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A comparative analysis of creative thinking patterns in
children who are gifted, learning disabled, and gifted with
learning disabilities

by

Edith B. LaFrance (Dee)

Thesis submitted to the School of Graduate Studies
of the University of Ottawa
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Education

Ottawa, Canada, 1993

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This dissertation is dedicated to the memory of my father, H. Godfrey Bird, a gifted physician and great friend who was 'learning disabled'; to my husband, Jim, whose continuing support encouraged me to persevere in spite of what sometimes seemed like insurmountable odds; and to my mentor, Dr. Margaret Byrd Rawson who taught me that even one person could make a difference.

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Table of Contents

	page
<u>Abstract of A comparative analysis of creative thinking patterns in children who are gifted, learning disabled, and gifted with learning disabilities</u>	x
Chapter	
1. INTRODUCTION.....	1
2. REVIEW OF THE LITERATURE.....	9
Mind Functions.....	9
Definitions.....	15
Creative Thinking.....	16
Identification of Three Groups of Exceptional Children	24
Identification of Gifted Children.....	25
Identification of Learning Disabled Children.....	28
Identification of Gifted/LD Children	31
Characteristics Gifted/LD Share with LD or Gifted.....	35
Research Questions Forming the Basis of the Inquiry...	39
3. METHODOLOGY.....	41
Sample and Target Population.....	41
Measurement Instruments, Variables and Analyses.....	44
The Wechsler Intelligence Scale for Children-Revised	45
Operational Definitions of the WISC-R Subtests...	47
The Torrance Test of Creative Thinking (TTCT).....	50
TTCT Revision and Definitions.....	51
Streamlined Scoring of TTCT.....	54
Norm Base and Types.....	55
Content and Construct Validity of Revision.....	55
Future Scenario Writing (FSW).....	59

History of FSW.....	60
Adaptation of FSW for Data Collection.....	61
The Grid and Emerging Codes.....	63
Reliability of Future Scenario Writing.....	65
Cross-rater Reliability.....	65
Four stages in training raters of FSW.....	66
Procedures for Data Collection.....	69
Personal Interviews with Teachers.....	73
Methodology Chosen to Operationalize Research Questions	75
 4. RESULTS OF DATA ANALYSES	 80
Analysis of the WISC-R (question 1).....	81
Analysis of TTCT Figural Form B (question 2a).....	98
Analysis of Creative Strengths of the TTCT	106
Analysis of Creative Thinking Patterns on Future Scenario Writing (FSW) (questions 2a and 3).....	112
Fluency.....	112
Titles.....	113
Analysis of Remaining Creative Characteristics....	113
Comparison of the TTCT and FSW (question 4).....	120
Analysis of teacher interviews (question 5).....	126
Summary.....	137
 5. SUMMARY AND CONCLUSIONS.....	 139
Teacher use of Creative Thinking Patterns.....	148
Assumptions and Limitations.....	151
Contributions and Educational Implications.....	152
Suggestions for Further Research.....	156

References.....	158
Appendices	
A. Myers/Briggs Personality Types.....	185
B. Permission to Adapt Scenario Writing.....	186
C. Examples of Future Scenario Writing.....	187
D. Consent Form for Teacher Interviews.....	201
E. Questions for Teacher Interviews.....	202
F. Information Form for Each Child in the Study.....	203
G. Parent and Student Consent Form.....	204
H. Proposal Abstract.....	205
I. Parent Information Sheet.....	206
J. Individual WISC-R and WJPEB Results.....	207
K. Kaufman's calculation of 'below their own average' with regards to the WISC-R subtests.....	213
L. Instructions for Future Scenario Writing.....	215
M. Streamlined Scoring Sheet: TTCT Figural Forms A/B	216
N. Classroom Extensions: Comparison of Three Groups on Creative Thinking Strengths.....	217

Table	List of Tables	Page
2.0	Reference for Numbers in Figure 2.3.....	37
3.1	Sample Description.....	43
3.2	Code Abbreviations and Labels.....	62
3.3	Information Regarding Research Design.....	71
3.4	Research Questions and Corresponding Methodology..	79
4.1	Means and Standard Deviations for Three Groups of Children on the WISC-R.....	81
4.2	Pooled Within-Group Correlations Between WISC-R Predictors and Canonical Discriminant Functions...	83
4.3	Canonical Discriminant Functions Evaluated at Group Means: Group Centroids WISC-R.....	83
4.4	WISC-R Predictors: Verbal, Performance, Full Scale Classification of Actual Group.....	86
4.5	Ordering of the WISC-R Variables.....	88
4.6	Group Means and Standard Deviations of Six WISC-R Subtests.....	90
4.7	Correlations Between Discriminating Variables and Canonical Discriminating Functions.....	91
4.8	Canonical Discriminant Functions Evaluated at Group Means: Group Centroids of 6 WISC-R Subtests.	92
4.9	Six Subtests of WISC-R: Classification of Actual Group.....	93
4.10	Ordering of 6 WISC-R Subtests (1).....	93
4.11	Ordering of 6 WISC-R Subtests (2).....	95

4.12 Means and Standard Deviations on the TTCT	
Predictors for the 3 Groups of Exceptional Children	99
4.13 Pooled Within-Group Correlations Between Predictors	
and Canonical Discriminant Functions.....	101
4.14 Canonical Discriminant Functions Evaluated at	
Group Means: Group Centroids (TTCT).....	102
4.15 Torrance Test of Creative Thinking Predictors:	
Classification of Actual Group.....	104
4.16 Ordering of TTCT Variables.....	105

List of Figures

Figure	Page
2.1 Creativity Circle, B. Clark, 1988.....	14
2.2 Integration of Two Models.....	23
2.3 Characteristics in Common: Gifted, Gifted/LD, LD..	36
4.1 Group Centroids: Verbal, Performance, Full Scale..	85
4.2 Group Centroids: 6 WISC-R Subtests.....	94
4.3 Spatial Configuration of Group Centroids (TTCT)...	103
4.4a Strengths in Creative Thinking (TTCT).....	109
4.4b Some Evidence of Characteristics (TTCT).....	110
4.4c TTCT: Combined Strengths/Some Evidence.....	111
4.5a FSW Strengths in Creative Thinking.....	115
4.5b (FSW) Some Evidence of Characteristic.....	116
4.5c FSW: Combined Strengths/Some Evidence.....	117

Abstract

A comparative analysis of creative thinking patterns in children who are gifted, learning disabled, and gifted with learning disabilities

Creative thinking is dynamic; its growth can be fostered in a democratic atmosphere with instruction and experiences which encourage the use of all mind functions. This study integrates two models of creative thinking and extends the existing research to include, not only gifted children, but also children who are learning disabled and children who are gifted with learning disabilities. Children who are gifted with learning disabilities (gifted/LD) are often achieving at or below grade level because their high abilities mask their extreme learning disabilities and their learning disabilities mask their high cognitive abilities. Unable to produce at the expected rate or standard, they are frequently given programming which excludes them from activities which might develop their potential in gifted behaviours. Unidentified and misunderstood, the gifted/LD, like the learning disabled children, perceive school as an experience in failure; self-esteem is lowered and the school experience is left behind as quickly as possible. Cognitive as well as creative thinking patterns are compared in these three groups of exceptional children by examining, through both quantitative and qualitative analyses, their subtest scores on the Wechsler Intelligence Scale for Children and their performance on figural designs as well as creative writing. Teachers in four Boards of Education were interviewed individually. They were aware of creative thinking characteristics in gifted and gifted/LD children but not in learning disabled children. Since the revised Wechsler Intelligence Scale for Children assessed only cognitive functioning, it was after administering tests of creative thinking that learning disabled children's strengths became apparent. These were intuitive creative aspects as expressed in figural form completion and expressing positive and negative feelings in their stories. Gifted/LD children were more similar to gifted than to learning disabled children in cognitive as well as other creative thinking abilities. This study should assist teachers and clinicians to identify creative thinking differences between gifted and gifted/LD and between gifted/LD and learning disabled children. By using their creative abilities while meeting educational needs, teachers are heightening self-esteem and encouraging the realization of their students' fuller potential.

Chapter 1

INTRODUCTION

Creativity is not only our most distinctly human quality but also our greatest challenge (Dixon, 1983). Although educators and scholars have not agreed on a definition for creative thinking per se, in an effort to understand the complexities of the human mind, they have closely studied the process of creative problem solving (Clark, 1986; Holland, Holyoak, Nisbett & Thagard, 1989; Torrance, 1973). In examining the skills that they maintain must be measured and practised, it may be possible to infer the essence of creativity. Since creative thinking is essential for solving complex problems (Guilford, 1986; Ornstein, 1977), it is imperative that educators foster the growth of creativity by providing experiences for the development of creative behaviours in all children.

It has been shown that creative abilities are complex and dynamic. They can be fostered in a democratic atmosphere with instruction or experiences which encourage the integration of all mind functions or brain processing strategies (Clark, 1986, 1988; Torrance, 1979, 1990). Studies indicate, too, that training in creative thinking increases competence of spontaneous writing in LD children (Fortner, 1986) and improves strategies for reading comprehension (Valett, 1986), yet tests of creative thinking

patterns are rarely, if ever, included in the battery which identifies strengths and needs of exceptional children.

In the past, research has been directed toward creative thinking in gifted children (Clark, 1986; Torrance & Torrance, 1978) and regular classroom children (Clark, 1988; Torrance, 1962b, 1990). Teachers of children who are learning disabled or gifted with learning disabilities have sparse information regarding such creative abilities as fantasy, insightfulness, openness to new ideas or tolerance for ambiguity. These gaps in the literature may be due to a lack of understanding of the importance of knowing creative characteristics when differentiating curricula. Teachers may have low expectations or reductionistic assumptions underlying their programming (Poplin, 1985). By criticizing and attending to correct form too early in the lives of the learning disabled, "we stifle their natural growth of language" (Poplin, 1985, p. 11). It is important that educators use the excitement generated by the "eureka process" and the ensuing task commitment in the elaboration of an idea to release creativity and improve feelings of self-worth (Clark, 1986; Ornstein, 1977; Torrance & Safter, 1990; Torrance & Torrance, 1978; Vygotsky, 1978).

