, it is deliberation as well. It is divergent thinking for it converges on some solution: It not only generates possibilities, but also chooses among them."* (p. 78.)

Reber (1985) *"Creativity: A term in the technical literature in basically the same way as in the popular, namely, to refer to mental processes that lead to solutions, ideas, conceptualizations, artistic forms, theories or products that are unique and novel."*

Isaksen (1987) . . . *"creativity is an important human phenomenon which is multi-faceted (complex; but not impossible to study) and universal (it exists within art and science as well as business and education.)"* (p. 2.)

Khatena (1987) *"Creativity is a very complex near elusive phenomenon."* (p. 314.)

Torrance (1988) *"Creativity defies precise definition. .. Creativity is almost infinite."* (p. 43.) *"Creativity is a multifaceted phenomenon that defies precise definition."* (p. 72.)

Nagy (1988) *"When is a grain of sand more than a grain of sand? When it's viewed through the eyes of a creative person, an individual whose world is colored by different hues - pastels and fine shadings and rich tones that go unobserved by the rest of us."* (p. 4.)

Johnson-Laird (1988b) *". . .a tractable computational algorithm for producing successful innovations."* (p. 218.)

Vernon (1989) *"Creativity means a person's capacity to produce new or original ideas, insights, restructurings, inventions, or artistic objects, which are accepted by experts as being of scientific, aesthetic, social or technical value."* (p. 94.)

Ochse (1990) a creative product is *"original (new, unusual, novel, unexpected) and also valuable (useful, good, adaptive, appropriate)"* (p. 2.)
A creative person is someone who has been *"recognised by expert opinion as having something of original value to the culture."* (p. 4.)

Milgram (1990) *"Creativity may be defined 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)."* (p. 220-221.)

Csikszentmihalyi (1990) *"It is impossible to define creativity independently of a judgment based on criteria that change from domain to domain and across time.' '. . . creativity is not an attribute of individuals but of social systems making judgments about individuals."* (p. 198.)

Ford, Harris (1992) *"Creativity is a modifiable, deliberate process that exists to some degree in each of us. It proceeds through an identifiable process and is verified through the uniqueness and utility of the product."* (p. 187.)

Ford, Harris (1992) *"Creative individuals see what everybody else has seen but think what nobody has thought."* (p. 192.)

Urban (1992) . . . *"the creative process is not to be seen as a simple step-by-step, unidimensional procedure, but as a back-and-forth, up-and-down swinging, multidimensional, partially simultaneously occurring process dependent on personality variables, like motivation, as well as on environmental conditions, like material resources, social obstacles etc."* (p. 4.)

Feldhusen & Goh (1995) *"Creativity is often defined as a parallel construct to intelligence, but it differs from intelligence in that it is not restricted to cognitive or intellectual functioning or behavior. Instead, it is concerned with a complex mix of motivational conditions, personality factors, environmental conditions, and even products."* (p. 231-232.)

Lubart and Sternberg (1996) *"Creativity is the ability to produce work that is both novel (i.e., original or unexpected) and appropriate (i.e., useful or meets task constraints."* (p. 677.)

Since the definitions were chosen to represent diversity, and demonstrate some of the variety of approaches taken by researchers to defining, or not defining,'creativity' they have not been classified (unless implicitly by their inclusion) other than by date. Categories can be found should one search for them, i.e. from those in which definition, due to complexity, is barely stated, to those that can be arranged to fit categories based on person, product, or process, or all three inclusively. The more recent definitions referring to a multi-faceted, universal phenomenon, tend to indicate the direction of current thoughts on creativity.

Appendix 2.1

ID. No. **TCT-DP Pilot Study results.**

	A	B	C	D	E	F	G	H
1	18	19	37	C	2	1	3	R
2	16	17	33	B	4	5	4	R
3	31	26	57	D	1	1	2	L
4	40	26	66	D	1	1	2	L
5	19	25	44	C	3	1	3	R
6	49	48	97	G	3	2	3	R
7	19	24	43	C	4	1	3	R
8	26	25	51	C	1	1	1	L
9	22	29	51	C	2	1	2	R
10	19	21	40	C	3	5	2	R
11	16	17	33	B	3	1	3	R
12	36	25	61	D	1	1	2	L
13	26	17	43	C				
14	27	22	49	C	2	2	3	L
15	23	20	43	C	5	3	5	R
16	19	27	46	C	2	1	2	R
17	32	31	63	D	3	2	3	R
18	18	22	40	C				
19	20	16	36	C	3	2	1	R
20	14	20	34	B				
21	14	15	29	A	3	2	1	R
22	18	18	36	C	2	1	2	R
23	21	18	39	C	1	1	3	R
24	30	26	56	C				
25	12	11	23	A				
26	18	15	33	B				
27	15	23	38	C				
28	26	33	59	D	2	1	3	R
29	23	22	45	C				

Key

A= TCT-DP Form A (raw score)
B= TCT-DP Form B (raw score)
C= TCT-DP Form A&B (raw score)
D= Classification by age group (based on norms for German sample, Urban,1972). A= far below average: B= below average: C= average: D= above average: E= far above average: F= extremely high above average:
G= "phenomenal":
E= Drawing ability, self rating, 1= good, to 5= not so good.
F= Drawing ability, how much do you like drawing? 1= lots, to 5= not at all.
G= Drawing ability, teacher rating, 1= good, to 5= not good.
H= right/left handed / ambidextrous

Appendix 2.2. Table of pilot TCT-DP and verbal protocol results

	ID code	TCT-DP	Grade	Form/score/grade	Time	Elements ID.	Verbal Protocol Analysis.
	A	B	C	D	E	F	
1	37	C					
2	33	B					
3	57	D	A31 C	10	1		hollstic, describing drawing
4	66	D	A40 D	10	1		holistic, description
5	44	C					
6	97	G	B48 F	5	0		holistic, very detailed description with story, involved dialogue with observer
7	43	C					
8	51	C	A26 C	5	6		holistic, identifies elements, describes drawing
9	51	C	B29 C	3	4		holistic, telling a story
10	40	C	A19 B	4	3		identifies, uses elements, holistic, describes drawing
11	33	B	B17 C	3	0		not holistic, uses elements only, description, monosyllables
12	61	D					
13	43	C	A26 C	4	6		holistic, identifies and joins elements
14	49	C	A27 C	8	3		identifies some elements, holistic, some story and description
15	43	C	A23 C	5	0		identifies, uses elements only, describing drawing
16	46	C	B27 C	4	4		holistic, describes some elements, describes drawing
17	63	D	B31 D	14	0		holistic, very detailed description, involved dialogue with observer
18	40	C	A18 B	9	3		identifies and mostly uses elements
19	36	C					
20	34	B					
21	29	A					
22	36	C					
23	39	C					
24	56	C	B26 C	3	5		abstract use of elements, identifies and joins elements
25	23	A					
26	33	B					
27	38	C	B23 C	5	3		identifies elements, only partly holistic
28	59	D					
29	45	C	B22 C	10	4		mostly uses elements, holistic, description

Questions about Drawing

Name _____ Class_____

Please could you put a (circle) in the most suitable place.

How do you rate yourself at drawing ?

good not so good

1 2 3 4 5

How much do you like drawing?

lots not at all

1 2 3 4 5

If your teachers were to rate you at drawing what do you think they would say?

good not so good

1 2 3 4 5

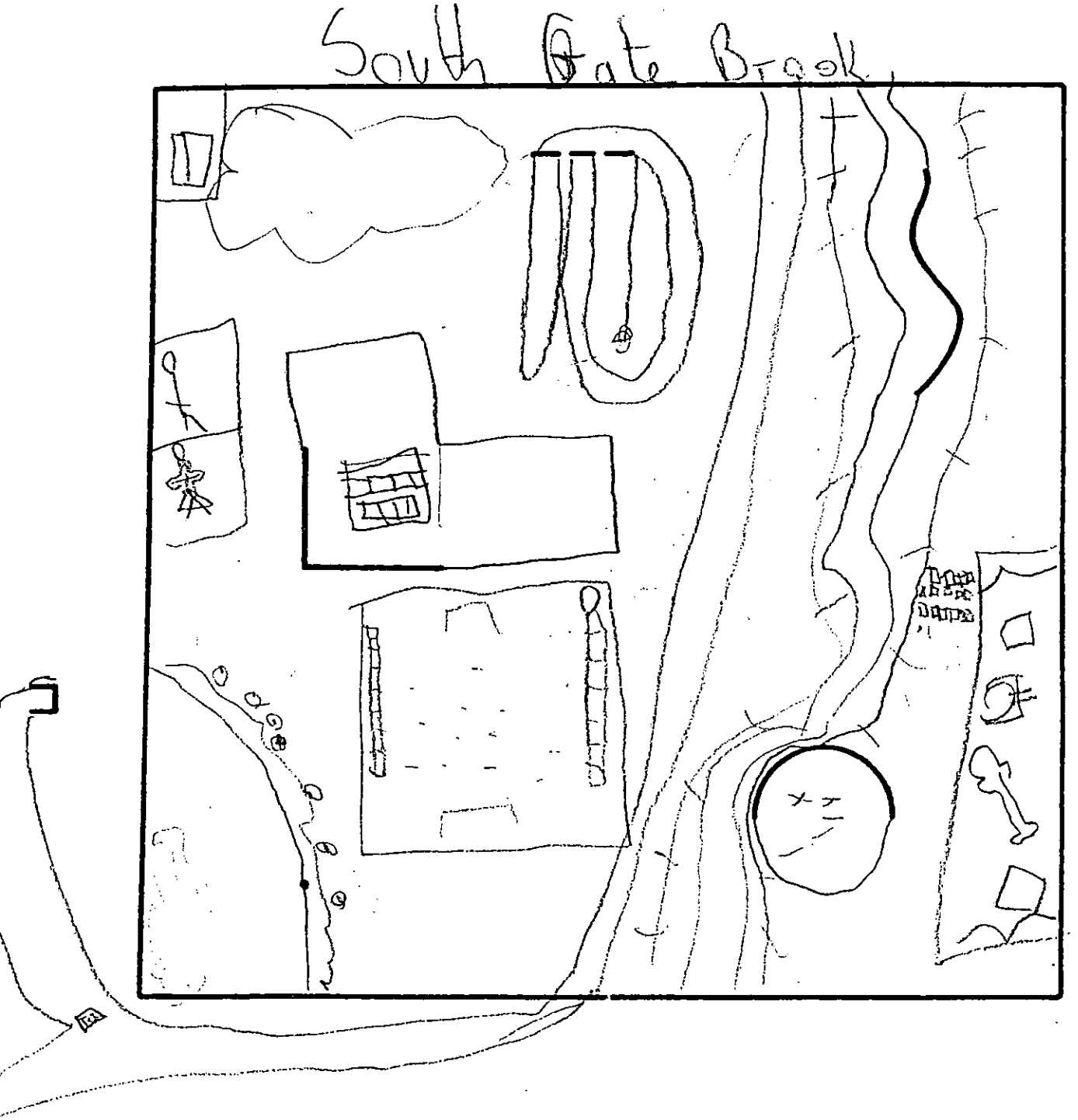
Are you right or left handed?

right handed either left handed

PROTOCOL TCT-DP Form B

s. 2.05 f. 2.11 6 mins
South Gate Brook

This is a school and this is Arran Avenue trail
no this is the river Blakewater going straight down
the river goes straight past there and straight to a park
this is just a round-a-bout thing
a park with swings
barbed wire fence and a barbed wire fence going round here so the children can't get in
and this is a dot here and it goes up like that this is where people this is a fence and this is where ducks live and this is where people come to feed them its a duck pond for people to feed
this is school might have a little window or thing there and draw some desks people looking will know.....
.....but not very high
these are people (tops of their heads)
there's a cloud here but its high
and this is ...bottom here .. and standing .....
and this is a racing track this is a fun place you know where people go in and try to find their way out again (a maze)
this is where they are meant to get out there but they need to climb through the bushes there's an' hole
and round here this is where the ...juniors play football against teams
this is just birds on the pitch and seats
and round here there is no sun and its just foggy
misty round
and this is where this is a famous park like Corporation or Witton and they are having music there tonight like a concert thing
this is a load of seats all covered up it looks small in here
right do you know number 1 at the top of pops they are playing in here tonight .. and its going to be on top of the pops
loads of seats down here stage with curtains and speakers
and band thing drums guitar is there that's one of them thin ones brass whatever
and this is some racing and this is just a public path people walk their dogs
down here this is a corner shop here because ... for people coming out of school or football just footballers there
this is a... just a... this is where dogs go when they need a toilet if they really want a walk they just walk round there's a path going down there dog's toilet sign for dogs
round here there's a toilet here for human's to pay ten p. to get in .