The literature suggests that both learning disabled children and children who are gifted with learning disabilities feel inadequate and experience difficulty coping with day to day problems in a classroom (Barton & Starnes, 1989; Ellis, Deshler, Lenz, Schumaker & Clark, 1991;

Tannenbaum & Baldwin, 1983). Both populations need to develop creative problem solving skills such as thinking of alternatives (fluency), coming up with original solutions, and keeping an open mind to allow creative ideas to flow (resistance to premature closure).

Children who are gifted with learning disabilities pose unique challenges to educators. Often achieving at an average level or below, they are in situations where their high abilities are masked by learning difficulties, or learning disabilities are hidden by high cognitive abilities (Miller, 1991; Southern, Wilson & Majsterek, 1988). Teachers maintain that these students perform well orally but do not express themselves well on paper or on the computer with attention to sentence structure, thought organization and correct spelling. They may be given programming which emphasizes their deficits simply because their creative strengths are not recognized by teachers or assessment personnel. If, on the other hand, the gifted/LD children are given a stimulating environment with peers of like ability, they are often unable to produce at the expected rate or standard (Baum, Owen & Dixon, 1991; Rawson, 1992). Unidentified and misunderstood, they perceive school as an experience in failure (Baum, 1984; Baum, Owen & Dixon, 1991) and school is often left behind as quickly as possible.

The literature on the gifted/LD points to the necessity of recognizing children who are gifted with learning disabilities. To counteract feelings of failure and

negativity in children who are learning disabled and gifted with learning disabilities (gifted/LD), teachers might optimize learning for them by utilizing their interests and creative strengths as they individualize curricula.

The purpose of the present study is to refine the criteria for the identification of children who are gifted/LD and for instruction of all three types of exceptional children. To know whether programming for gifted/LD should be more similar to that for LD or for gifted children, it is important to determine whether there are both cognitive and creative thinking patterns which differentiate these three groups of exceptional children.

Cognitive abilities can be examined by analyzing profiles of the Wechsler Intelligence Scale for Children-Revised (WISC-R, 1974). Creative abilities may be examined by analyzing the performance of these three groups of exceptional children on figural forms and on writing creative stories. Results and conclusions can effect a change only if teachers recognize creative thinking and its value in differentiating curricula for these children.

Chapter 2 will explore mind functions and creativity separately and interactively as general concepts which precede the theoretical model. The chapter focuses on the characteristics of three groups of exceptional children: children who are gifted, those who are learning disabled and those who are gifted with learning disabilities. As will be shown, the literature suggests some characteristics are

similar in both gifted and gifted/LD children; whereas others are similar in gifted/LD and learning disabled children. Research has not been directed toward the creative thinking characteristics of the latter two groups. Two models are examined; one focuses on the assessment of creative thinking and the other on teaching children to connect various mind functions in order to stimulate creativity. These models are integrated to form the theoretical framework of the study.

The methodology which has been selected to examine each of the research questions is outlined in chapter 3. The sample, instruments and procedures are described in detail. A quantitative measure was required which would determine which variables, cognitive or creative, might significantly separate the three groups. Without prior assumptions, predictors were selected by a direct or stepwise descriptive discriminant function. The tests of significance determined what patterns of scores discriminated one group from another.

Descriptive qualitative methods were chosen for analyzing creative strengths apparent in the completion of figural forms as well as the categories and codes which emerged in the students' creative writing. The Ethnograph, a program for the computer-assisted analysis of text, was used to facilitate the development of an instrument which would reveal the creative thinking patterns in creative writing. Any single text segment could be assigned to several different categories and retrieved as needed. As

categories and codes emerged, they were modified, recoded or deleted (Seidel, Kjolseth, & Seymour, 1988). This study attempted to assess an ill-defined task which resembled everyday life therefore, concordance among judges analyzing the children's stories was an important aspect of the reliability of this adapted instrument (Ericsson & Simon, 1984; Holland, Holyoak, Nisbett, & Thagard, 1989).

To determine whether teachers recognized creative thinking and its value in differentiating instruction, techniques from Spradley's (1979) interviewing process were used. Questions moved from "grand tour" descriptive ones to structural or contrast ones. The same seven contrast questions were asked each informant and the interviews were audio-taped, transcribed verbatim, colour coded and analyzed for frequency of similar replies (Patton, 1990).

This study departed from the naturalistic qualitative methods espoused by Lincoln and Guba (1985) by using audio technology to gather data from some of the students and all of the teachers as well as by using both qualitative and quantitative methodology. The use of quantitative measures allowed the discovery of patterning in situations which might otherwise merely be seen as random variation (Saville-Troike, 1989). She stated that attitude research, in particular, was enhanced by an integration of both qualitative and quantitative procedures.

Analysis of the data is presented in chapter 4. Five research questions are addressed as ability tests and

creative thinking patterns are compared for the three groups of exceptional children. An analysis of teacher interviews explores their knowledge of creative thinking and their perception of individualizing instruction in learning needs while utilizing children's creativity.

Chapter 5, the concluding chapter, summarizes the findings regarding both cognitive and creative thinking patterns in the three groups of exceptional children. Assumptions, limitations and educational implications are discussed as well as suggestions for further research.

Materials that may be of interest to the reader are included in the appendices. These include various consent forms, examples of Future Scenario Writing by students who are gifted, learning disabled and gifted/LD and guidelines for identifying gifted/LD students through creative thinking.

Since the literature is very sparse regarding creative thinking characteristics of LD and gifted/LD children, there are no hypotheses or theoretical preconceptions regarding creative thinking patterns; however, initial research questions arising from the problems form the basis of the inquiry:

1. Are there patterns in individual cognitive assessments which might differentiate children who are gifted, learning disabled and gifted with learning disabilities?

2. What conclusions can be drawn from the data on creative thinking that will be helpful in refining criteria

for the identification of children who are gifted/LD.

3. How does Future Scenario Writing add information to the literature regarding how three groups of exceptional children integrate thinking, feeling, intuition and physical sensation when writing creative stories?

4. Are children who are gifted with learning disabilities more similar to gifted or to learning disabled children in their pattern of creative thinking?

5. Do teacher interviews disclose awareness of creative characteristics in children who are learning disabled or children who are gifted with learning disabilities? Is there an interest in incorporating students' creative thinking strengths when individualizing instruction?

In conclusion, this study involves a comparative analysis of creative thinking patterns in children who are gifted, learning disabled and gifted with learning disabilities. It discusses identification of these groups of exceptional children. Finally, this study examines whether teachers, in general, understand the creative thinking process and welcome information which would assist them to motivate exceptional children while they address their learning needs. Creative thinking characteristics integrated into individual and cooperative activities for these children suggests programming issues which might heighten their self-esteem thereby assisting them to be less negative and less likely to perceive that school is an experience in failure.

Chapter 2

REVIEW OF THE LITERATURE

Chapter 2 will define mind functions as used in this study and describe their relevance to creative thinking in children. The characteristics of three groups of exceptional children will be discussed as will the information available on the creative thinking patterns they have in common. The chapter will conclude with the research questions to be addressed.

Mind Functions

Jung (1923) distinguished four mind functions: thinking, feeling, intuition and sensation. The essential function of sensation is to establish that something exists; thinking tells us what it means, feeling tells what its value is, and intuition surmises where it comes from and where it is going. Thinking and feeling, being discriminative functions, are rational. Jung called sensation and intuition irrational functions, because they are both concerned with what happens and with actual or potential realities. Sensation rules out any simultaneous intuitive activity, since the latter is not concerned with the present but is rather a sixth sense for hidden possibilities, and therefore should not allow itself to be unduly influenced by existing reality. In the same way, thinking is opposed to feeling, because thinking should

not be influenced by or deflected from its purpose by 'feeling values', just as feeling is usually spoiled by too much reflection (Jung, 1936).

These four orienting functions, Jung stated, naturally did not contain everything that is in the conscious psyche. Will and memory, for instance, were not included. The reason for this was that the differentiation of the four orienting functions was, essentially, an empirical consequence of typical differences in the functional attitude. People for whom the numinal accent (numinosity is the relationship of psychic energy to the living individual) falls on sensation are fact-minded persons in whom intellectual judgment, feeling and intuition are driven into the background by the paramount importance of actual facts. If feeling is numinal, then the psyche's adaptation to the facts will depend entirely on the feeling value attributed to them (Jung, 1936).

Jung maintained that it is not the purpose of a psychological typology to classify human beings into categories. Its purpose is rather to provide a critical psychology which will make a methodical investigation and presentation of the empirical data possible. First and foremost, it is a critical tool for the research worker who needs definite points of view and guidelines if she or he is to reduce the chaotic profusion of individual experiences to any kind of order.

In his later writings, Jung (1957) warned that even

persons with a highly developed intellect can go badly astray because they have never learned to use intuition or feeling which might be at a regrettably low level of development. He explained that what he meant by feeling was not an emotion which was an involuntary bodily reaction but a rational judgment of value, for example, agreeable/disagreeable, good/bad feeling values and feeling judgments, "that is to say, our feelings are not only reasonable, but are also as discriminating, logical and consistent as thinking" (Jung, 1933b, p. 91).

Thinking and feeling, then, are ways to make a judgment; whereas, sensation and intuition deal with perception of the situation. When we think, he posited, it is in order to judge or reach a conclusion, and when we feel, it is in order to attach a proper value to something. Sensation and intuition, on the other hand, he said were perceptive; they make us aware of what is happening, but do not interpret or evaluate it. (p. 91-92).