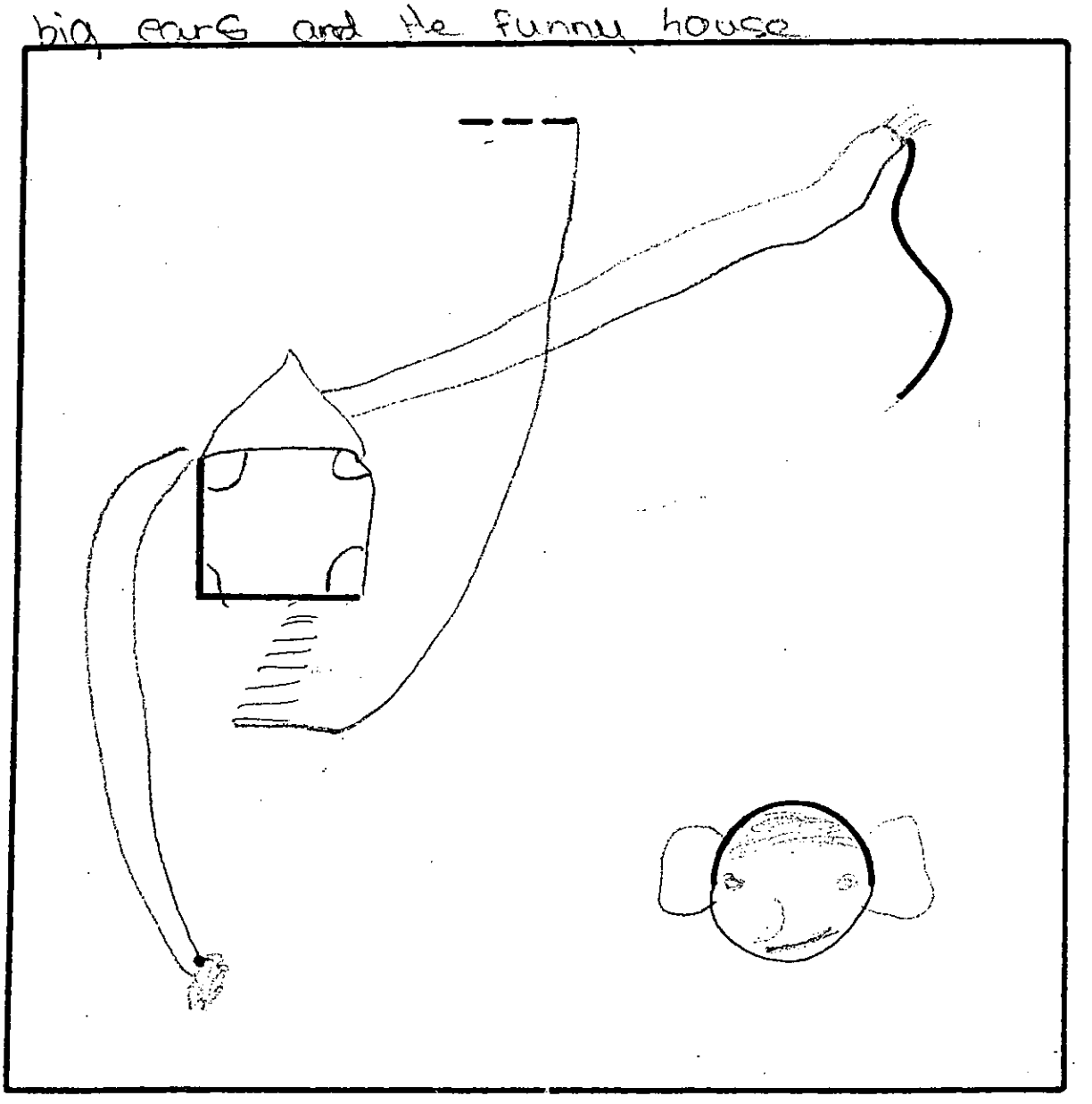
PROTOCOL Form B

Age 11. yrs time 5 mins.

Big ears and the funny man.

001 I'm going to start in the corner
do windows
002 ..... then circle bit at the bottom
do a circle round it
draw a ....
draw some ears
draw some eyes
draw a nose
draw a little mouth
draw that there
a chimney
and these can be the steps

003 this dot can be ....
these are steps as well



Appendix 3.1

TCT-DP Original Instruction (from the manual, Urban, 1993)

1. All testees need a copy of the TCT-DP testsheet, form A,and a black pencil or marker perferably without eraser in order to avoid changing the drawing production and without a ruler.
The testees are asked to write their first name, initial of their surname, age gender, and grade (class) onto the top of the testsheet (whatever is needed).

2. When all students are ready the tester reads/says clearly and slowly the following instruction:
"In front of you is an incomplete drawing.
The artist who started it was interrupted before he or she actually knew what should become of it.
You are asked to continue with this incomplete drawing.
You are allowed to draw whatever you wish!
You can't draw anything wrong. Everything you put on the paper is correct. When you finish your drawing, please, give me a sign, so I can take it."
The tester might want to add one more time:
"You can draw as you please."

3. The tester records the starting time (e.g., "9.30").

4. Questions during the testing session should be answered with:
"You are allowed to draw whatever you wish!" or
"Everything will be correct; you can't make any mistakes!"

If the testee insists, for example, asking questions about the fragment outside the large square frame, the statements above should be repeated. DO NOT provide any explanations about content, or methods!
Also avoid making direct reference to how much time is available to complete the

drawing. The tester should say:
"Just begin your drawing and don't worry about the time." And then add: **"But we don't have a whole hour to complete this drawing."**

5. When the first testee is ready, say to all participants:
"If you know a name or a title or a theme for your drawing, please, write it above your drawing" (Help can be given to those who need it!)

The tester records the time of the completed and handed in drawings by noting the minute on the upper right hand corner (e.g., "22") and immediately gives form B sheet to the testees.

Just in case the tester should remind to add a title to the testee's composition - but there is no must! This inquiry must be conducted in a short and quiet fashion in order not to disturb others who are still working

6. When collecting the form B sheets make sure that the name and initial is marked on top, ask for a title if there is none, and record the time of handing in the sheet by noting again the minute.

Appendix 3.2

TCT-DP Alternative Instruction (modified from the manual, Urban, 1993)

1. All testees need a copy of the TCT-DP testsheet, form A,and a black pencil or marker perferably without eraser in order to avoid changing the drawing production and without a ruler.
The testees are asked to write their first name, initial of their surname, age gender, and grade (class) onto the top of the testsheet (whatever is needed).

2. When all students are ready the tester reads/says clearly and slowly the following instruction:
"In front of you is an incomplete drawing.
The artist who started it was interrupted before he or she actually knew what should become of it.
You are asked to continue with this incomplete drawing.
You are allowed to draw whatever you wish!
Try to make your drawing as interesting and as imaginative as you can!
You can't draw anything wrong. Everything you put on the paper is correct. When you finish your drawing, please, give me a sign, so I can take it."
The tester might want to add one more time:
"You can draw as you please."

3. The tester records the starting time (e.g., "9.30").

4. Questions during the testing session should be answered with:
"You are allowed to draw whatever you wish, but try to make it as interesting and imaginative as you can!"
"Everything will be correct; you can't make any mistakes!"

If the testee insists, for example, asking questions about the fragment outside the

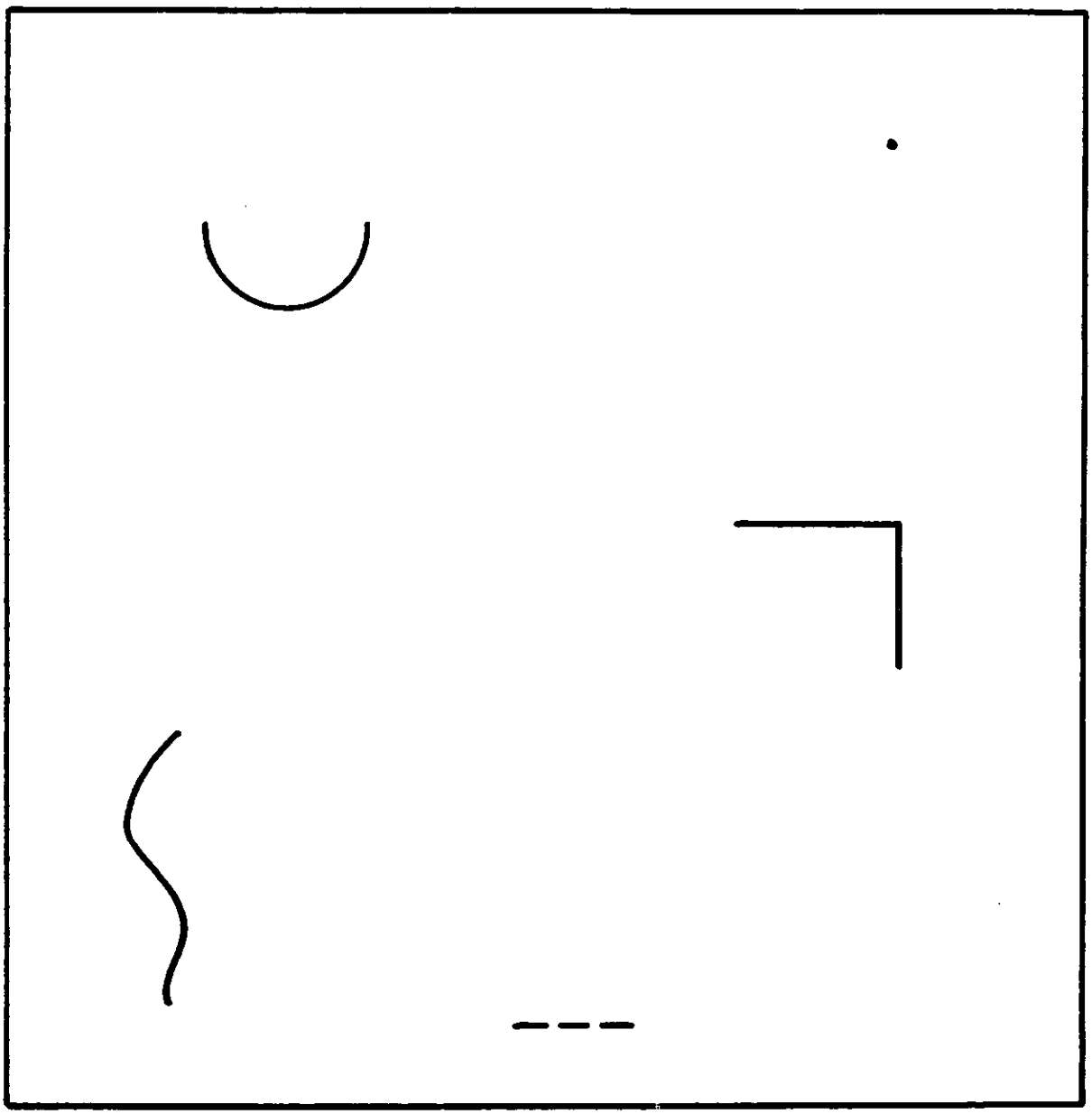
large square frame, the statements above should be repeated. DO NOT provide any explanations about content, or methods!
Also avoid making direct reference to how much time is available to complete the drawing. The tester should say:
"Just begin your drawing and don't worry about the time." And then add: **"But we don't have a whole hour to complete this drawing."**

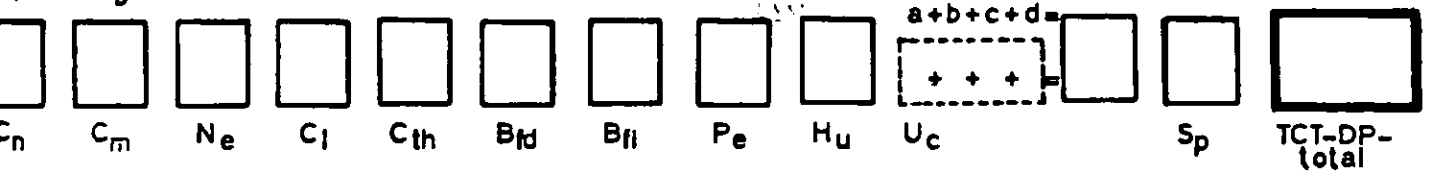
5. When the first testee is ready, say to all participants:
"If you know a name or a title or a theme for your drawing, please, write it above your drawing" (Help can be given to those who need it!)