Jung maintained that the achievement of personality means nothing less than the optimum development of the whole individual human being in all its biological, social and spiritual aspects. He called the journey toward wholeness the process of individuation maintaining that, if we lived in such a way that conscious and unconscious demands are taken into account as far as possible, then the centre of gravity of the total adult personality shifts from the ego to the hypothetical point between conscious and unconscious, the

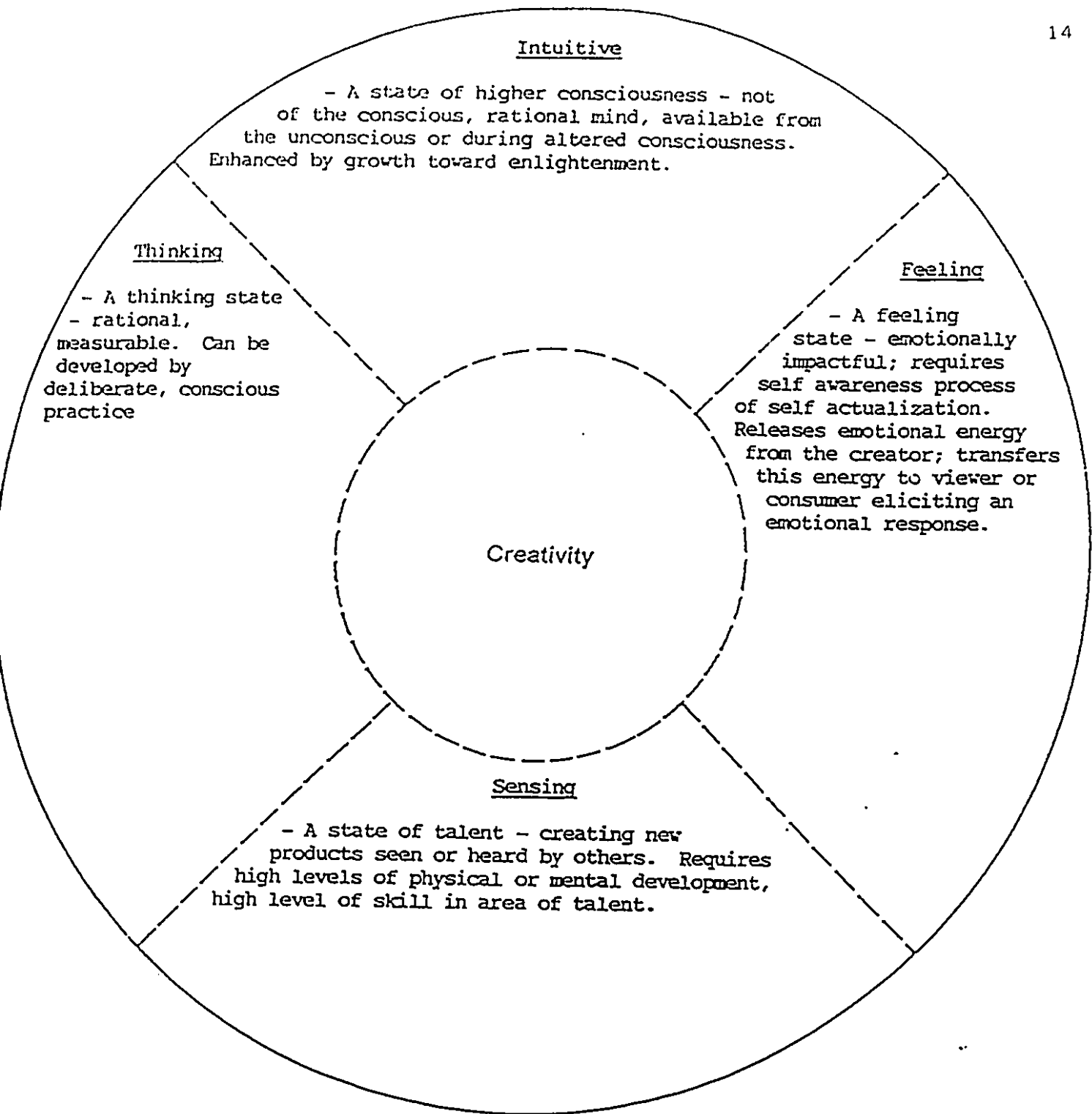
self (McGuire, 1967). Jung posited that each of the orienting mind functions, thinking, feeling, intuition and sensation, varied according to the general attitudes of extraversion and introversion, and thus eight variants were produced.

Myers (1962) found Jung's typology too narrow to accommodate the varied human personalities encountered. She stated that most persons use a dominant function in the preferred introverted or extraverted world and also use the auxiliary function in the less preferred world thereby providing balance to the personality. It was posited that Jung did not describe types with an auxiliary function developed well enough to provide a balance between judgment (thinking/feeling) and perception (intuition/sensation). Therefore, Myers (1962) extended Jung's typology to describe sixteen personality types (Appendix A). Myers and Myers (1988) explained that whichever judging process a child prefers, thinking or feeling, will be used most often, trusted more implicitly, and be most readily obeyed. The other kind of judgment will be a sort of minority opinion, half heard and often wholly disregarded. Thus, the child who prefers thinking, they posited, develops along divergent lines from the child who prefers feeling, even when both like the same perceptive process and start with the same perceptions (Myers & Myers, 1988).

The sixteen personality types described by Myers and Briggs are of assistance to teachers in determining teaching

and learning styles (Albi, 1988). However, Jung's four orienting functions provided a critical starting point for methodical research on creative thinking and a framework for presenting the literature on characteristics. At the same time, it is important for the researcher to be aware of the possible emergence of categories other than thinking, feeling, intuition and sensation.

Through research on optimizing learning by integrating mind functions, Clark (1986, 1988) developed an Integrated Education Model (IEM) for gifted children and extended it to regular classroom children. She cited empirical evidence that educators release the potential for creativity in children by creating a non-threatening, non-judgmental, atmosphere where children are encouraged to learn through physically sensing the environment, cognitively understanding it, and by bringing to conscious awareness their feelings and intuitions. Figure 2.1, the Creativity Circle (1988), illustrates the essence of her Integrated Education Model. She stated that teachers in a democratic classroom could frame their questions and develop activities in such a way as to encourage gifted and regular education children to use all mind functions. The model organizes curriculum through conscious use of four functions "to integrate whole-brain activities resulting in a coherent, total learning experience" (Leroux & McMillan, 1993, p.47). Although the IEM is an excellent instructional model, teachers still need a way of assessing how individuals are currently performing



CREATIVITY CIRCLE B. CLARK, 1988

Figure 2.1

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in creative thinking through cognitive understanding, physical sensing, and becoming consciously aware of their feelings and intuitions.

Definitions

For the purpose of this study, Clark's definitions were used for cognition, affect, intuition, physical sensing and creative behaviours (Clark, 1986, 1988).

Cognition: --a thinking state--rational, measurable. It can be developed by deliberate, conscious practice including both linear and spatial processing.

Affect:--a feeling state--'emotionally impactful'. It requires self-awareness and self-actualization, releases emotional energy from the creator, transfers this energy to the viewer or consumer eliciting an emotional response. It can be developed by empowering learners, thereby adding to their self-worth and dignity.

Intuition:--a state of higher consciousness--not of the conscious, rational mind, available from the unconscious or during altered consciousness. Growth toward enlightenment is enhanced through imagery, fantasy, visualization, "what if" enquiry and futuristics.

Physical Sensing:--a state of talent--creating new products seen or heard by others. It requires high levels of physical or mental development and a high level of skill in an area of talent; it can be developed through

tension reduction and by movement and physical encoding to support learning.

Creative Behaviours:--actions which show an absorption in an area of interest where alternative solutions are examined with openness of mind and tolerance for ambiguity. Such creative behaviours as resistance to premature closure and awareness of intuitions and feelings may lead to an original solution, an analogy that no one has seen before (Koestler, 1964).

Creative Thinking

Educators and scholars have not agreed on a definition for creative thinking; however, in an effort to further understand the complexities of the human mind, they have closely studied the process of creative problem solving. In looking at the skills they claim must be measured and practised, it may be possible to infer not only relevant skills but also the essence of creativity.

Influenced by Jung's studies of the conscious and unconscious psyche, Wallas (1926) proposed four stages of creative thinking: preparation, incubation, illumination and verification. He used the term "intimation" for that moment in the illumination stage when the fringe consciousness of an association was in a state of rising consciousness indicating that the fully conscious flash of insight was imminent. His landmark work on the creative process was the first to acknowledge the importance of mind functions, conscious and

unconscious, cognitively prepared and intuitive.

The early behaviorist school of thought ascribed creativity to chance and contingencies rather than to a conscious mental effort to solve problems. The unconscious, intuition, insight or affect were considered unimportant, and programmed instruction was a key result of Skinner's (1953) approach. Educational aims were composed of behaviourally stated objectives which were sometimes heatedly criticized (Arnstine, 1968; Eisner, 1967). Popham noted (1993) that the unthinking adoption of an objectives-attainment approach to educational evaluation often led to the advocacy of evaluation models whose objectives had been achieved "irrespective of the defensibility of the objectives" (p.55). At that time, many educators did not encourage their students to solve problems in an original or creative way (Guilford, 1950; Koestler, 1949).

Koestler (1949) posited that associative habit behaviour, produced by stimulus-response thinking, characterized the dim routine of existence; whereas, creative mental functions like invention and discovery had a bisociative as opposed to associative pattern. He called the mental process which produced an original and relevant bisociation in a prepared mind a "eureka process" and said that it could occur in a single flash of insight and was the highest form of learning because of the high improbability or anti-chance probability of the solution (Koestler, 1964).

Renewed interest in creative thinking was spawned by

problems in industry, the need for military inventions, space age exploration and the social implications of technological advances which gave more leisure time for creative activities (Koestler, 1964; Simon, 1965). Because of dissatisfaction with a stimulus-response explanation for creativity, scholars turned back to examine traits of individuals as well as the process of creativity. During this period of renewed interest in a dynamic intellect, Guilford developed his Structure of Intellect Model (Guilford, 1950).

Guilford's model was illustrated by 120 defined intellectual abilities in the form of a cube. Each cell in the trigram denoted an operation, content and product. In attempting to identify the creative thinking abilities by factor analysis, he suggested a number of dimensions as hypotheses that needed to be further tested (Guilford & Merrifield, 1960).

Guilford (1968) maintained that even traditional skills could be taught using the students' creative thinking abilities. He believed that teachers who understood creative thinking might redefine behaviours they had previously labeled undesirable, see in them a reflection of abilities which gave promise of highly desirable talent and assist the students to apply such talents in productive, socially acceptable activities.

During the sixties and seventies, much research was done in the field of creative thinking. Parnes (1967), at the request of the American business community, developed a model

for creative problem solving (CPS) describing a five stage process. Along with Osborn (1963), he listed characteristics essential for creativity and emphasized that deferred judgment was extremely important during 'idea finding'. Torrance (1962c, 1974) developed tests for creative thinking which revealed divergent/productive abilities such as fluency, flexibility, originality and elaboration. His research was based on historical accounts of creative achievement, studies of lives of creative persons, laboratory and field studies designed to affect creative functioning, studies involving the evaluation of creative products and processes, and efforts to measure various aspects of mental functioning. He states,

We have used these sources in generating ideas and testing them theoretically to make certain the instruments developed would have as good face validity as possible (Torrance, 1965, p.38-40).

Many programs and materials were published to help teachers counteract the atrophying of children's creative talents (Feldhusen & Treffinger, 1977). Teachers became facilitators of learning who set up interest centres which allowed movement and concrete experiences as the children interacted with materials and each other. These democratic atmospheres were seen as conducive to creativity. (Torrance, 1963).

Williams' Model (1972) added affect to divergent

thinking in an attempt to reach untapped mental and emotional capacities of children as they learned subject matter through multiple teaching strategies. Such affective characteristics as curiosity and risk-taking were important because longitudinal studies showed that adult creative accomplishment was dependent on factors other than simply divergent production (Torrance, 1972a, 1972b, 1981).

Torrance revised his creative thinking skills model over time by comparing behaviours of acknowledged highly creative achievers identified by their inventions, discoveries and ideas, contemporary highly creative achievers, test responses of children who became high achievers, and statistical analyses of these test protocols. He admitted that there were probably other indicators and that some may eventually be renamed, but he determined that the following creative behaviours appeared in highly creative achievers: finding the problem, producing alternatives (fluency), originality, abstracting (highlighting the essence), elaborating, keeping open, being aware of and using emotions, putting ideas in context, combining and synthesizing, visualizing richly and colourfully, fantasizing, using movement and sound, looking at things from a different perspective, visualizing things internally, extending boundaries, humour and respect for infinity (Torrance & Safter, 1990). Torrance maintained that these behaviours occur as a result of integrating information processed by either hemisphere of the brain, and his research showed that these qualities appeared in test protocols and

could be scored with reasonable success (Ball & Torrance, 1984; Torrance & Ball, 1984).

When comparing Guilford's (1950) list of Creative Thinking abilities with Torrance and Safter's (1990), it was noted that the research results of the intervening years have changed from an emphasis solely on cognitive divergent production to a list of skills which include the four fundamental mind functions (Jung, 1923, 1945). The following divisions are based on Jung's descriptions (1936) and Clark's Integrative Education Model (1986, 1988):

Cognition: finding the problem, abstracting the essence,
 finding alternatives (fluency), combining and
 synthesizing, putting ideas in context

Affect: elaborating, feeling the problem, being aware of
 and using emotions, keeping open, respect for
 infinity

Intuition: originality, humour (relaxing tension),
 visualizing richly and colourfully, fantasy,
 incubation, extending boundaries

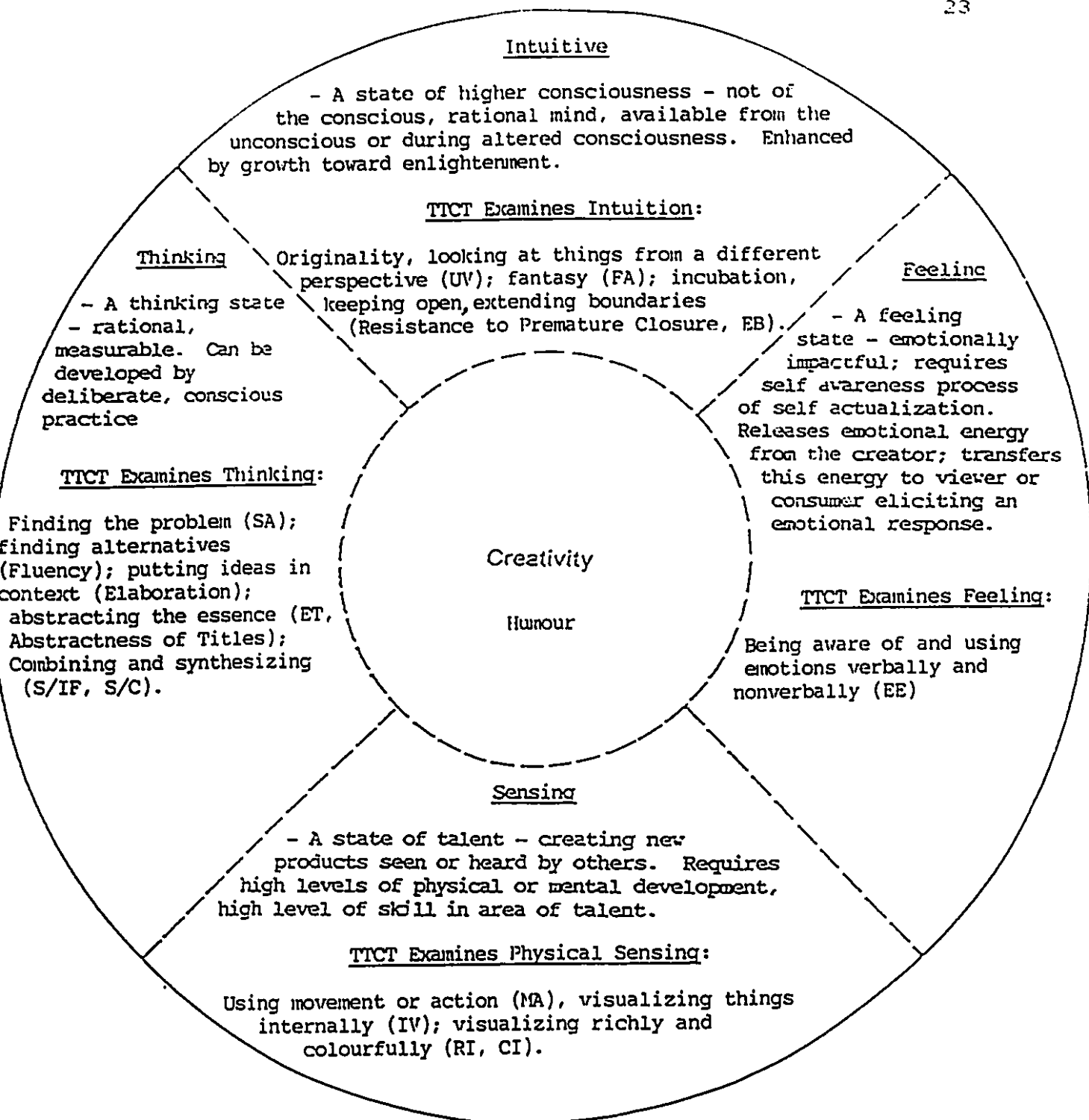
Physical Sensing: using movement and sound, extending
 boundaries, visualizing things internally, looking
 at things from a different perspective.

Such cognitive strengths as abstracting the essence, finding alternatives, putting ideas in context can be addressed within the Jungian framework of Clark's IEM.

Figure 2.2 illustrates how Clark's Creativity Circle may integrate the creative thinking literature, particularly from

the perspective of Torrance (1979, 1990). Torrance's model was diagnostic in its assessment of creative strengths. However, his assessment model gave no assistance to teachers faced with developing curricula for more and more diverse learners. An integration of the two models would not only assist teachers to identify exceptional children through their creative thinking differences, but also to program for different children's needs more effectively.

In conclusion, the literature on creative thinking has indicated that creative abilities are complex and dynamic. Their growth can be fostered in a democratic, non-threatening atmosphere with instruction or experiences which encourage the use of all mind/brain processing strategies (Ornstein, 1977; Torrance & Safter, 1990; Vygotsky, 1978). Although the process of creativity was viewed largely as a cognitive one by Wallas (1926), Guilford (1950), Parnes (1967), Osborn (1963) and others, researchers such as Torrance (1979), Renzulli (1978), Koestler (1949), Ornstein (1977), Wallach (1976) and Williams (1970) drew attention to the need for including intuition and affect in any discussion of creativity. It became more and more apparent that the act of creation, or what Koestler (1964) called the highest form of learning, required an integration of thinking, feeling, sensing and intuition. Clark (1986), whose detailed review of the literature led her to the same conclusion, developed the Integrative Education Model (IEM) to facilitate this integration and the release of creativity in children.



CREATIVITY CIRCLE B. CLARK, 1988

Figure 2.2

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Torrance Tests of Creative Thinking 1979, 1990.

Torrance's recent research (1982, 1990) led him to conclude that creative individuals did integrate both hemispheres of the brain. His revised tests for creative thinking (1990; Torrance & Ball, 1984) determined children's present functioning in traits which led to a creativity index.

There are gaps, however, in the literature with regard to creative thinking traits in children who are learning disabled and in children who are gifted with learning disabilities. It is important that research fill these gaps in order that teachers integrate all ways of knowing in all children and produce members of society better equipped to solve the complex problems of today.

Identification of Three Groups of Exceptional Children

In order to be in a position to compare creative characteristics of three groups of exceptional children, it is essential that the groups be recognized by their distinguishing characteristics. The following sections define the groups while recognizing that the children vary so much among themselves within the groups, that there is considerable overlapping.

Identification of Gifted Children

Identification of gifted children varies according to the definition, restrictiveness or breadth of perspective. The Ontario Ministry of Education defined giftedness as an "unusually advanced degree of general intellectual ability that requires differentiated learning experiences of a depth and breadth beyond those normally provided in the regular school program to satisfy the level of educational potential indicated" (Ontario Ministry of Education, 1985, p.6). Although educators and scholars agree that it is difficult to measure "intelligence" (Maker, 1992, in press; Treffinger & Renzulli, 1986), many school boards use the revised Wechsler Intelligence Scale for Children (WISC-R, 1974) which is a "reasonable measure of where a youngster is currently able to function" (Rosner & Seymour, 1983, p.83).

Scrutiny of performance on subtests can be helpful in program planning. Children are considered for gifted programs if their score is above 130 and if they have achieved above the 90 percentile in both the language/arts and the mathematics/science areas. If the Henmon-Nelson Test of Mental Ability or the Woodcock-Johnson Psycho-Educational Battery is administered instead of the Wechsler Intelligence Scale for Children, a result of at least the 98 percentile is expected. Other information from report cards, teacher and parent checklists forms part of the assessment which is prepared prior to a formal meeting of Board and school

personnel, parent(s)/guardian(s) and pupil. At the Identification, Placement and Review Committee meeting (I.P.R.C.), the pupil may be deemed intellectually gifted and recommended for an appropriate program.