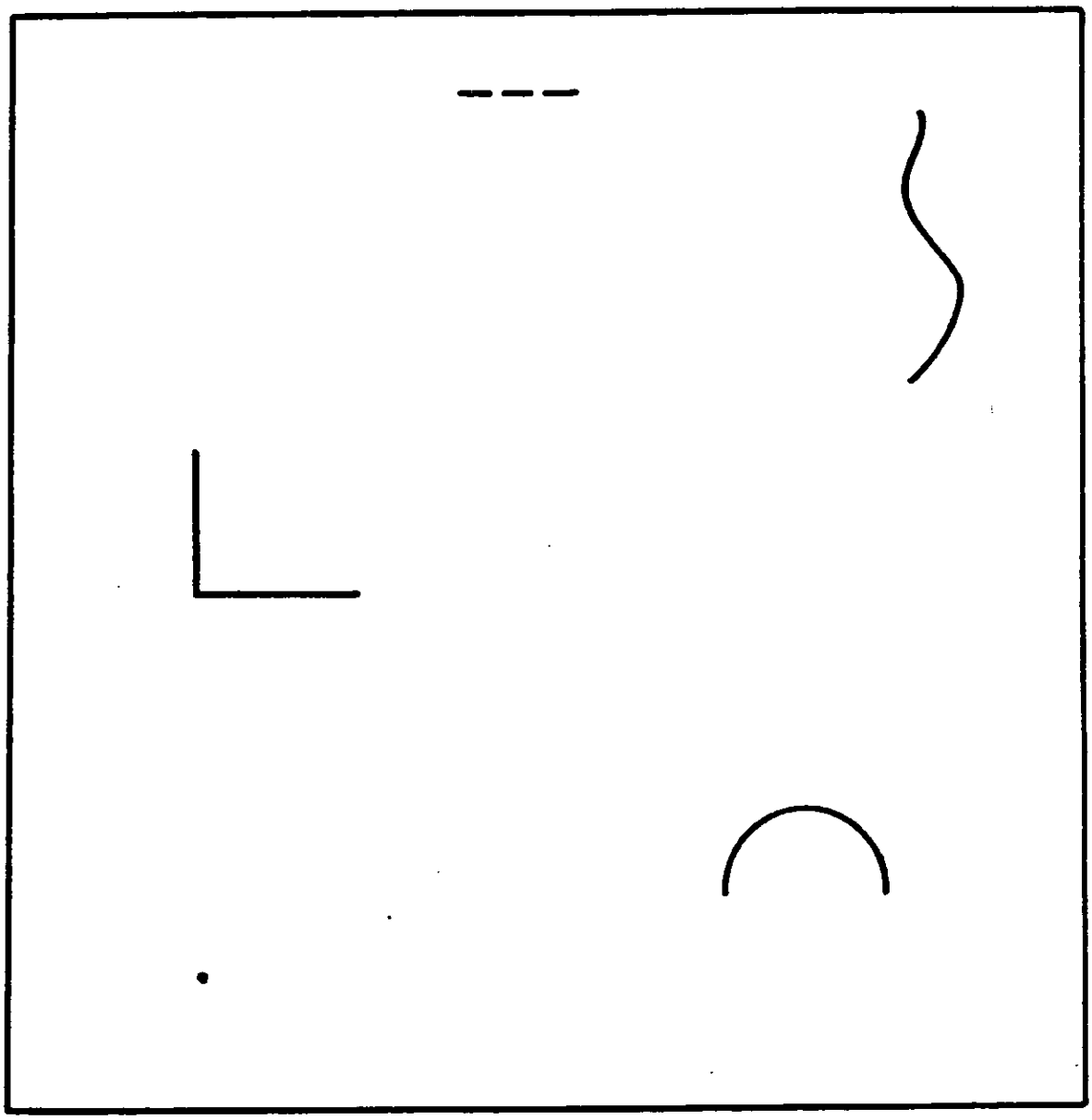
The tester records the time of the completed and handed in drawings by noting the minute on the upper right hand corner (e.g., "22") and immediately gives form B sheet to the testees.

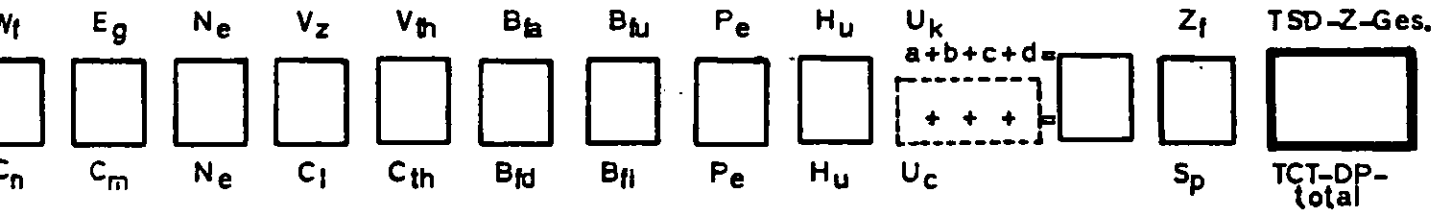
Just in case the tester should remind to add a title to the testee's composition - but there is no must! This inquiry must be conducted in a short and quiet fashion in order not to disturb others who are still working

6. When collecting the form B sheets make sure that the name and initial is marked on top, ask for a title if there is none, and record the time of handing in the sheet by noting again the minute.




Nf
Eg
Ne
Vz
Vth
Bta
Btu
Pe
Hu
Uk
a+b+c+d=
Zf
TSD-Z-Ges.
Cn
Cm
Ne
Cl
Cth
Btd
Btl
Pe
Hu
Uc
Sp
TCT-DP-
total




Wf
Eg
Ne
Vz
Vth
Bfa
Bfu
Pe
Hu
Uk
a+b+c+d=
Zf
TSD-Z-Ges.
Cn
Cm
Ne
Cl
Cth
Bfd
Bfl
Pe
Hu
Uc
Sp
TCT-DP-total

Appendix 4.3

Simplified scoring instructions for the TCT-DP

Any use, continuation or extension of the given 6 fragments

One point is given, when any of the continued fragments utilizes additional points lines, markings or textures

One point is awarded to new and supplementary elements which are added X not repetitions of completions √ speech bubbles / words

Each drawn connection between two continued fragments ----> 1 point.

Any figure contributing to theme gets a point

Any use of small open square 3 points - if extended 6 points

For drawing figs. extens. outside large square 3 or 6 points

Any attempt to break away from 2D to 3D - 1 point

Any humorous response

Manipulation - lateral, circular folds or reverse utilization of sheet
Symbolic abstract surreal
Symbol, figure use

Non-stereotypes Subtract 1 point from a total of 3
Check form A and form B below.

Stereotypes	A	B
	sun, face, wheel balloon, circle	face, sun, flower wheel, ball balloon, circle
	house, box, stairs chair, rectangle, square	house, garage, box, stairs square, rectangle
	snake, flower, tree thread, rope, vase fish, plant, cloud, road.	road, snake, worm, flower, vase thread, rope, fish, plant, cloud
	road, street, path, line	road, ceiling, lines
	centre flower, wheel or spiral, eye, rain/snow. dot, cloud	

Speed scores							
Under minutes	2	4	6	8	10	12	15
points scored	6	5	4	3	2	1	0

Cn	0-6
Cm	0-6
Ne	0-6
Cl	0-6
Cth	0-6
Bfd	0-3-6
Bfi	0-3-6
Pe	0-6
Hu	0-6
a + b + c + d = Uc	3+3+3+3 / 0-12
Sp	0-6
TCT-DP Total	

Appendix 4.4

The 'Test for Creative Thinking- Drawing Production' (TCT-DP).

Notes from the Manual. K.K. Urban & H.G. Jellen+ (1993)

Short description. (Urban, 1993)

The TCT-DP is described as "a screening instrument which allows for a first rough , simple, and economic assessment of a person's creative potential." (p. 1).
It can be used to identify both high creative potential and those with poor creative abilities. The criteria of simple administration and evaluation, and broad usefulness were considered important. By using the medium of drawing the TCT-DP was aiming for a high degree of culture fairness.

The test sheet with six 'figural fragments' is intended to stimulate further drawing in a free and relaxed way. The drawing product is scored and evaluated by 14 evaluation criteria. The TCT-DP aims to recognise and value qualitative traits of creative achievement rather than merely measuring mere quantative fluency of ideas. The total score for the TCT-DP gives a rough assessment of creative potential, and scores can be compared with those in norm tables, classified by age and grade. Rough classification percentiles and T-scores are provided.

Two forms of the test are available, A & B. These are normally given consecutively. They test can be used with individuals or groups and with a wide ranging age group from 5 to 95 years. Administration time is given as approximately 15 minutes for each form. Scoring after some training is described as about 1-2 minutes using a detailed description of evaluation procedures.

Fields of application.

The TCT-DP can be used whenever a teacher requires a deeper insight into the creative potential of pupils. The test scores give comparisons to average norm scores for ages and grades. The TCT-DP is useful for studying effects of training and learning as a pre- and post-test. It may be a useful diagnostic tool for counselling and

guidance for problematic children. It may be productive in special education for diagnosing hidden potential. It can be used as a broad screening instrument to identify individuals with a very high creative potential, and for selection procedures for vocational and professional training The TCT-DP's claims on validity, reliability and objectivity make it suitable for research studies.

TCT-DP Evaluation.

Figural Composition and Interpretation

The test-sheet is composed of six figural fragments:-

1. a semi-circle
2. a point (dot)
3. a large right angle
4. a curved line
5. a broken line
6. a small open square outside the large square frame.

The large square frame is not a fragment, but has its special function.

Testing and Evaluation Criteria.

Eleven key elements constituted the TCT-DP construct:-

Continuations - (Cn): made on each of the six figural fragments. Scoring: 0- 6 points

Completions - (Cm): any additional lines, points or markings are utilized on the continued fragments. Scoring: 0- 6 points.

New elements - (Ne): any new figure, symbol or element. Scoring: 0- 6 points.

Connections made with lines - (Cl): between one figural fragment or figure and another. Scoring: 0- 6 points.

Connections made that contribute to a theme - (Cth): any figure contributing to a compositional theme or "Gestalt". Scoring: 0- 6 points.

Boundary breaking being fragment dependent - (Bfd): any extension or continuation of the 'small open square' located outside the square frame. Scoring: 0- 6 points (or 3 points).

Boundary breaking being fragment independent - (Bfi): any extension or continuation that break the boundary or lie outside the'large square frame'. Scoring: 0- 6 (or 3

points).

Perspective - (Pe): any breaking away from two dimensionality. Scoring: 0- 6 points

Humour, affectivity/emotionality/expressive power of the drawing - (Hu): any drawing which elicits a humorous response. Scoring: 0- 6 points.

Unconventionality - (Uc): any manipulation of the material; any surrealistic and/or abstract elements; any combination of figures, signs, and/or symbols; unconventional figures. Sub-score (Uc,a): 0 or 3 points, (Uc,b): 0 or 3 points, (Uc,c): 0 or 3 points, (Uc,d): 3- 0 points. Total (Uc, a-d) 0-12 points.

Speed - (Sp): a breakdown of points acording to the time spent on the drawing production. Scoring: 0- 6 points.

Total scoring of the TCT-DP.

The lower part of the testing sheet reveals a scoring proforma which allows the evaluator to record and total all points given from the eleven criteria.

In theory the maximum total of points on the TCT-DP is 72 points.

TCT-DP Norms and classification of results.

Scoring discrepences between trained evaluators should be smaller than 3.

The classification scheme used differentiates into seven achievement groups.