The U.S. Government's definition of giftedness includes one or more of the following: exceptional intellectual ability, specific academic aptitude, creativity, ability in the visual and performing arts or leadership (P.L. 95-561, 1978). Renzulli's (1978) review of research determined that giftedness was the interaction among three clusters: above average ability, high levels of task commitment and high levels of creativity. He posited that none of these alone reflected the potential for creative/productive accomplishment or gifted behaviours in real life (Renzulli, 1977; Renzulli & Reis, 1985). Treffinger and Renzulli (1986) posited that since intelligence is contextual, dynamic and multifaceted, the Intelligence (I.Q.) test was inadequate as a sole criterion in identifying giftedness.

Betts and Neihart (1988) identified six profiles of the gifted and talented using a combination of grade point average, achievement tests, I.Q. tests, interviews, products, teacher/peer/parent/self nominations, recommendations from a mentor or teacher advocate, demonstrated performance in non-school areas and creativity testing. Frasier (1990) revised the Frasier-Talent Assessment Profile (F-TAP) to integrate results from such multiple sources in order to identify potentially gifted (minority) students, without setting a

series of cut-off points on tests or teachers' ratings. She emphasized that the gifted are not a homogeneous group nor do they express their talents in the same way.

Maker extended the research on identifying gifted behaviours in cross-cultural groups by studying intelligence and creativity in multiple intelligences (Maker, 1992; in press). She posited that the key element in giftedness or high competence is, "The ability to solve the most complex problems in the most efficient, effective, or economical ways" (Maker, in press, p.13). Highly gifted individuals, she continued, are "capable of solving simple problems in the most efficient, effective, or economical ways" (Maker, in press, p.14).

When identifying gifted behaviours, some Ontario school boards incorporate tests of creative thinking since creativity has been shown to be an integral component of giftedness (Betts & Neihart, 1988; Feldhusen & Treffinger, 1977; Frasier, 1990; Gowan, Demos & Torrance, 1967; Guilford 1959, 1986; Koestler, 1964; Maker, 1986, 1992a, 1992b; Parnes, 1977; Passow 1982; Renzulli, 1978; Rogers, 1986; Stein, 1974; Torrance 1962b, 1963, 1965, 1973, 1981). It was from a review of the literature on giftedness that Clark (1986, 1988) developed her model (Figure 2.1, p. 14) which showed creativity as central, an integration of cognition, intuition, physical sensing and feeling as per Jung (1933b, 1936).

Identification of Learning Disabled Children

The identification of a learning disability varies, like that of giftedness, according to the restrictiveness or breadth of perspective. Teachers usually observe high ability in some areas and great difficulty in others (Fox, Brody, & Tobin, 1983; Rawson, 1992; Schiff, Kaufman, & Kaufman, 1981). The child might have been very good, for example, in answering orally but very poor in expressing answers on paper (Bowler, 1988; Wees, 1990). In Ontario, observation is often followed by a battery of intelligence and achievement tests. If there is a severe discrepancy between measured potential intelligence and actual academic performance, a file is opened. Information from teachers, parents, and past report cards forms part of the assessment which is presented at an Identification, Placement, Review Committee meeting. The pupil might then be deemed exceptional in the area of communication and recommended for appropriate special education programming.

Often four subtests of the WISC-R are identified as weaknesses in learning disabled and reading disabled children: Arithmetic, Coding, Information and Digit Span (Schiff, Kaufman & Kaufman, 1981). The term, learning disabilities (LD), does not include learning problems that are primarily the result of visual, hearing or motor handicaps; mental retardation; or environmental, cultural or economic disadvantage.

If the definition is too broad, however, LD programming can become a "dumping ground" for students who need remedial education for reasons other than a disorder in one or more of the basic psychological processes involved in understanding or using language, either spoken or written. This may manifest itself in trouble listening, thinking, speaking, reading, writing, spelling or doing mathematical calculations.

A wide range of prevalence estimates, anywhere from one percent to thirty percent, of the general population has appeared in the literature (Rawson, 1992; Reid & Hresko, 1981). This may reflect the variations in definitions, the heterogeneity of the population, the homogeneity of the population (M.B. Rawson, personal communication, July 15, 1993), the failure to define operationally what is meant by the term or all of the above.

A recent definition proposed by the American National Joint Committee for Learning Disabilities (NJCLD) has been formally adopted by most of the NJCLD member organizations:

Learning disability is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span. Problems in self-regulatory behaviours, social

interaction may exist with learning disabilities but do not by themselves constitute a learning disability. Although learning disabilities may occur concomitantly with other handicapping conditions (for example, sensory impairment, mental retardation, serious emotional disturbances), or with extrinsic influences (such as cultural differences, insufficient or inappropriate instruction), they are not the result of those conditions or influences (NJCLD, 1990)

Like the gifted, the learning disabled are not a homogeneous group nor do they express their strengths and needs in the same way. The neurophysiological research on evoked potential of brain waves conducted to date has shown evidence of multiple types of central nervous system dysfunction in multiple regions of the brain (John, 1989). John reported significant neurometric differences in three subgroups of learning disabled children: children who did well with reading and writing but not arithmetic had dysfunction in the right hemisphere; those with difficulty in reading and verbal concepts showed left hemisphere abnormalities; children with disabilities in both verbal and mathematical abilities demonstrated predominantly left hemisphere changes and these occurred at an earlier point in the evoked-potential recordings than for the solely verbal underachievers. Although the causes of LD varied from child to child, John found that neurometric results discriminated

between non-learning disabled and learning disabled children with 97 percent accuracy.

Recent neurobiological studies (e.g. Livingstone, 1992) have found anomalies in magnocellular and parvocellular systems in the brains of dyslexics. These cells deal with the visual processing of form, motion and depth and may explain why many persons who have dyslexia, the most prevalent type of learning disability, read very slowly (M.B. Rawson, personal communication, November 20, 1992).

Although studies have indicated that training in creative thinking increased the competence of spontaneous writing in LD children (e.g. Fortner, 1986) and improved their strategies for reading comprehension (Valett, 1986), tests for creative thinking patterns (Torrance & Ball, 1984) are rarely, if ever, included in the battery which identifies their strengths and learning needs. Such an oversight may be due to a failure to understand the importance of creative strengths of learning disabled students when differentiating curricula for them.

Identification of Gifted Children with Learning Disabilities

Children who are gifted with learning disabilities, (gifted/LD), are now being identified as separate and unique populations (Baum, 1984, Baum, Owen, & Dixon, 1991; Daniels, 1983b; Fox, Brody, & Tobin, 1983; Udall & Maker, 1983; Whitmore & Maker, 1985; Whitmore, Hansford, Kraynak &

Wingenbach, 1987; Yewchuk, 1985a). These children are as capable as gifted children in some areas but have processing dysfunctions which may cause them severe difficulties in areas such as acquiring information with limited reading skills, organizing information, remembering details, handwriting and spelling or feeling valued (Baum, Owen, & Dixon, 1991; Nielsen & Mortorff-Albert, 1989; Silverman, 1989).

Like the learning disabled population, there is considerable scatter among subtest scaled scores on the WISC-R. Schiff, Kaufman, and Kaufman (1981) found that there were subtle differences in WISC-R profiles from either those of the gifted or of the learning disabled children. Like the gifted students, the gifted/LD scored extremely high on verbal comprehension and expression but well below their own average on Arithmetic, Coding, and Digit Span scales. Schiff, Kaufman & Kaufman (1981) found that verbal conceptualization strengths resembled those of normal students from high socioeconomic background. They noted that normal or learning disabled students might have a Verbal/Performance discrepancy of 12 or 13 points.

A recent investigation of WISC-R factors for gifted students with learning disabilities (Waldron & Saphire, 1990) compared their performance on the WISC-R with a control group of gifted students and with cognitive patterns on 14 factor scores using the classification systems of Bannatyne (1971, 1974), Kaufman (1975), Rapaport, Gill, and Schafer

(1946) and Wechsler (1974). Results indicated that there was no significant difference from the control group between Verbal and Performance I.Q. scores. When compared with their own relative strengths on each of the factors, gifted/LD students were stronger than gifted students on the Verbal Conceptualization factor (Bannatyne, 1974) and the Reasoning factor (Kaufman, 1979). There was significantly more frequent occurrence of the Organic Brain Syndrome factor (Wechsler, 1974) which comprised Digit Span, Coding and Block Design.

It is important to note that the gifted/LD children did not demonstrate the same cognitive profile as the non-gifted reading disordered children who, in previous research, exhibited strengths on the Spatial ability factor (Picture Completion, Block Design, Object Assembly) and lower ranking of the Verbal Conceptualization factor (Rugel, 1974). The experimental group in the Waldron and Saphire study was average on the nonverbal Spatial Ability factor and higher than the gifted control group on the Verbal Conceptualization factor (Similarities, Vocabulary, Comprehension). The authors concluded that psychologists and educators need to exercise caution in using the profile of children who are learning disabled in the identification of children who are gifted/LD. It is important to confirm ability patterns on the WISC-R which serve to identify children who may be gifted/LD.

It may be the case that gifted/LD children are as

creative as gifted children. Such information would affect both identification and differentiation of the curriculum for them. Since an assessment of creative thinking patterns does not currently form part of the process for identifying children who are gifted/LD, there appears to be a serious gap here.

Thus far, mind functions and creative thinking have been explored separately and interactively as general concepts which preceded the theoretical model. Clark's Integrated Education Model (IEM) is an excellent instructional model; however, teachers are given no way of assessing how individuals are currently performing in the four orienting mind functions. On the other hand, Torrance's model assesses creative behaviours that occur as a result of integrating information processed by both hemispheres of the brain; however, the model gives no assistance to teachers faced with developing curricula and fostering creativity in diverse students.

This study integrates the models of Clark and Torrance (Figure 2.2) by using Clark's Creativity Circle (Figure 2.1) to integrate the creative thinking literature, particularly from the perspective of Torrance. Also, this study extends the research of both Clark and Torrance to include creative thinking of children who are learning disabled and who are gifted/LD.

Characteristics Gifted/LD Share with LD or Gifted Children

There are characteristics common to both the gifted and the gifted/LD and to both the learning disabled and the gifted/LD. A synthesis of the literature is illustrated in Figure 2.3. The brackets indicate whether characteristics have been found to pertain to one group or to more than one group. The numbers on Figure 2.3 refer to studies listed alphabetically in Table 2.0.