The distribution of scores into these seven groups is based on the results of the norming investigation for various German samples and subsamples. (n-total = 2286)

TCT-DP: Schema of the Screening Classification for German students (c Urban, 1992)

A = Far below average:	lowest 10%, percentile ranks 0-10, or T-scores < =37
B= Below average:	percentile ranks 11- 25, or T-scores 37- 43
C= Average:	middle 50%, percentile ranks 26 -75, or T scores 44- 56
D= Above average:	percentile ranks 76- 90, or T scores 57- 63.
E= Far above average:	percentile ranks 91 - 97.5, or T scores 64- 70.
F= Extremely high above average:	upper 2.5%, percentile ranks 97.5 - 100, or T scores >70 (>X=2s)
G= "Phenomenal":	beyond upper limit of norm-sample

TCT-DP Screening-Classification

Classification by age-groups, Form A

Age	A	B	C	D	E	F	G
4 - 6 years	< 7	7-9	**10-22**	23-28	29-33	34-41	> 41
7 years	< 7	7-10	**11-23**	24-31	32-37	38-46	> 46
8 years	< 9	9-13	**14-27**	28-33	34-41	42-51	> 51
9 - 10 years	< 10	11-15	**16-29**	30-36	37-42	43-51	> 52
11 -16 years	< 16	16-20	**21-33**	34-40	41-46	47-56	> 56

N (total) = 1835

Classification by age-groups, Form B

Age	A	B	C	D	E	F	G
6 - 7 years	< 9	9-12	**13-22**	23-28	29-33	34-41	> 41
8. years	<10	10-14	**15-27**	28-33	34-40	41-50	> 50
9 - 11 years	< 12	12-16	**17-30**	31-34	35-42	43-51	> 51
12-16 years	< 18	18-21	**22-34**	35-40	41-46	47-55	> 55

N (total) = 918

Classification by age-groups, Form A

Age	A	B	C	D	E	F	G
6 - 7 years	< 20	20-25	**26-45**	46-57	58-72	73-82	> 82
8 years	< 23	23-30	**31-54**	55-63	64-77	78-87	> 87
9-11 years	< 25	25-35	**36-56**	57-68	69-78	79-93	> 93
12-16 years	< 38	38-45	**46-66**	67-77	78-86	87-102	> 102

N (total) = 880

Empirical studies with the TCT-DP (Urban, 1993)

The first investigation with the TCT-DP was done with four groups of seventh graders from different academic achievement levels (see table below)

TCT-DP statistics for four groups of seventh graders from different academic achievement levels and correlations of the scorings of two trained scorers (1985)

classes 7 grade)	N	TCT-DP total M	SD	range of variation	correlation of scorings
Special school	22	19.4	7.1	11-29 (37)	.91
Main school	27	19.9	8.6	10-30 (50)	.97
Gymnasium	18	29.0	7.2	18-38 (43)	.89
Math. Projekt *	45	25.2	5.7	15-32 (49)	.94

* Mathematically highly talented students from the Hamburg project "Talent search math" 1984/85.

The results show according to Urban, (1993) a low positive relationship between the average level of academic achievements (i.e. form of school) and the test scores. For the students with the highest TCT-DP scores in eacg group additional data, including teacher interviews, were collected. These case studies supported the hypothesis that the TCT-DP contributes to the reliable identification of high creative potential and unconventional thinking.

A comparison of TCT-DP scores with IQ scores within the highest achievements group revealed a correlation of zero.

The statistical control of interrater reliability yielded correlation coefficients between .88 and .97 suggesting the operational descriptions of the evaluation criteria to be adequate.

The investigations for establishing norms for German population were done between 1988 and 1991.

Statistics for different age groups (4-15 years: kindergarten and school) form A

age	4	5	6	7	8	9	10	11	12	13	14
Mean	15.6	19.3	16.1	18.4	21.5	23.3	24.0	27.1	28.5	28.3	25.8
SD	9.0	10.5	8.0	9.4	9.9	9.6	9.2	9.8	8.9	9.4	8.7
Se	1.6	1.9	0.6	0.6	0.6	0.7	0.5	0.8	0.8	0.7	1.3
Mode	8	5	10	16	22	20	23	16	29	29	18
Median	15	21	14	17	21	22	23	26	29	28	25
Min.	3	3	5	4	4	4	6	4	8	8	10
Max.	35	36	40	62	84	53	51	54	56	55	43
N(1809)	30	32	152	257	265	207	309	159	119	169	43

Urban, (1993) cautiously labelled the TCT-DP as a developmental instrument, the effects of age are not linear but step-like, (six developmental stages of creativity, closely related to general cognitive development were identified, Urban, 1991) From the age of 11 years on, no significant changes could be found in the normal school population, (see table above).

Concerning gender, Urban (1993) found that there was no significant difference in the means of male and female testees (23.88 vs. 23.24) in the total population.

The parallel test reliability correlation between forms A and B with an average of r= .70 was highly significant. The reliability of scoring proved a very high correlation of .89 to .97. A high re-test reliability was found with a control group with no training, resulting correlation of r= .71.

The question of validity is difficult as there is no comparable instrument, but other studies have according to Urban (1993) shed positive lights on questions of validity and reliability. (e.g. Scheliga, 1988, Herrmann, 1987, Bröcher, 1989).

Appendix 5. Anomalies Alternative Instructions results

TCT-DP raw v. Alt. Ins. raw Analysis of anomalies

Rec. No	TCT-DP raw	Alt. Ins. raw	school year	gender	class	gain/loss	N=33			
2	A24	B23	Y6	M	6W	1-	22 gains	11 losses		
20	A22	B35	Y6	M	6W	13+				
29	A23	B17	Y6	F	6W	6-	9 males	7 males		
33	B33	A34	Y6	M	6A	1+	13 females	4 females	(f= female)	
35	B24	A47	Y6	M	6A	23+		year group com	(m= male)	
36	B34	A27	Y6	F	6A	7-	Y6 5 (2 f)	Y6 5 (2 f)		
44	B30	A25	Y6	M	6A	5-	Y5 6 (5 f)	Y5 3 (2 f)		
50	B22	A35	Y6	M	6A	13+	Y4 5 (4 f)	Y4 1		
56	B25	A43	Y6	F	6A	18+	Y3 5 (2 f)	Y3 2		
61	B26	A16	Y6	M	6D	10-				
64	B29	A22	Y5	F	6D	7-	highest gain +25	highest loss -12		
69	B26	A35	Y6	F	6D	9+				
82	A28	B37	Y5	F	5L	9+				
84	A22	B16	Y5	F	5L	6-		highest losses	-9 or above	gender
93	A22	B24	Y5	F	5L	2+			-12	m Y4
100	A20	B35	Y5	F	5L	15+			-11	m Y3
107	B21	A33	Y5	F	5C	12+			- 9	m Y3
111	B20	A15	Y5	M	5C	5-			-10	m Y6
117	B24	A33	Y5	F	5C	9+			from different classes	
119	B28	A29	Y5	M	5C	1+				
144	B31	A19	Y4	M	4S	12-	gains total 242		losses total 79	
163	B21	A31	Y4	F	4S	10+				
166	A18	B28	Y4	F	4J	10+	highest gains +12 or above	gender		
175	A18	B33	Y4	M	4J	15+	+13 m	Y6		
185	A24	B31	Y4	F	4J	7+	+23 m	Y6		
202	A18	B24	Y4	F	4C	6+	+13 m	Y6		
222	B23	A48	Y3	M	3P	25+	+18 f	Y6		
233	B13	A19	Y3	M	3W	6+	+15 f	Y5		
250	B26	A15	Y3	M	3W	11-	+12 f	Y5		
251	B19	A36	Y3	M	3W	17+	+15 m	Y4		
262	A18	B27	Y3	F	3G	9+	+25 m	Y3		
264	A16	B28	Y3	F	3G	12+	+17 m	Y3		
273	A27	B18	Y3	M	3G	9-	+12 f	Y3		

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc		re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B		C	D	E	F	G	H	I
1	A		11			A	18 m. =14.5	37	25+ 3-	18-11-84
2	C		24		23	A		41	50+ 3+	11-05-85
3	C		27			A		40	50+ 3	13-05-85
4	D	43	40			A		47	75+ 2	02-10-84
5	C	20	19			A		34	25 4	21-03-85
6	C		21			A	30 m.=25.5	41	50 3	05-09-84
7	C	23	23			A		33	25 4	17-08-85
8	C	23	26			A				05-07-85
9	C		21			A		37	25+ 3	30-04-85
10	C		29	28		A		42	50+ 3+	10-11-84
11	D	36	33			A	43 m.=38	47	90 2+	12-08-85
12	C		28			A		38	25+ 3-	26-05-85
13	A		13			A		22	<5 5	17-09-84
14	E	39	38			A	48 m.=43	36	25 4	16-12-84
15	C		28			A	32 m.=30	39	25+ 3	16-06-85
16	C		25			A		39	25+ 3	01-04-85
17	D		31			A				10-01-85
18	C		22			A		38	25+ 3	06-12-84
19	B		16			A		40	25+ 3	31-10-84
20	C		22		35	A		45	75+ 2	12-04-85
21	C		26			A		38	25+ 3-	13-05-85
22	C		18	20		A		46	75+ 2	21-02-85
23	A		10			A				22-05-85
24	B		14			A		51	95 1	28-03-85
25	C		26			A		40	50 3	15-06-85
26	C		23			A		42	50+ 3+	06-02-85
27	E		37			A		46	75+ 2	16-01-85
28	C		18			A		25	5+ 5	26-01-85

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
29	C	23		17	A		38	25+ 3	25-10-84
30	C	20	23		A		27	5+ 4	11-07-85
31	C	23			B		37	25+ 3	16-05-85
32	C	21			B				08-01-85
33	D	33		34 34	B		37	25+ 3	28-11-84
34	A	11			B		30	5+ 4	06-09-84
35	C	24		46 47	B		29	10 4	01-08-85
36	D	36 34		27	B		41	50+ 3	04-03-85
37	C	21	33		B				19-02-85
38	C	24 27	27		B		38	25+ 3	04-06-85
39	C	19			B		35	25+ 3-	16-02-85
40	D	31			B		19	<5 5	19-02-85
41							29	10+ 4	01-08-85
42	C	21			B		37	25+ 3-	26-02-85
43	C	23			B				06-06-85
44	C	35 30		25	B		26	5+ 4-	27-11-84
45	C	24			B	27 m.=25.5	33	25 4	08-08-85
46	C	26	34		B		36	25+ 3-	14-08-85
47	D	27 31			B		52	95 1	05-12-84
48	C	26			B				12-11-84
49					B		29	10+ 4	17-08-85
50	C	22		35	B		34	25 3-	26-04-85
51		39 39			B		35	25+ 3	20-02-85
52	D	33			B		46	75+ 2	06-09-84
53	C	25			B		51	95 1	15-10-84
54	A	10			B	29 m.=19.5	34	25 4	24-10-84
55	E	37			B	36 m.=36.5	35	10+ 4	14-10-84
56	C	25		44 43	B		34	10+ 4	09-09-84

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc		re-test Alt. form	Alt. Ins.		Form	Protocols		IQ Raw	Percentile / Grade		D-o-b.
	A	B		C	D		E	F		G	H		I
57	C		21				B			45	75	2	16-12-84
58	C		19				B			31	10	4-	22-11-84
59	D	38	34				B						12-03-85
60	D	31	31				B						28-01-86
61	C		26			16	B			29	10+	4	08-01-85
62	C		16	25			A	14	m.=15	45	75+	2	11-02-85
63	C		18				A			38	25+	3-	04-06-85
64	C		29		20	22	B						09-03-86
65	C	30	30				B			31	10	4-	15-11-84
66	D		32				A						02-12-85
67	C		22				A						21-11-84
68	C		24				B			32	10+	4	07-06-85
69	C		26		38	35	B			28	5+	4-	02-02-85
70	D		33				A	27	m.=30	41	50	3	23-10-84
71	C	30	29	30			B						03-01-86
72	C		25				B						17-01-86
73	C		27	23			A						06-03-86
74	C		19				A						17-07-86
75	C		30				B						04-10-85
76	D	31	32				A						03-09-85
77	C	25	25				A						25-06-86
78	E	36	36				B						08-01-86
79	C	24	25				A	29	m.=27				02-06-86
80	C	29	29				A						
81	C		26				A						04-11-85
82	C		28			37	A						02-07-86
83	C		29				A						17-06-86
84	C		22			16	A						03-07-86