The theoretical framework has been used to examine characteristics that gifted/LD children have in common with those who are gifted and those who are learning disabled. For example, Figure 2.3 illustrates that, in the cognitive area, the gifted and gifted/LD are good at problem-solving (Coleman, 1992; Suter & Wolf, 1987; Wees, 1990; Whitmore and Maker, 1985; Yewchuk, 1985a and 1985b) and have a large knowledge base (Kanevsky, 1990; Tannenbaum & Baldwin, 1983). A sense of humour was found in gifted children by Torrance (1979) and by Torrance and Ball (1984), and it was found to be a characteristic of gifted/LD by Tannenbaum and Baldwin (1983). Some authors consider humour as either an affective or a cognitive characteristic. Clearly the "placement" of humour is open to debate. As Figure 2.3 illustrates, sense of humour was not studied in the LD literature.

Characteristics gifted children with learning disabilities (G/LD) have in common with gifted and learning disabled (LD)

Cognitive	Characteristics	Gifted	Gifted /LD	Learning Disabled
	-focused/detailed area of interest	(3, 12, 42, 43, 45,-----)		
	-factual and conceptual ideas intact	(3, 15,-----)		
	-large knowledge base	(17, 31,-----)		
	-dominate discussion with expertise	(27, 31,-----)		
	-good problem solving; logical	(6, 30, 42, 43, 45,-----)		
	-ability to generalize learning	(17, 18,----)		
	-good abstract thinking	(35,-----)		
	-good reasoning and reading comprehension	(8, 28, 30, 37, 38, 45,--)		
	-aptitude/achievement discrepancy		(1, 28, 40,-----)	
	-significant scatter on WISC-R subtests		(1, 28, 40,-----)	
	-use metacognitive strategies to process		(6, 11, 16, 24,)	
	-short attention span; distractible		(28, 31, 39,-----)	
	-persistent	(6, 25,-----)		
Affective	-good communication skills	(12, 29, 30,-----)		
	-dislike repetition and drill	(21, 39, 40, 45,-----)		
	-possess keen sense of humour	(34, 35,-----)	(23, 31,----)	
	-sensitive to feelings of self/others	(5, 13, 26, 41,-----)		
	-have fears and pessimism re future	(7, 14, 46,-----)		
	-to feel secure, need structured environment		(11, 13, 19, 24, 26,-----)	
	-low self-esteem		(1, 3, 8, 26, 28, 41,-----)	
	-intense social/emotional defense mechanisms		(15, 37, 39,-----)	
	-excessively critical of self/others		(31,-----)	
	-rebellious against curriculum perceived irrelevant		(31,-----)	
	-frustrated by demands of classroom		(1, 6, 11, 31, 39,-----)	
	-poor peer relations and social skills		(11, 30, 39, 46,-----)	
	-intense fear of failure		(39,-----)	
Intuitive	-curious and imaginative	(17, 35,----)	(23, 30, 45,)	
	-insightful in class discussions	(9, 34, 36,)	(15, 23,----)	
	-strong views about world issues	(36,-----)	(7, 14,----)	
	-open to new ideas	(36,-----)		
	-tolerance for ambiguity	(34, 35,----)		
	-supersensitive		(6, 20, 27, 31, 42, 44,-----)	
	-unrealistic self-expectations		(20, 44,-----)	
	-negative/self-defeating attitude		(37, 39, 45,-----)	
	-perceive school as experience in failure		(2, 4, 39,-----)	
	-good non-verbal communication skills	(39,-----)		
Physical Sensing	-perfectionism	(42,-----)		
	-high level of concentration during creative problem solving	(22, 25, 32, 33)		
	-enjoy challenge of autonomously solving novel problems	(18, 39,----)	(1, 5,-----)	
	-high level of spatial ability		(4, 10,----)	
	-psychomotor inefficiency		(1, 27, 30,-----)	
	-fail to complete written assignments		(31, 37, 39,-----)	
	-exhibit inappropriate behaviour in class		(15, 37, 46,-----)	

Numbers refer to studies listed alphabetically in Table 2.0.

Table 2.0

References for Numbers in Figure 2.3

1. Barton & Starnes, 1989
2. Baum, 1984
3. Baum, 1988
4. Baum, Owen, & Dixon, 1991
5. Betts & Neihart, 1988
6. Coleman, 1992
7. Clark & Hankins, 1985
8. Daniels, 1983a and b
9. Davidson & Sternberg, 1984
10. Dixon, 1983
11. Ellis, Deshler, Lenz, Schumaker & Clark, 1991
12. Emerick, 1989
13. Fox, Brody & Tobin, 1983
14. Galbraith, 1985
15. Gunderson, Maesch & Rees, 1987
16. Hannah, 1990
17. Kanevsky, 1990
18. Kanevsky & Rapagna, 1990
19. Kegley & Siggers, 1989
20. Maker, 1977
21. Maker, 1986
22. Martindale, 1975
23. McGuire, 1990
24. Miller, 1991
25. Montague, 1991
26. Nielsen & Mortorff-Albert, 1989
27. Rosner & Seymour, 1983
28. Schiff, Kaufman & Kaufman, 1981
29. Silverman, 1989
30. Suter & Wolf, 1987
31. Tannenbaum & Baldwin, 1983
32. Torrance, 1962b
33. Torrance, 1974
34. Torrance, 1979
35. Torrance & Ball, 1984
36. Torrance, Weiner, Presbury & Henderson, 1987
37. Udall & Maker, 1983
38. Valett, 1986
39. Vespi & Yewchuk, 1992
40. Waldron & Sapphire, 1990
41. Waldron, Sapphire & Rosenblum, 1987
42. Wees, 1990
43. Whitmore & Maker, 1985
44. Wolf & Gygi, 1981
45. Yewchuk, 1985a and 1985b
46. Yewchuk, 1992

Although metacognitive strategies are used by gifted children when processing information and problem solving (see studies listed in Table 2.0), recent literature has indicated that these strategies can be taught to both LD and gifted/LD children "with specificity which is crucial" (Ellis, Deshler, Lenz, Schumaker & Clark, 1991; Miller, 1991).

In the affective area, most of the attributes shared by the gifted/LD and learning disabled children are of a negative nature such as low self esteem, intense social/emotional defence mechanisms, excessive criticism of self and others, frustration from demands of the classroom, and poor peer relations and social skills. By observing the literature within this framework, it is apparent that educators are failing these two populations in the area of feeling or affect.

Examination of intuitive aspects related to creative thinking reveals that little research has been directed to LD children's imagination, curiosity, insightfulness or to either LD or gifted/LD children's openness to new ideas or tolerance for ambiguity. Possibly these two groups of exceptional children would have a more positive outlook if their creative strengths were recognized and fostered. Appropriate creative thinking approaches to teaching these children might alleviate their supersensitivity, unrealistic self-expectations, negative self-defeating attitude and perception of school as an experience in failure. Through their strengths, they might be taught how to circumvent their

psychomotor inefficiencies, how to complete assignments and how to exhibit appropriate behaviour in class, all difficulties which seem to be subsumed under physical sensation.

An in-depth assessment of creative thinking might be added to that which already exists (Lupart, 1990) in order to identify gifted/LD children and to develop appropriate individualized and co-operative learning programs for all three groups of exceptional children.

It has been shown that the literature is very sparse regarding creative thinking characteristics of LD and gifted/LD children. Since gifted/LD children are often difficult to identify, this study examines their cognitive and creative strengths and needs, their similarities to both LD and gifted children and teacher interest in incorporating creative strengths into their programming.

Research Questions Forming the Basis of the Inquiry

Research questions arising from the problems delineated in the introduction are reiterated and refined here since they form the basis of this inquiry:

1. Are there patterns in the revised Wechsler Intelligence Scale for Children (WISC-R) which might differentiate children who are gifted, learning disabled and gifted with learning disabilities?

2. What conclusions can be drawn from the data on

creative thinking that will be helpful in refining criteria for the identification of children who are gifted/LD?

3. How does Future Scenario Writing add information to the literature regarding the integration of thinking, feeling, intuition, physical sensing and humour in the three groups of exceptional children?

4. Are children who are gifted with learning disabilities more similar to gifted or to learning disabled children in their pattern of creative thinking?

5. Do teacher interviews disclose awareness of creative characteristics in children who are learning disabled or children who are gifted with learning disabilities? Is there an interest in incorporating students' creative thinking strengths when individualizing instruction or planning cooperative group learning?

The following chapter will report on the sample and the research methodology chosen to address the above research questions.

Chapter 3

METHODOLOGY

The purpose of chapter 3 is to report on the research methodology by describing: the sample and target population, the measuring instruments with their variables, and procedures for data collection and analysis. The chapter ends with a summary of the methodology chosen to operationalize each research question.

Sample and Target Population

The factors that determined the sample for the present study were sample size and representativeness, characteristics of the creativity instruments chosen, and practicality. There are many gifted underachievers (Rimm, 1986; Wees, 1990), but few children in any one Board who are both gifted and learning disabled, therefore, it was decided to approach four Boards across Ontario. Two Boards were urban and two were rural or County Boards with a widespread catchment area. Each of the four Boards selected eight gifted, eight learning disabled and eight children who were gifted with learning disabilities who wished to be in the study and whose parents had given written permission for their son or daughter to participate. It was expected that of the ninety-six participants, some would be unable or unwilling to complete both assessment instruments. In fact, during the assessment which took two half days per group,

four children were ill on the second half day and two chose to withdraw from the study. Thirty children in each group of exceptional children completed both creative thinking instruments.

The sample of ninety was drawn from children in grades five to eight who were ages nine to fourteen years. This age was selected because many Boards identify children for pull-out or withdrawal services after age eight. At the elementary level, children are motivated to be as creative as possible; whereas, at the secondary level, there is a period when conformity or helplessness rather than creativity is more motivating for young persons (Farmer & Vispoel, 1990; Weiner, 1979). The study was "blind" in that the researcher had no prior knowledge regarding which children in each group were from the gifted program, in special education classes, or from regular education classes who received resource enrichment, remediation or both. Thus, a deliberate selection process was used by the Boards rather than a random selection process to produce the sample shown in Table 3.1.

Table 3.1

Sample Description

	Number of Gifted	Number Learning Disabled	Number Gifted/LD
Females	14	5	4
Males	16	25	26
Grade 5	6	7	12
Grade 6	10	8	3
Grade 7	10	9	9
Grade 8	4	6	6
<u>n = 30 in each group of exceptional children</u>			

The proportion of females to males was fairly even in the gifted group but about 5 to 1 in both other groups. Although unplanned, these are similar to the proportions that exist in the target population (Baum, Owen & Dixon, 1991; Rawson, 1992; Reid & Hresko, 1981).

The gifted and the learning disabled children had been declared exceptional earlier by their respective Boards' Identification Placement Review Committees (IPRCs). The gifted children had scored above the 90th percentile on standardized tests of mathematics and language arts and had scored in the 98th percentile on any one of the Deviation Intelligence Quotients of the Wechsler Intelligence Scale for Children-Revised (1974) (WISC-R) or the Woodcock-Johnson Psycho-Educational Battery (1977) (WJPEB). The learning disabled children were average or above in intelligence and, because of a variety of processing difficulties, were experiencing academic difficulties.

Some of the 30 children who were gifted with learning disabilities (gifted/LD) had been doubly identified by their Boards' identification committees, but many were selected by consultants along with teachers of "regular" children, of gifted children and of learning disabled children. The selection criteria in each board was that of Waldron and Saphire (1990) whose study was made available to each of the four Boards. All gifted/LD subjects had been determined to exhibit gifted behaviours. Criteria for eligibility included either the WISC-R or WJPEB, standardized test scores which scored below the 70th percentile and an uneven profile of scores typical in children who experience processing difficulties.

The Measuring Instruments, Their Variables and Their Analysis

The measuring instruments used in this study were the revised Wechsler Intelligence Scale for Children (1974), the Torrance Tests of Creative Thinking Figural Form B (1990), and an adaptation of Future Scenario Writing (Torrance & Torrance, 1978). These instruments will be described along with definitions of their variables or subtests, their reliability and validity, the procedures for scoring them and for analyzing them and their function in operationalizing the research questions according to the theoretical framework of Clark/Torrance.

The Wechsler Intelligence Scale for Children (WISC-R)

The emphasis on the Intelligence Quotient (IQ) and its relationship to achievement often keeps pupils who are gifted with learning disabilities (gifted/LD) from being identified and included in activities where their creative thinking potential might be developed along with their academic skills. The demographic data on each subject required the school Psychologist or Psychometrist to search the school records for ability and achievement results. Such information assisted the researcher to note discrepancies between these two types of tasks and also to determine patterns present in the individually administered WISC-R. Boards generally used the Wechsler Intelligence Scale for Children Revised (WISC-R, 1974) for identification and placement. A breakdown of the WISC-R subtests was available on 76 of the subjects. One gifted/LD student had only Verbal, Performance and Full Scale scores on his information sheet. For 13 gifted or learning disabled (LD) children, one Board had administered the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977). Of particular note was whether the LD and gifted/LD children had a large difference between Verbal and Performance Scales, and also whether subtest scores on the WISC-R were similarly scattered in both LD and gifted/LD children.

The Wechsler Intelligence Scale for Children - Revised (WISC-R) (Wechsler, 1974) is one of the best intelligence

tests available (Sattler, 1982). It was developed for children ages 6.0 through 16.11 years and takes approximately one hour to administer. The WISC-R has excellent norms and reliability and adequate validity. It provides Deviation Intelligence Quotients (IQs) for the Verbal, Performance and Full Scales, with a mean of 100 and standard deviation of 15. The norms for the subtests also are standard scores with a mean of 10 and standard deviation of three.

The WISC-R was standardized on 2,200 white and non-white American children selected to be representative of the population to be covered by the scale on the basis of 1970 U.S. census data. The reliabilities of the Verbal, Performance and Full Scale average .94, .90, and .96 respectively with a standard error of measurement for the Full Scale of about three IQ points. Subtest reliabilities range from .70 for Object Assembly to a high of .85 for Block Design and .86 for Vocabulary. Concurrent validity is acceptable. Median correlations with selected cognitive measures range from .61 to .95 (Wechsler, 1974).

A factor analysis of the WISC-R standardization data indicated that three factors account for the scale's structure: Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility. The Verbal Scale subtests loaded primarily on Verbal Comprehension; Performance Scale subtests loaded primarily on Perceptual Organization; and Arithmetic, Digit Span and Coding loaded primarily on what Kaufman (1975) called Freedom from Distractibility. Kaufman

found that the best indicators of g (general ability) were Vocabulary, Information, Similarities, Comprehension and Block Design (Kaufman, 1975).

Six of the subtests form the Verbal Scale: Information, Similarities, Arithmetic, Vocabulary, Comprehension and Digit Span. The other six form the Performance Scale: Picture Completion, Picture Arrangement, Block Design, Object Assembly, Coding and Mazes.

Operational Definitions of the WISC-R Subtests

Information samples the kind of knowledge that average children with average opportunity should be able to acquire for themselves. Memory, based on habitual, overlearned responses, is an important aspect of performance.

Similarities measures verbal concept formation, an ability to place objects and events together in a meaningful group or groups. Performance may be related to cultural opportunities and to interest patterns. Also, memory may be involved.

Arithmetic measures numerical reasoning ability and also concentration and attention since the child solves orally presented problems without pencil and paper.

Vocabulary measures a variety of functions including language development, learning ability and fund of general information.

Comprehension measures social judgment, the ability to draw on past experiences in reaching solutions to a

variety of situations. Responses reflect a child's knowledge of conventional standards of behaviour, extensiveness of cultural opportunities and development of conscience or moral sense. These skills imply an ability to use facts in a pertinent, meaningful and emotionally appropriate manner.

Digit Span measures short-term memory and attention. The task assesses the child's ability to retain in mind several elements that have no logical relationship to one another (digits). Digits Backward involves more complex processing than Digits Forward. The task has been called by Bannatyne (1974), "auditory vocal sequencing memory".

Picture Completion measures the ability to differentiate essential from nonessential details. It requires concentration, visual organization, visual memory and reasoning or visual alertness.

Picture Arrangement measures nonverbal reasoning ability. It may be viewed as a measure of ability to comprehend and size up a total situation. It requires an ability to anticipate the consequences of initial acts or situations and to interpret social situations.

Block Design measures visual-motor coordination and perceptual organization. It is the best single measure of g (general ability) among the Performance Scale subtests. Block Design involves the ability to perceive and analyze forms by breaking down a whole (the design)

into its component parts and then assembling the parts into the identical whole.

Object Assembly measures perceptual organization ability.

The jig saw problems are presented in a specified disarranged pattern. Assembling pieces into a whole is mainly a test of synthesis and of anticipating the relationships among the individual parts.

Coding measures visual-motor coordination, speed of mental operation, and short term memory. It requires the copying of symbols paired with other symbols while carrying information in short-term memory long enough to reproduce the symbol in the proper answer box. Success depends on the child's comprehending the task and skill with pencil and paper. Coding involves a verbal encoding process and measures the ability to learn combinations of symbols and shapes and the ability to make associations quickly and accurately.

Mazes measures planning ability and perceptual organization. Children are requested to draw a line showing how to find their way out of a series of mazes without becoming blocked. Visual-motor control and speed combined with accuracy are, in part, needed for success. The subtest is not counted in obtaining the IQ when the five standard Performance Scale subtests are administered.

The WISC-R was used to operationalize the first research question: Are there patterns in the WISC-R which might

differentiate children who are gifted, learning disabled and gifted with learning disabilities?

The Torrance Tests of Creative Thinking (TTCT)

The Torrance Tests of Creative Thinking have evolved from their initial contribution in 1959 as has the concept of creative thinking itself. The term "Creative Thinking Abilities" as used in the TTCT refers to that constellation of generalized mental abilities that is commonly presumed to be brought into play in creative endeavours. Torrance (1972a) has maintained that high levels of those abilities measured by tests such as TTCT increase the chances that the possessor will behave creatively. Predictive validity studies which support these contentions have been carried out (Torrance, 1972a, 1972b; Torrance and Wu, (1981). In the latter study, Torrance and Wu found that performance on the creativity tests combined with personality traits of students and their teachers to make a difference in creative accomplishments over 22 years of the longitudinal study.

Many different indicators of creative thinking ability are shown in response to Figural Forms A and B of the TTCT. Initially, the responses were scored for ten or more indicators, but scoring and interpretation were too complex and Torrance decided to limit the evaluation of responses to the four divergent production abilities proposed by J.P.Guilford (1959): Fluency, Flexibility, Originality and Elaboration. Procedures were standardized and norms

accumulated for each educational level from kindergarten through graduate school. Since publication of the forms in 1966 and 1974, a vast amount of validity evidence has been accumulated and published (e.g. Torrance et al, 1979).

Many users made two major criticisms: 1) the scoring was too time consuming, and 2) the tests assessed only divergent production abilities and did not tap the essence of creativity. These factors led to extensive revision.

TTCT Revision

Over ten years, Torrance and his associates have re-surveyed the creativity literature and test protocols. As a result, they have selected two new norm-referenced measures and about a dozen criterion-referenced indicators of creativity which met three criteria: 1) clear manifestations in test performances; 2) adequate frequency of occurrence; and 3) amenability to changes as a result of training, instruction and practice.

The two new norm-referenced measures are Abstractness of Titles and Resistance to Premature Closure. The rationale for Abstractness of Titles is based on the idea that creativity requires one to sense the essence of a problem, to know what is truly essential which is in turn reflected in the level of abstraction given to the titles of the pictures drawn, especially in response to the Picture Construction and Picture Completion activities. It is defended as part of the figural battery on the grounds that it requires the

transformation of figural information to a linguistic modality.

Resistance to Premature Closure as an operational concept is based on the generally accepted conclusion that creative behaviour requires a person to "keep open" in processing information and to consider a variety of information.

The theoretical rationale for the creativity indicators or Creative Strengths is discussed in detail in Torrance (1979). The author shows the role each of the indicators plays in real life creativity and how each ability can be improved with practice. Torrance defined the Creative Strengths as follows:

Storytelling Articulateness indicates a subject's ability to clearly and powerfully communicate an idea or tell a story by providing some kind of environment and sufficient detail to put things in context.

Synthesis of Incomplete Figures which involves the combination of two or more figures is quite rare and suggests an individual whose thinking departs from the commonplace, one who is able to see relationships among diverse and unrelated elements, and who, under restrictive conditions, utilizes whatever freedom is allowed.

Synthesis of Lines/Circles is the same as synthesis of figures except for the combination of sets of parallel lines (Form A) or combination of circles (Form B).