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
85	C	27			A				25-08-86
86	C	21			A				20-02-86
87	C	18			A				30-04-86
88	C	24			A				17-08-86
89	D	34			A				26-07-86
90	B	15			A				23-03-86
91	C	24	25		A	23 m.=23.5			20-12-85
92	C	26			A				17-07-86
93	C	22		24	A				27-09-85
94	C	16			A				17-06-86
95	B	13			A				21-02-85
96	D	30 31			A	43 m.=37			04-03-86
97	C	17	16		A				03-10-85
98	C	20			A				30-09-85
99	C	26 27			A				13-06-86
100	C	20		35 35	A				09-08-86
101	C	24			A				13-09-85
102	B	14			A				05-08-86
103	C	25			A				28-09-85
104	B	15			A	17 m.=16			06-09-85
105	C	27 27			A				26-09-85
106	D	34 34			A	30 m.=32			
107	C	21 21		33	B				09-07-86
108	C	19 18			B				07-06-86
109	C	17			B				23-05-86
110	D	31			B				10-07-86
111	C	20		15	B				03-10-85
112	C	22 23			B				21-11-85

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
113	C	30 26			B				01-12-85
114	C	23			B				26-03-86
115	B	16			B				21-02-86
116	C	23			B				23-01-86
117	C	25 24		35 33	B				15-06-86
118	A	11			B				23-12-85
119	C	28		31 29	B				29-05-86
120	D	31 32			B				18-11-85
121	C	25 25			B				25-07-86
122	B	12			B				09-10-85
123	C	26			B				11-09-85
124	C	24	19		B				27-11-85
125	D	32 31			B				16-09-85
126	C	20			B				16-09-85
127	C	30 30	28		B				21-02-86
128	C	30 30			B				10-09-85
129	C	20			B				10-05-86
130	C	24			B				14-04-86
131									
132	C	21			B				28-02-86
133	C	27 27			B				25-09-85
134	C	23			B				29-04-86
135	A	10			B	20 m.=15			06-06-86
136	C	21			B				28-10-86
137	D	36			B	34 m.=35			11-10-86
138	C	26			B				09-07-87
139	C	18	20		B				22-04-87
140	C	17	19		B				11-01-87

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
141	D	29			B	24 m.=26.5			19-05-87
142	C	26	18		B				15-06-87
143	D	29			B				30-12-86
144	D	31		19	B				29-10-86
145	C	27			B				04-03-87
146	C	24			B				31-10-86
147					B				06-07-87
148	D	28			B				31-03-87
149	D	31 30			B				17-07-87
150	B	16			B				22-09-86
151	C	29	21		B				12-11-86
152	D	33 31			B				30-09-86
153	C	24	21		B				01-07-87
154	B	12			B	21 m.=16.5			14-03-87
155	C	22	23		B				20-08-87
156	C	30 28			B				02-10-86
157	A	11			B				20-09-86
158	B	12			B				16-06-87
159	C	15			B				28-05-87
160	C	25			B				11-03-87
161	B	13			B				22-08-87
162	C	25			B				
163	C	21		31	B				
164	C	23 24			A				14-10-86
165	C	16			A				29-05-87
166	C	18		28	A				19-05-87
167	C	22			A				23-11-86
168	C	21			A				17-01-87

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
169	C	24 25	28		A				16-08-87
170	D	30 30	35		A				18-01-87
171	C	18			A				02-07-87
172	C	22			A				02-12-86
173	E	39 40			A				18-01-87
174	C	24 24			A				06-03-87
175	C	18		33	A				06-04-87
176	C				A				22-05-87
177	C	22	23		A	27 m.=24.5			13-07-87
178	C	20 20			A				29-01-87
179	C	23			A				13-11-86
180	C	20			A				23-02-87
181	C	17			A	19 m.=18			14-12-86
182	C	24			A				25-03-87
183	C	26 27			A				31-07-87
184	C	25 24			A				06-05-87
185	C	25 24		30 31	A				19-02-87
186	C	23			A				05-03-87
187	C	22 22			A				22-06-87
188	C	18 18			A				23-06-87
189	C	16			A				22-08-87
190	C	29 28			A				07-11-86
191	D	32 33			A	35 m.=34			06-06-87
192	D	30			A	35 m.=32.5			19-02-87
193	C	17			A				20-03-87
194	C	15 17			A				01-03-87
195	C	24 25			A				08-10-86
196	C	24			A				28-01-87

Appendix 6.1. Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
197	C	22			A	15 m.=18.5			01-03-87
198									18-02-87
199	C	19			A				28-05-87
200	C	16			A				21-07-87
201									29-09-86
202	C	19 18		24	A				16-08-87
203	C	22			A				22-04-87
204	C	16			A	29 m.=22.5			07-02-87
205	C	24	27		A				19-01-87
206	C	21			A				31-03-87
207	C	20 22			A				25-05-87
208	C	27			A				10-11-86
209	B	15			A				04-11-86
210	C	21			A				08-10-86
211	D	23			B	30 m.=26.5			26-03-88
212	D	28			B				05-11-87
213	D	28	33		B				16-03-88
214									21-09-87
215	C	25			B	29 m.=27			21-10-87
216	D	28			B				30-08-88
217	C	16			B	26 m.=21			20-02-88
218	C	24			B				01-02-88
219									08-04-88
220	C	26			B				13-11-87
221	C	22			B				24-08-88
222	C	23		49 48	B				30-09-87
223	B	13			B				04-12-87
224	C	19			B				06-10-87

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code. TCT-DP Grade Raw sc re-test Alt. form Alt. Ins. Form Protocols IQ Raw Percentile / Grade D-o-b.

	A	B	C	D	E	F	G	H	I
225	C	22			B				15-07-88
226	E	34			B				19-01-88
227	D	26			B				21-08-88
228	C	26			B				04-03-88
229	D	30			B				25-12-87
230	C	24 27			B				12-10-87
231	C	25	22		B				31-10-87
232	D	25 28			B				20-12-87
233	C	13 13		19	B				10-05-88
234	D	28			B				12-02-88
235	B	9 10			B				25-12-87
236	B	10			B				18-08-88
237	C	21 22			B				15-10-87
238	C	14			B				27-01-88
239	C	14			B				11-06-88
240	B	10			B				08-07-88
241	C	22			B				25-08-88
242	C	21			B	19 m.=20			25-05-88
243	C	20 20			B				14-11-87
244	B	10			B				10-11-87
245	D	26			B				11-05-88
246	B	11			B				25-03-88
247	E	28 29			B	19 m.=24			11-06-88
248	C	14			B				28-03-88
249	D	24			B	40 m.=32			13-04-88
250	C	26		15	B				11-02-88
251	C	19		36	B				03-08-88
252	E	34			B				19-01-88

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
253					B				16-10-87
254	C	17			B				04-01-88
255	D	26			B				09-05-88
256	A	9			B	15 m.=12			30-01-88
257	B	11			B				03-12-87
258	B	11	12		B				14-12-87
259	C	18			B				04-12-87
260	C	16			A				21-05-88
261	C	18	18		A				08-08-88
262	C	18		27	A				05-08-88
263	C	19			A	27 m.=23			09-03-88
264	C	16		28	A				31-05-88
265	D	25 26			A				23-12-87
266	D	24			A				01-03-88
267	D	27 27	30		A				06-04-88
268	C	12			A				30-03-88
269	C	18 17			A				31-05-88
270					A				14-12-87
271	D	31 29			A				11-07-88
272	C	18	19		A				06-07-88
273	D	25 27		18	A				04-06-88
274	C	19			A				10-03-88
275	C	15			A				27-07-88
276	C	26			A				17-04-88
277	E	40 40			A	32 m.=36			09-11-87
278	C	21			A				28-09-87
279	C	25			A				30-01-88
280	C	12			A				05-01-88

Appendix 6.1. . Table of TCT-DP blanket test results

ID.code.	TCT-DP Grade	Raw sc	re-test Alt. form	Alt. Ins.	Form	Protocols	IQ Raw	Percentile / Grade	D-o-b.
	A	B	C	D	E	F	G	H	I
281	B	8			A				07-07-88
282	D	30 28			A				20-12-87
283	C	26 26	28		A				08-10-87
284	C	19			A				05-04-88
285	C	18			A				03-11-87
286	C	14			A				07-04-88
287	B	11			A	39 m.=25			11-01-88
288	C	15			A				
289	B	12			B				
290	C	29			B		30	5+ 4-	07-11-84

Appendix 6.2. TCT-DP Class results for 3P and 3W

3P	raw sc.	TCT-DP grade	3W	raw sc.	TCT-DP grade
I.D. Code			I.D. Code		
211	23	D	231	25	C
212	28	D	232	29	D
213	28	D	233	13	C
214			234	28	D
215	25	C	235	10	B
216	28	D	236	10	B
217	16	C	237	26	C
218	24	C	238	14	C
219			239	14	C
220	26	C	240	10	B
221	22	C	241	22	C
222	23	C	242	21	C
223	13	B	243	20	C
224	19	C	244	10	B
225	22	C	245	26	D
226	34	E	246	11	B
227	26	D	247	29	E
228	26	C	248	14	C
229	30	D	249	24	D
230	27	C	250	26	C
			251	19	C
			252	34	E
			253		
			254	17	C
			255	26	D
			256	9	A
			257	11	B
			258	11	B
			259	18	C

Appendix 7.1

Questionnaire about ***" creative children in my class ".***

Please indicate appropriate statements with a √ tick.

1. *'How easy is it recognise creative children in your class?'*
   please give details . . . . . .

2. *'What are your criteria for determining creative children?'*

   - type and style of work they produce
   - questions they ask in class
   - general behaviour
   - personality factors
   - good at anything in particular, e.g.

   - other factors ? . . . . . .

3. *' Do you think creative children differ from other children in your class ? if so, in what way ? '*
   please give details . . . . . .

4. *' Are creative children different to teach?'*

   if so, are they ?

   - more difficult to teach
   - different to teach
   - no difference
   - other reasons

   please give details . . . . . .

5. *'Do you think other children recognise any differences in creative children?'*

   e.g.

   - by their working practices, skills ?
   - how they work ?

   please give details . . . . . .

6. *'Are certain personality traits more evident in creative children than other children?'*

   - more confident
   - more outgoing
   - more competent
   - *any others ?* . . . . . .

7. *'Do creative children seek your attention more often than others?'*

If so, do you think from :

- boredom
- inquisitiveness
- talkativeness
- needing to express an idea
- to push themselves
- information-seeking
- *other reasons ?. . . . .*

8. *'Are there any aspects of class work creative children are generally good at ?'*

please give details . . . . . .

9. *'Are there any aspects of class work creative children are generally not good at?'*

please give details . . . . . .

10. *'Does teaching creative children alter your approach or teaching style to the class in general?'*

please give details . . . . . .

11. *'Do creative children ever present difficulties other than general ' run of the mill ' school ones?*

if so, which?

please give details . . . . . .

12. *'If you could choose one trait found in creative children which would benefit all children which would it be?'*

please give details . . . . . .

13. *' Can you list the creative children in your current class ?'*

please list. . . . . .

ID Code [ ]

Appendix 7.2 **Replies of the class teachers who participated in an interview about *"creative children in my class"*, when asked:-**

'How easy is it recognise creative children in your class?'

ID code

1 • fairly easy
2. • not easy
3 • very difficult
4 • they were good drawers
5 • easy
6 • easy, when given open-ended problem solving work to do

'What are your criteria for determining creative children?'
From a selection of criteria the following were chosen

1.2.3.4.5.6 • type and style of work they produce
1.2.4.6 • questions they ask in class

other comments,

5 • good at art, creative writing and poetry
2 • imaginative, good at design and art

'Do you think creative children differ from other children in your class and if so, in what way?''

6 • they have initiative and inspiration
2 • they use their own ideas beyond the literal
1.6 • they use own ideas and show initiative
3 • they have got the extra spark
4 • they are better behaved and show more effort
6 • they are less predictable, respond badly to 'boring' work

'Are creative children different to teach?'

5 • they are no different but that they (the children) give more back
3 • they are different
4 • easier

'Do you think other children recognise any differences in creative children?'

4 • by their working practices, skills
3 • how they work
2 • no differences
5 • recognised their talents
6 • other children would remark about their skills

'Are certain personality traits more evident in creative children than other children?'

1.5 • a bit more confident and competent
2.4 • no different
3 • vary, some are, some aren't
4.6 • can be very shy

'Do creative children seek your attention more often than others?'

2.3 • no
4 • less often
5 • not in a positive way, but do a lot of talking
1.6 • yes

Those who replied in the affirmative were pursued for more information

5 • children are inquisitive
5 • talkative
1.4.5.6 • seek information

'Are there any aspects of class work creative children are generally good at ?''

ID code

1 • creative writing
5 • illustrating maps and diagrams
5 • pride in presentation of work
5 • good across the curriculum
4 • illustrating history work
1.3 • imaginative written work or art
6 • problem solving
6 • technology, practical work, unusual stories,
6 • used different methods when working

'Are there any aspects of class work creative children are generally not good at?'

3 • tend not to like P.E. generally
3 • unsympathetic, irritating with not suffering fools gladly
2 • no
4 • not good at rote learning

'Does teaching creative children alter your approach or teaching style to the class in general?'

2 • no
3 • individually only
4 • yes, pulled the level up to accommodate
5 • spend longer in discussion if getting ideas from them
6 • yes give more scope for open-ended activities

'Do creative children ever present difficulties other than general 'run of the mill' school ones?'

4 • looking for extra work
4 • dreamy
6 • create financial burdens by requiring unusual resources
2 • call beyond teachers capability
3.5 • no
6 • easily bored
5 • frustration

'If you could choose one trait found in creative children which would benefit all children which would it be?'

4 • ease of application (cross curricular skills)
1.6 • ability to think
6 • curiosity
6 • ability to be critical
1.2 • imagination
3 • confidence in using initiative
5 • patience
5 • persistence

'Can you list the creative children in your current class?'

• the teacher's provided lists of 'creative' children in their class.

Key 1=LS, 2=[illegible], 3=EW, 4=CC, 5=HA, 6=PT

Appendix 7.3 **Teachers identifying creative children in their class**

children identified				children not identified by class teachers but scoring grade D or above on TCT-DP			
class	child	TCT-DP raw	Grade	class	child	TCT-DP raw	Grade
3W	232	28	D				
3W	237	22	C				
3W	251	19	C				
				3W	247	29	E
				3W	252	34	E
				3W	234	28	D
				3W	245	26	D
				3W	249	24	D
				3W	255	26	D
3G	263	27	C				
3G	267	30	D	3G	265	26	D
3G	268	12	C	3G	266	24	D
3G	269	18	C	3G	271	31	D
3G	273	27	D	3G	282	30	D
3G	276	26	C				
3G	278	21	C				
3G	281	8	B				
3G	284	9	C				
3G	286	14	C				
3G	277	40	E				
3G	287	23	B				
3P	220	26	C				
3P	222	23	C	3P	212	28	D
3P	226	34	E	3P	213	28	D
3P	228	26	C	3P	216	28	D
				3P	227	26	D
				3P	229	30	D
4C	192	35	D				
4C	195	25	C				
4C	207	22	C				
4S	137	36	D				
4S	157	11	A	4S	141	29	D
4S	160	25	C	4S	144	31	D
4S	143	29	D	4S	148	28	D
4S	170	30	D	4S	149	31	D
4S	140	17	C	4S	152	33	D
				4J	173	40	E
4J	191	33	D				
5L	89	34	D	5L	96	31	D
5L	106	34	D				
5L	99	27	C				
5C	123	26	C	5C	110	31	D
5C	127	30	C	5C	120	32	D
5C	128	30	C	5C	125	32	D
6D	71	30	C				
6D	70	33	D				
6D	66	32	D				
6D	76	32	D				
6D	78	36	E				
6W	8	26	C	6W	14	48	E
6W	11	36	D	6W	17	31	D
6W	10	29	C	6W	27	37	E
6W	4	43	D				
				6A	36	36	D
6A	57	21	C	6A	40	31	D
6A	47	31	D	6A	33	33	D
6A	48	26	C	6A	52	33	D
6A	42	21	C	6A	59	34	D
6A	55	37	E	6A	60	31	D
6A	51	39	E				

A=far below average, B= below average, C= average, D= above average, E= far above average

Appendix 7.3.1 Chi-squared test results for individual teachers

Teachers identifying creative children in their class.

Teacher 1.

	Correctly identified		Incorrecly identified	
	Actual(observed) frequency and (Expected frequency)			
TCT-DP Grades A,B & C	13	(12.137) A	9	(9.862) B
TCT-DP Grades D & E	3	(3.862) C	4	(3.137) D

n=29

X^2 = **0.5658** *df* = 1, a value of 1.64 is required for significance with **p< 0.20**

Teacher 2.

	Correctly identified		Incorrecly identified	
	Actual(observed) frequency and (Expected frequency)			
TCT-DP Grades A,B & C	9	(6.666)	3	(5.333)
TCT-DP Grades D & E	1	(3.333)	5	(2.666)

n=18

X^2 = **5.5125** *df* = 1, a value of 5.41 is required for significance with **p< 0.02**

Teacher 3.

	Correctly identified		Incorrecly identified	
	Actual(observed) frequency and (Expected frequency)			
TCT-DP Grades A,B & C	20	(15.931)	2	(6.0689)
TCT-DP Grades D & E	1	(5.0689)	6	(1.9310)

n=29

X^2 = **15.607** *df* = 1, a value of 10.83 is required for significance with **p< 0.001**

Appendix 7.3.1. Chi-squared test results for individual teachers

Teachers identifying creative children in their class.

Teacher 4.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	25 (24.074)	0 (0.9259)
TCT-DP Grades D & E	1 (1.925)	1 (0,0740)

n=27

X^2 = **12.980** *df* = 1, a value of 10.83 is required for significance with **p< 0.001**

Teacher 5.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	14 (14.117)	2 (1.8823)
TCT-DP Grades D & E	1 (0.8823)	0 (0.1176)

n=17

X^2 = **0.1416** *df* = 1, a value of 1.64 is required for significance with **p< 0.20**

Teacher 6.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	16 (13.370)	3 (5.6296)
TCT-DP Grades D & E	3 (5.6296)	5 (2.3703)

n=27

X^2 = **5.8910** *df* = 1, a value of 5.41 is required for significance with **p< 0.02**

Appendix 7.3.1 Chi-squared test results for individual teachers

Teachers identifying creative children in their class.

Teacher 7.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	22 (21.230)	1 (1.7692)
TCT-DP Grades D & E	2 (2.7692)	1 (0.2307)

n=26

X^2 = **3.1400** *df* = 1, a value of 2.71 is required for significance with **p< 0.10**

Teacher 8.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	22 (19.642)	3 (5.3571)
TCT-DP Grades D & E	0 (2.3571)	3 (0.6428)

n=28

X^2 = **12.32** *df* = 1, a value of 10.83 is required for significance with p< 0.001

Teacher 9.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	17 (17.181)	1 (0.8181)
TCT-DP Grades D & E	4 (3.8181)	0 (0.1818)

n=22

X^2 = **0.2328** *df* = 1, a value of 1.64 is required for significance with **p< 0.20**

Appendix 7.3.1 Chi-squared test results for individual teachers

Teachers identifying creative children in their class.

Teacher 10.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	23 (20.833)	2 (4.1666)
TCT-DP Grades D & E	2 (4.1666)	3 (0.8333)

n=30

X^2 = **8.112** *df* = 1, a value of 6.64 is required for significance with **p< 0.01**

Teacher 11.

	Correctly identified	Incorrecly identified
	Actual (observed) frequency and (Expected frequency)	
TCT-DP Grades A,B & C	15 (12.000)	3 (6.0000)
TCT-DP Grades D & E	3 (6.0000)	6 (3.0000)

n=27

X^2 = **6.75** *df* = 1, a value of 6.64 is required for significance with **p< 0.01**

Appendix 8.1.1

Examples of TCT-DP Protocol Analysis transcripts.

TCT -DP Protocol Analysis H Protocol

I.D. Code 70

On our way to the circus

I'm going to go round to the spiral and put a little stick on it to show that I have got a lollipop
here I'm going to do some hair on the half circle some eyes a big nose with a line on the top of it a big round mouth to show that it is a clown with a hat on the top and a flower
here I'm going to do a man with a belt on and a car driving touching the pedals
and now I'm going to carry on with these little lines and make it into a big square
in the square I'm going to write I'm going to draw lots of sweets
and with the squiggly line I'm going to draw a dress with a girl and the girl is going to go dancing
I'm going to put decorations on it the little shoes are going to have ribbons
I'm going to carry on with the clown and its face I'm going to draw rosy cheeks and put a few ribbons in the clowns hair
and I'm going to put a circle here
In this box of sweets I'm going to add a banana which is called happy face
because all the sweets are making a face
and the man is in the car and he is driving to the circus where all these things are.

Appendix 8.1.2

TCT-DP Protocol Analysis M. Protocol

I.D. Code 79

I'm going to make this circle into a smiley face like this
I'm going to put some hair on top of it like that make it look like a woman
then I'm going to make this L shape into a into a little house with a chimney on it a little one it's got a fancy little door with a footpath coming out of it
and then
and now the 3 little lines at the top I'm going to write not write draw a sign a loopy sign I'm going to draw a load of little patterns on it
and then this curly line into a sort of ribbony shape
and then I'm going to put stripes on it and dots in between these lines so it looks like a snake
then on the little house I'm going to do like little lines like little cracks in the house
and then and on this ribbon thing I'm going to make it into I'm putting a line there (a tongue)
and I'm going to put a body on the girl and she is saying "me"
and then in the middle where there's the . . I'm going to draw
I'm going to put what they are the ribbon is like a snake
and then this is a little cottage
and then this is a curvy pattern
and then on the curvy pattern I'm going to draw some things dropping from it little raindrops or icicles
and then on the girl's hair I'm going to shade it in with my pencil make some cheeks on the top I'm going to draw some buttons and in her hand she is has got a balloon the dot it's a sunflower I'm going to draw a flower it's going to be like a sunflower and then I'm going to draw an arrow pointing to the picture I'm going to shade that in .

Appendix 8.1.3

TCT-DP Protocol Analysis L Protocol

I.D. Code 62.

Magic pictures

first I'm going to make this into like a house shape
I'm going to add a roof to it
and I'm going to put a window in the top left and right hand corner put like an add in the middle
I'm going to put brick ...
I'm going to put door a little window at the top put a letter box and a door handle
now I'm going to just put half a circle to make it into a fool put hair on it and round eyes and a nose and a big smile
just put two shoulders in.
I'm going to put a snake a rattle snake and its got a tongue sticking out
for this one I'm going to put two lines going down there a windmill a big wooden door

Appendix 8.1.4

TCT -DP Protocol Analysis L Protocol

I.D. Code 104

The boy who went to the football match

started off with the circle made it into a football

started of with the

pointed shape made into a square make it into a house

started off with 3 lines put on the 3 lines the word two

started off with the squiggly line finished up with something like a face

Appendix 8.1.5.

TCT - DP Protocol Analysis H. Protocol

I.D. Code 106

The sunny day

make this into a wheel

make it into a car

some doors

car handle

draw a house chimneys

the door

windows

the curtains

somebody holding a balloon

the sun

a tree

a pavement

path

Appendix 8.1.6

TCT-DP Protocol Analysis M. Protocol

ID Code 91

The cemetery

right, I'm doing a house and its got a roof
and it's got some windows 4 windows
and an oval like an arch shaped door
and I've got like top of an egg shape I'm going to draw a face
and the face has got eyes with eyelashes on
it's got 3 eyelashes on and it's got a circle for a nose and like a heart shape not
and its got hair its like curly like its permed
and I'm going to do a vase
and the vase has got a flower in it with 7 leaves
I mean 7 petals and 2 leaves
and on the vase it has got a moon a sun and some stars
It's got 2 stars on it
and on here I'm going to draw a boot the boot has a
its got a teddy on it I can't draw teddies so I'm going to do a match stick man
and a nose and eyes and a mouth
there's a dot here
and that face has got a triangle nose and whiskers on it
and a little smile thing on it
It has 2 ears
and that's it.

Protocol analysis (p.= blanket test score TCT-DP c.= protocol test score) (pp+conv. g. = percentile point and conversion to SPM grade). (H= Holistic, SH= Semi-holistic, NH=non holistic).

H-M-L refers to high / medium / low TCT-DP scores chosen for protocol sample. H=raw 30+, M=raw 21-29, L=raw 0-20. * Some anomalies occur when mean raw is below 30 but because of age the individual is a high scorer by grade e.g. D or E.

Rec. code	H-M-L	p.TCT-DP	c.	mean TCT-DP	grade TCT-DP	SPM raw	pp+conv. g.	CPM pp.g.raw	D.O.B.	age at testing	Year Group	Dev.Stage	H-SH-NH
55	H	37	36	36.5	E	37	25 - 50 3-		14-10-84	11.6		6	H
14	H	38	48	43	E *	36	25 4		16-12-84	11.4	6	6	H
11	H	33	43	38	D *	47	90 2+		12-08-85	10.8	6	6	H
70	H	33	27	30	D *	41	50 3		23-10-84	11.6	6	5	N-H
45	H	24	27	25.5	C	33	25 4		08-08-85	10.7	6	5	S-H
15	M	28	32	30	C	39	25+ 3		16-06-85	10. 10	6	6	H
6	M	21	30	25.5	C	41	50 3		05-09-84	11.8	6	6	H
54	L	10	29	19.5	A	34	25 4		24-10-84	11.6	6	6	S-H
62	L	16	14	15	B/C	45	75+ 2		11-02-85	11.2	6	6	N-H
1	L	11	18	14.5	A	37	25+ 3-		18-11-84	11.5	6	6	N-H
106	H	34	30	32 *		44	90 2+	95+ 1	33	9.5	5	5-6	H
96	H	31	43	37	D *	39	50+ 3+	90 2+	04-03-86	9. 10	5	5	H
79	M	25	29	27	C *	24	10-25 4		02-06-86	9.11	5	4	N-H
91	M	24	23	23.5	C	52	95 1	95+ 1	20-12-85	9.5	5	5-6	N-H
104	L	15	17	16	B	41	75 3+	95 1	06-09-85	9.8	5	6	N-H
135	L	10	20	15	A	30	10-25 4	50-75 3+	06-06-86	9.3	5	6	N-H
137	H	36	34	35	D	44	90 2+	95+ 1	11-10-86	9. 0	4	4	H
192	H	30	35	32.5	D	32	25-50 3-	75-90 2	19-02-87	8.11	4	4	H
191	H	33	35	34	D *	32	25-50 3-	90 2+	06-06-87	9.1	4	6	H
177	M	22	27	24.5	C	29	25-50 3-	75 2	13-07-87	8.11	4	5	H
141	M	29	24	26.5	C	17	10 4-	10+ 4	19-05-87	9.1	4	3-4	H
197	M	22	15	18.5	C	20	10-25 4	25-50 3-	01-03-87	9.3	4	4	N-H
204	L	16	29	22.5	E	30	25-50 3-	75-90 2	07-02-87	9.3	4	4-5	N-H
154	L	12	21	16.5	B	16	5-10 4-	10 4-	14-03-87	9.3	4	5	S-H
181	L	17	19	18	C	29	25-50 3-	50+ 3+	14-12-86	9.6	4	5	N-H
249	H	24	40	32	D	22	25-50 3-	75 2	13-04-88	8.2	3	4	H
277	H	40	32	36	C *	29	25+ 3	50-75 3+	09-11-87	8.7	3	3-4	H
247	H	29	19	24	E *	14	10+ 4	10-25 4	11-06-88	8. 0	3	4	N-H
211	H	23	30	26.5	D	26	50+ 3+	75-90 2	26-03-88	8.2	3	4	H
263	M	19	27	23	C	20	10-25 4	50+ 3+	09-03-88	8.3	3	5-6	N-H
242	M	21	19	20	C	27	50-75 3+	90-95 2+	25-05-88	8. 0	3	4	S-H
215	M	25	29	27	C	41	90-95 2+	95+ 1	21-10-87	8.7	3	5	H
287	L	11	39	25	B	22	25 4	50-75 3+	11-01-88	8.6	3	6	H
256	L	9	15	12	A	9	5 5	<5 5	30-01-88	8.4	3	4	N-H
217	L	16	26	21	C	27	25-50 3-	75-90 2	20-02-88	8.3	3	2-6	H

Appendix 9.1. **Table of results. Protocol Analysis.**

Appendix 9.2. **Protocol analysis TCT-DP scripts verbal**

I.D. No.	Cn	Cm	Ne	Cl	Cth	Bfd	Bfl	Pe	Hu	Uc a	b
55	5	5	6	5	5	0	0	1	2	0	3
14	6	6	6	6	6	0	6	0	0	3	0
11	6	2	6	6	6	3	3	0	2	0	3
70	5	5	4	0	5	0	0	0	1	0	0
45	5	4	2	5	4	0	0	0	1	0	3
15	5	4	5	5	5	0	0	0	2	0	0
6	5	4	3	4	5	0	0	1	1	0	0
54	5	5	3	3	5	0	0	0	1	0	0
62	4	4	2	0	0	0	0	0	0	0	0
1	5	2	0	5	0	0	0	0	0	0	0
106	5	5	5	5	5	0	0	1	0	0	0
96	6	6	5	6	5	6	0	0	0	0	0
79	6	6	5	0	0	6	0	0	0	0	0
91	5	5	1	0	2	0	0	0	0	0	3
104	4	3	2	0	0	0	0	0	0	0	0
135	4	4	0	0	3	0	0	0	1	0	0
137	5	3	6	5	5	0	0	0	2	0	3
192	5	5	6	4	5	0	0	1	2	0	0
191	5	5	6	5	5	0	0	1	2	0	0
177	5	4	5	3	5	0	0	0	1	0	0
141	5	2	2	4	4	0	0	0	1	0	3
197	5	4	0	0	1	0	0	0	0	0	0
204	5	5	6	0	5	0	0	1	0	0	3
154	5	3	5	3	0	0	0	0	1	0	0
181	4	4	3	0	0	0	0	0	1	0	0
249	6	6	6	0	6	6	6	0	1	0	3
277	5	5	6	0	5	0	0	1	1	0	3
247	5	5	2	0	2	0	0	1	1	0	0
211	5	5	5	3	5	0	0	0	1	0	0
263	5	3	5	0	2	0	0	0	1	0	3
242	4	3	6	0	1	0	0	0	2	0	0
215	5	5	1	5	5	0	0	0	1	0	3
287	6	3	5	5	6	6	0	1	0	0	0
256	4	4	1	0	1	0	0	0	0	0	0
217	5	5	1	5	5	0	0	0	0	0	0

Appendix 10

Stages for the development of creative abilities. (Urban, 1991)

Stage 1.

The child is not able yet to recognise or perceive provided information or adapt to the information according to the given problem: He or she scribbles or draws something independent from the fragments.

Stage 2.

Beginning accommodations; the child uses the fragments, but without completing or forming or changing. The fragments are only copied.

Stage 3.

First assimilating, but still not very creative drawings: The fragments are completed and become more or less closed, completed and become more or less closed, completed, simple figures, like circles or squares.

Stage 4.

Uses own individual and complex schemes and assimilation, incorporating given fragments by means of creating and interpreting figures as objects or creatures.

Stage 5.

Figures and objects are drawn and interpreted as having an inner relation of thematic dependency structure; an intention of forming and composition becomes recognisable.

Stage 6.

High stage of creative achievement; all completed, equipped, new elements and parts of the drawing contribute to a holistic composition, and to a common theme which is expressed by the holistic way of formal figural quality of the drawing. (This does not necessarily mean high technical artificial drawing skills.)

Appendix 11.

Verbal protocol analysis.

The use of the methodology as a means of gathering information on what a person is thinking about and information heeded as a task is being carried out has a long history Watson (1920) and Duncker (1945).

According to Ericsson and Simon (1993) thinking and talking loud can be elicited almost instantaneously by the appropriate instruction from virtually all human adults

Talk-aloud asks the subjects to say out loud whatever they are saying silently to themselves. Think-aloud verbalisations consist of both orally encoded information and other kinds of thoughts. Generating new thoughts under all kinds of constraints of relevance is a slow process. Verbal descriptions are much more fluent than explanations which require more thinking and analysis.

Green (1995) stated that verbal protocol analysis was the term used to describe a methodology where verbal reports generated by individuals under a range of circumstances are used as data. These verbal reports are qualitative and under certain circumstances can be coded and statistical techniques applied.
Verbal protocol analysis is used principally as a means of inferring thought processes and heeded information from behaviour.
Generally, Verbal protocols may show evidence or erroneous reasoning, failure to note relevant features in a student's work that should be credited or the use of criteria other than those recommended.
Students may be asked to generate verbal protocols as they work through a series of test items. The protocols are then analysed in order to identify the cognitive processes involved in carrying out the tasks.

The validity of verbal reports depends crucially upon the extent to which information that is actually heeded as a task is being carried out corresponds to what is then

actually verbalised. The verbal report should ideally be produced as the task is being carried out, with minimum intervention from the observer. Use of the concurrent (simultaneous) report procedure avoids error due to time lapse. Unaided verbalisation where the individual is asked to think aloud and only prompted when he/she pauses for a period of time. The prompts are as unobtrusive as possible and would include requests to 'keep talking'.
Gilhooly (1986) found that individuals vary considerably in the quality and quantity of the verbal data produced.

Ericsson and Simon (1993) "*Verbalisations cannot convey information than was available to the process that produced them. Protocol analysis may involve categorising the verbalisations according to the processes that could have generated them.*" (p. 313).

Aspects of reactivity in protocol generation were discussed by Russo, Johnson and Stephens (1989).When the demands of articulating spoken words, maintaining an adequate voice level and recording idiosyncratically abbreviated oral codes so that they are intelligible to other listeners are present, subjects are confronted by the problem of how to allocate processing resources between the primary task and verbalisation. Further, vocalisation creates additional aural stimulation that might either facilitate or interfere with performance of the primary task. Generating a protocol may facilitate learning by giving subjects the opportunity to reflect on the primary process.
Since concurrent protocols are usually generated in the presence of an experimenter and intended for subsequent transcription and analysis, subjects can consequently anticipate exposure of their errors and may behave more in accord with the perceived preferences of the experimenter.
Russo, Johnson and Stephens (1993) held that on the basis of their experiences with verbal protocols, they believed that nothing could match the processing insights provided by verbal protocol.

A verbal talk-aloud protocol which was generated as a consequence of doing the

TCT-DP and used as a means of supplementing data.

Protocol analysis involves distinct phases involved in gathering and analysing verbal data. (Green 1995)

* *Task specification* - identifying a suitable task and deciding on procedure whether concurrent or retrospective reports.

* *Data collection* - verbal data recorded on tape or video.

* *Data transcription* - the verbal data are transcribed in its entirety. time markers may be used to indicate how much time is spent on a particular phase of activity.

* *Exploration* - a subset (random sample) of protocols is examined to develop coding categories.

* *Construction of a theoretical framework for the analysis of verbal data* - a theoretical framework guides the analysis of data.

* *Segmenting of protocols* - each segment corresponds to a sequence of behaviour such as a statement or phrase.

* *Encoding* - codes are assigned to each segment within a protocol (protocols should be encoded by at least two coders).

* *Analysis* - once the protocols have been coded, data are analysed. Coded data may be quantified for statistical analysis.

Protocol analysis can be seen as both qualitative and quantitative in approach.

Appendix 12.1

Story-telling.

A picture book was purpose made, adapted with the illustrations from the first chapter of "Annelie in the Depths of the Night." by Imme Dros. Illustrated by Margriet Heymans. Published by Faber and Faber Ltd. 1991.

Instructions for story-telling.

"Here I have a picture story book. It is a story without words it has only pictures.
Can you use the pictures to tell an interesting story?
Can you use your imagination to tell a really interesting story.
You are allowed to look through the picture book before you begin your story.
Use the pictures to help tell your story."

Appendix 12.2

Creativity Judging (Hennessey, Amabile, 1988b)

The judges were asked to consider the following categories, and rate each category for every story on a scale of 1 to 10.

Creativity - using your own, subjective definition of creativity, the degree to which the story is creative.

Liking - how well you liked the story, using your own, subjective criteria for liking.

Novelty - the degree to which the subject/plot is novel.

Imagination - the degree to which the subject/plot is imaginative.

Logic - the degree to which the story events are logical, or understandably related.

Emotion - the amount and depth of emotion the story conveys.

Grammar - the degree to which the story is grammatically correct.

Detail - the amount of detail contained in the story.

Straightforwardness - the degree to which the story is straightforward.

Appendix 12.3 - Story-telling
Results
Judge 1.

Story-telling. Judges scoring sheet

ID	Creat.	Liking	Novel.	Imag.	Logic	Emot.	Gram.	Detail	Str.fwd	Totals
001	4	5	4	3	6	5	6	4	6	43
002	6	6	6	6	6	7	6	6	6	55
003	4	5	5	4	6	5	6	5	6	46
004	4	4	4	4	5	4	5	5	6	41
005	5	5	6	6	7	6	6	5	6	52
006	3	3	3	3	4	3	3	3	4	29

Judge 2.
Story-telling. Judges scoring sheet

ID	Creat.	Liking	Novel.	Imag.	Logic	Emot.	Gram.	Detail	Str.fwd	Totals
001	7	7	7	7	8	8	8	7	7	66
002	9	8	8	9	8	9	8	9	8	76
003	7	6	7	7	7	6	8	7	8	63
004	6	5	6	6	5	6	7	6	6	53
005	8	8	7	8	8	7	8	8	7	69
006	6	6	6	6	5	6	6	5	6	52

Appendix 12.3

Judge 3.
Story-telling. Judges scoring sheet

ID	Creat.	Liking	Novel.	Imag.	Logic	Emot.	Gram.	Detail	Str.fwd	Totals
001	3	3	2	3	3	2	4	3	4	27
002	4	4	2	4	4	2	6	6	4	36
003	3	3	2	3	3	2	5	4	4	29
004	3	3	2	3	2	4	4	4	4	28
005	3	3	2	3	5	2	5	3	4	30
006	2	2	2	2	2	2	4	2	4	22

Appendix 12.3.1. Judges scoring sheet blank

Story-telling. Judges scoring sheet

ID	Creat.	Liking	Novel.	Imag.	Logic	Emot.	Gram.	Detail	Str.fwd	Totals
001										
002										
003										
004										
005										
006										

Story-telling 1

Annelie was colouring a picture while her mum was washing. Her mum went out to pick some apples from a tree. Annelie was really bored. Annelie decided to go in and play with her little dolls while grandmother was knitting. Mother was outside pegging the washing out. Annelie was helping bringing out the pegs. It was going to be night-time, Annelie's mother tucked her up into bed. Annelie could not sleep, eventually Annelie fell asleep and dreamed that she was in a world of her own. She went into a place, it was like Cinderella and she was talking to herself even though she did not know it. Grandmother came in and told her to be quiet. Annelie fell asleep again and dreamed that she was on the moon, she thought she was in the clouds and she thought she was in a graveyard. Annelie went back home in her dream and she went into the open window. She went onto a swing what was inside the house. Annelie was hungry she decided to have something to eat. She went into the little house she did not know whose it was and looked through a load of stuff. An old wicked witch came in and said, "what do you think you are up to ?" and Annelie said she was just thirsty and so a giant mouse took her to a cupboard where she could get a drink. Annelie had a glass of milk and the giant mouse was watching her. Eventually she woke up and everything was back to normal. Annelie and her mother went to the shops in the morning and bought Annelie a nice new dress.

Appendix 12.4 .2

Story-telling 2

One morning Sarah was colouring while her mother was washing up. "Would you like to go and pick some apples later Sarah?"
"Yes mother", Sarah said, so they went out. After, Sarah finished her picture and went to start to pick the apples off the tree. When they got back in mother did some washing and asked Sarah to come outside with a bucket of pegs. She came outside. Her mum was already pegging some up but she did not have enough pegs so Sarah brought them out and she hung them on the line. They did a lot of work that day and they came in because Sarah was very tired and her mother tucked her into bed. It took Sarah quite a while to go to sleep but eventually she fell asleep. She had a dream about she woke up and went into a room where there was a woman begging with a basket of nuts and a white bird on her shoulder. She asked her what she was doing. She said I am waiting. Sarah asked her what she was waiting for. She said she was waiting for her husband to come back from the moon from fighting. Of course Sarah knew she was a ghost so she started talking to her. All of a sudden she heard a loud noise and she woke up very fast and she screamed and then her mother came upstairs, told her to be quiet and to get to sleep. Sarah fell back asleep again and after a few minutes she started dreaming again. She dreamt she was in a field of lovely poppies and daisies all around and then suddenly she jumped as high as she could and she went right through the clouds and she shouted, "Ah what a lovely life it is", and then she got back down again and went into the dark passage, and thought well, this is strange so she went through a door and it looked like she was in some kind of attic. She didn't know about it anyway where she could find she saw a swing swinging about. Sarah couldn't reach it so she tried to jump again but she couldn't reach it she looked around and she saw some bottles on the shelves and she thought well what could it be. She saw some writing on which looked like a toy language so she couldn't read it. She looked around there was a pile of old bags she was having a look when she heard a squeaky voice. "What are you doing?' Sarah said, "Oh I was just having a look, do you mind ?"
"Yes I do mind," said the straggly old woman. She had tatty old clothes on and a stripy vest and she had a mens hat on and she looked like she was very old. There were piles of everything all over. The woman told her to get out, and Sarah

said she would. When the woman had gone Sarah went over to a cupboard, heard some squeaking noises Sarah looked and there it was a giant mouse. " Oh!" she said. " what are you doing ?" The mouse looked very tatty and old, it was a very big mouse it feeled like it was talking so she ask d it was doing. "Well I've just been brewing something would you like to test it ?" She said,
"Yes, what is your name?"
"My name's Billy," he said.
"Billy, what a nice name," Sarah said. "What is it you have been brewing?
"It is a very sweet drink, I don't know what to call it yet, maybe you could help me."
Sarah picked up a glass and tasted it she said it was nice and sweet. "What do you think we should call it?"said Billy.
"Mmm I don't know," said Sarah.
" Well you think it over".
"Oh I've got it cherry
"No".
"Sweeting drink,"
"No".
"Well, we'll just have to leave it at that and call it a simple name like Billy's drink, yes we'll call it that for now.
"Thank you, Sarah"
"You're welcome."
Next day, Sarah woke up and her mother was already up.
"Sarah come on quick we have got to go to the shops, its very late."
"What time is it mother?"
"It's eight o clock".
"Oh dear, I should have been up at seven, I slept in an hour, a full hour," she said.
"Well we must get you washed and dressed and then we'll go to the shops."
"O K then," Sarah said.

Appendix 12.4 .3

Story-telling 3

One day little Angelica who is 8 years old was drawing while her mum was washing up. Then all of a sudden her mum asked Angelica if she wanted to go and pick some apples off the apple tree. So they went outside and picked some apples and angelica ears started hurting and she had a headache. Then her mum went in wondering and did some sewing while Angelica had some medicine. Then her mum asked her for some pegs out. Then it was dark time and her mum tucked her in bed and Anjelica went to sleep. Then Angelica woke up and she went downstairs to see her mum, and her mum was baking and she asked her to go back to sleep. Then Angelica started to have a dream where she was on top of clouds and she went on top of one and she saw another and climbed through it and she started drowning then also she came to a door and saw a small house, and there was an open window so she went through and saw some ladders so she climbed up them. Then when she had finished getting on top, she saw some bottles and she looked at them and some of them were salt, tea, coffee and all of them sort of things. Then she saw some ropes so she looked at them. Then also a woman came in her name was rat master and every night every time at midnight she turns into a rat and Angelica. It was midnight and Angelica was watching rat master turn into a rat and as soon as she arrived she opened a cupboard and got a drink out and she asked Angelica to drink it. Then Angelica started to talk to rat master who think she was a good friend then all of a sudden she woke up and also then she was back to her normal room and woke up. The next day she woke up and went out of the house and walked away with her dad.

Appendix 12.4 .4

Story telling 4

It was Sunday night at 7 p.m. and mum was washing up in the kitchen while Amelia was drawing on the table. Then the mum went out to pick some apples and Amelia came out and she said, " Mum I'm tired ",so they go back inside and mum makes some tea and they have a drink. Mum washes her hands and then pegs the washing out. Amelia comes out with her crayons again and she said, "I don't know what to do."

"Well, come in and we'll have some tea." They came in at tea and at 8 p.m. She went to bed and mum took her up, and gave her a cuddle and kissed her and said, "good night mum". and mum said "good night" back. And then she it had gone past 9 o'clock and the Amelia was still sat up in bed awake and couldn't get to sleep. And then she fell asleep and had a dream and she thought she had gone off to somewhere like a fairy story and then she was talking in her sleep. Her mum woke her up and said shhh! and she dozed off dreaming that she was climbing. She thought she was climbing up her bed cover but then she discovered she had gone through a cloud. Then she saw a door she opened it and she went in and then when she went through that she saw another like door thing. She went through that and saw a big swing. She started pushing it up and down, up and down and then she looked and there was a big like shelves, loads of shelves and they had pop on and she thought, oh I'm thirsty, which shall I get. Then she didn't decide so she looked around and realised it was Cinderella's. It looked like Cinderella's thing because there is slippers. Then a lady walked in and started saying to her what are you doing and then said, "Come here." They went into a different room and there was like a rat, a cross between a rat and a small mouse and it said to Amelia, "Would you like a drink?" and she said,

"Yes. I'm really thirsty." So they sat down and had a little feast together. Then he got some cheese for Amelia, and Amelia said, "Oh I'm too tired to eat." Then she went back through the room and saw got to a different room another room where there were bottles with stuff inside. Then she went out of her dream back to sleep. And next morning at 8 o'clock she woke up and went out with her mum to the shops.

Appendix 12.4 .5

Story-telling 5

One day a girl called Elizabeth asked her mother when she was eating "Could I have beer?" She wanted to try it and see what it was like. Her mum said, " No !" Then her mum walked out into the garden where she asked her again but she still said no again. Then when dinner time came she asked her again and her mum said no. The next day she asked her mum again when she was pegging the clothes up, and she said no and then that day when she went to bed she asked her again for the last time. Then in her bed she sat there thinking about how the beer would taste like and then she started her dream. And dreamed that she was with Cinderella and that she was talking to her about something and then her mum came into the room all of a sudden and said to her to be quiet and she went back to sleep again. Then she dreamed about how she got out of her bed went outside and started to crawl everywhere. The next thing she knew she was in the clouds and then she saw an archway in the clouds and she went through the archway and saw an attic and she went into the attic and she saw a swing and she went to the swing and had a go onto it. Then she looked around the room and saw some bottles of drink, she saw some shoes and she tried some on, but she didn't like them. All of a sudden a lady came up to her and creeped towards her, "follow me" and then led her into this other room where there was a large
rat, and he had a cupboard full of beers and he asked her "Would you like some?" and she said,
"Yes." He gave her ten glasses and she drank all of them and after that the rat ran away. And the girl she saw this other door with a key in it. And then she turned the door and all of a sudden she was back into her own room and then she fell asleep. The next day she told her mum all about the dream and she went shopping with her mum and her mum said, "I hope this dream can't be true."

Appendix 12.4 .6

Story-telling 6

"Mum, where are you going?. I'm colouring book, where are you going?"
"I'm going outside to pick some apples."
"I'm coming." "Mum where's the vinegar on the chips?"
And she goes back outside. "Oh, where's my felt-tips and all the pencil crayons?"
At night she goes back to bed and she's feeling scared. She's having a weird dream and talking in her dream. Mum comes in and tells her to be quiet and then she starts to have her dream again. She's like on top of the clouds and she's down like flying through the clouds. Now she is entering something very dark with a hole while she is near the roof with a window going in. Now she's outside in the garden playing with a see-saw. She is looking at all sorts of bottles with stuff in. Now she's playing with a - old ropes. Now she sees a lady come in like a wicked witch and she sees a big mouse which asks her to come and look at that a lot of drinks. So the mouse tells her to drink some drink. She drinks some and she starts talking with the mouse then she goes to a door and opens it and goes. Now she is back in bed and she's going with her mum to shopping.