Extending Boundaries suggests that a person is able to remain open long enough to permit the mind to make mental leaps to get away from the obvious and commonplace and to open up or extend the boundaries or limits imposed upon the stimulus figure.

Fantasy recognizes a person's use of fantasy imagery in responding to the test tasks.

Emotional Expressiveness measures a subject's ability to communicate feelings and emotions verbally or nonverbally through the drawings, titles and speech figures in the drawings.

Humor suggests that an individual perceives and depicts conceptual and perceptual incongruity, unusual combinations, and surprise.

Richness of Imagery reflects a subject's ability to create strong, sharp, distinct pictures in the mind of the beholder.

Colorfulness of Imagery reflects a subject's ability to excite and appeal to the senses.

Internal Visualization indicates that a subject is able to visualize beyond exteriors and pay attention to the internal dynamic workings of things.

Movement or Action judges a person's perception of movement through titles and the speech and bodily posture of figures in the drawings.

Expressiveness of Titles recognizes a person's use of titles that go beyond simple description and communicate

something about the pictures that the graphic cues themselves do not express without the title.

Unusual Visualization acknowledges an individual who sees things in new ways as well as old familiar ways and who can return repeatedly to a commonplace object or situation and perceive it in different ways.

Streamlined Scoring of TTCT

The streamlined scoring system of the TTCT that was published in 1990 represents ten years of developmental work. The directions for administering and scoring the tests, motivation and warm-up, time limits, and so on, are the same (Torrance, 1974). Only the scoring has changed; and several scoring reliability studies indicated that it is possible to keep the scoring reliability at over .90.

The three activities in the test booklet are: 1) a picture construction activity in which the children are asked to think of a picture or object they can draw with this shape as part; 2) a picture completion activity which consists of ten incomplete figures; and 3) a circles activity which consists of rows of circles with which the children are asked to make as many creative pictures as possible. After warm-up, the children are given ten minutes to complete each activity. The inclusion of the two variables, Abstractness of Titles and Resistance to Premature Closure plus Creative Strengths aim to tap the essence of creativity (Torrance, 1979; 1990).

Norm Base and Types

Over 88,355 Figural (Streamlined) A or B records of American and Canadian children were used in the development of Figural norms for kindergarten to college. Two types of national norms are provided. The standard scores represent a change from those used by the TTCT in the past, and percentile ranks are available for grade levels. The following definitions are used:

Standard Scores: Standard scores are normalized scores which allow for comparison across grades, scores and forms (Torrance, 1990).

Percentile Ranks: Percentile Ranks for all scores are in-grade norms. Since the average Standard Score is used in most screening programs, American percentile rank norms have been developed for the average Standard Score, the major part scores, and the Creativity Index, which is simply the creative strengths bonuses added to the average Standard Score.

Content and Construct Validity of Streamlined Revision

The content and construct validity of the scoring variables constituting the streamlined scoring was explored in a factor-analytic study by Mourad (1976), a comparative study by Rungsinan (1977), a developmental study by Alieldin (1978) and by Torrance (1982). These studies assembled considerable theoretical and empirical research to support

the content validity of each of the indicators used in the streamlined scoring system which optimized whole mind functions: thinking, feeling, intuition and physical sensing (Clark, 1986, 1988).

Torrance's study (1982) provided useful information about the construct validity of the new scoring procedures. He administered the Figural Form A of the TTCT to 33 graduate students along with: Style of Learning and Thinking, Form A; What Kind of Person are you?; Something About Myself; Schaefer's Similes Test; Stein's Physiognomic Cue Test; Guilford's Possible Jobs and Seeing Problems; Torrance's Creative Motivation Scale; and the Rorschach Inkblots. The product-moment coefficients of correlation between the predictor and criterion variables are summarized in the technical manual (Torrance, 1990).

From these data it would appear that Fluency has significant elements in common with the right hemisphere or spatial/holistic style of processing information, creative personality characteristics, the ability to produce original similes, the ability to produce a large number of alternatives on the Guilford Possible Jobs and Seeing Problems, divergent thinking tests, an innovative style of management, and strong creative motivations. On the other hand, Resistance to Premature Closure scores have significant elements in common only with the Rorschach Movement Scores. The Creative Strengths indicators have elements in common with the right hemisphere style of thinking, creative

personality characteristics, an innovative style of management, creative motivation, and Rorschach Movement and Originality.

In view of the complexity of marking the revised, streamlined TTCT, the researcher trained under Dr. T. Safter, University of Georgia, Torrance Center for Creative Studies. Dr. Safter recommended the Scholastic Testing Service Center (STS) because cross-rater reliability studies involving STS are conducted on an ongoing basis. Studies indicated that scorers who are familiar with the scoring rationale for scoring variables and the examples given in the manual, maintained a scoring reliability above the .90 level (Torrance, 1990). In view of the training received in interpretation, previous research results, and the expertise of STS scorers, the TTCT booklets from the 90 subjects, arranged by grade levels, were sent to the Scholastic Testing Service Research/Scoring Center for scoring.

The data, upon return from STS, included a profile of creative thinking scores for each subject, frequency distributions, means and standard deviations by grade level of the five standardized scores: fluency, originality, elaboration, abstractness of titles and resistance to premature closure. The profiles contained a Standard Score and American national percentile for each of these variables, an average of the Standard Scores, a checklist of the creative strengths previously defined and the creativity index with its American national percentile for each

individual (Appendix M).

Trained scorers from the Scholastic Testing Service had reviewed each student booklet of Figural Form B for evidence of special creative strengths. A rating of 2 was given for repeated evidence of a strength (three or more times). A rating of 1 was given for some evidence of a strength (usually one or two times). A blank was given in the absence of evidence of the strength in the completion of the figures. The creativity index, found by Torrance (1990) to serve well as an overall indicator of creative potential, was found by pooling the creative strength ratings and the average Standard Score from the profile. Before the data were computerized for analysis, the individual creativity profiles received from STS were separated into the three groups of exceptional children as delineated by the information sheets received from each Board.

In conclusion, no longer were only divergent production abilities being measured. The researcher perceived that all mind functions were integrated in order to be creative. For example, Torrance examined THINKING through Fluency, Elaboration, Abstractness of Titles, Expressive Titles (ET), Storytelling Articulatness (SA), and combining and synthesizing (S/IF, S/C). Also, Torrance examined FEELING through Emotional Expressiveness (EE), the ability to communicate feeling values (elated/dejected) verbally or nonverbally; PHYSICAL SENSING through Movement/Action (MA), Richness of Imagery (RI), Colourfulness of Imagery (CI),

Internal Visualization (IV); and INTUITION through Originality, looking at things from a different perspective (UV), Fantasy (FA), incubation, keeping open, extending boundaries (Resistance to Premature Closure, EB). The criticisms of educators which had led to the revisions appeared to have been met: 1) The streamlined scoring is much less time-consuming in spite of the addition of 13 creative strengths to the 5 main variables. 2) The streamlined scoring assessed not only divergent productive abilities but also the essence of creativity which was defined by Clark as the highest expression of giftedness, an integration and interaction of all functions of the brain: cognitive, affective, physical/sensing, and intuiting (Clark, 1988).

Results of the analysis of the TTCT partially addressed the second research question: What conclusions can be drawn from the data on creative thinking that will be helpful in refining criteria for the identification of children who are gifted/LD?

Future Scenario Writing (FSW)

The second instrument used in the study was developed in order to study creative thinking patterns through creative writing. This section will discuss the history of Future Scenario Writing and its adaptation for the purpose of this study.

History of FSW

Over the past twenty years or more, Scenario Writing has been used to provide practice in skills involved in emotional awareness and in the use of this awareness to facilitate creative growth (Torrance, 1974, 1979, 1990; Torrance & Torrance, 1978; Williams, 1970, 1972). Futurists and practical-minded engineers and scientists of the National Aeronautics and Space Administration make use of fantasy and scenarios as vehicles for pushing forward thinking about space colonization (Johnson, 1977). In Henchey's (1977) model for studying the future, the scenario is an artistic approach appearing in the form of simulations, case studies and games. Since the scenario makes assumptions about time, and is concerned with determining possible futures, it has caused people to become aware of the consequences of certain policies and practices that might endanger the future of our civilization (Torrance, 1979).

In the late 1970s, Torrance and his associates developed the Future Problem-Solving Program as a curriculum project for gifted and talented students from grades 4-12 (Torrance & Torrance, 1978, 1980). They developed, in 1978/1979, an interscholastic competition in Scenario Writing involving over 20,000 students in 43 states. Results of the interdisciplinary approach to studying and solving future problems gave Torrance and his associates a glimpse of the possibilities that might come from encouraging children to

give their problem-solving exercises a futuristic orientation. The children were asked to imagine that it was now 25 years in the future. They were asked to write a scenario, a description of a sequence of events that might possibly happen in the future. Since the future was already here and now, the scenario would reflect what they had achieved, the kind of life they were living, what was happening in the world, changes in themselves and their hopes and aspirations.

It was evident that, with the same instructions and brainstorming preamble, Future Scenario Writing (FSW) could be scored with a view to studying creative thinking in gifted children and in other exceptional children within the framework of the Clark/Torrance model. In examining creative thinking as it emerged in writing, it would then be possible to compare performances on the FSW and TTCT. Permission was granted by the University of Georgia to use Future Scenario Writing in order to study creative thinking qualitatively (Appendix B).

Adaptation of FSW for Data Collection

In four Ontario Boards of Education the same ninety children who completed the TTCT were each asked to write one scenario set 25 years in the future. A sample of five scenarios from each of the three groups of 30 exceptional children acted as a base to form a grid for protocol constructs. These fifteen stories or scenarios were

transcribed and typed using an ASCII format that allowed transfer to The Ethnograph, a program for the computer assisted analysis of text based data (Seidel, Kjolseth, & Seymour, 1988) (Appendix C).

The content was studied with a view to coding creative thinking characteristics into the four mind functions: thinking, feeling, intuition and sensation (Clark, 1986, 1988; Jung, 1923, 1933a, 1933b). Through the juxtaposition of Torrance's Creative Strengths (1990) and Clark's Integrative Education Model (1988), codes emerged which were discussed with three experts in the fields of gifted education and learning disabilities. These emerging codes, abbreviated with their labels on Table 3.2, became the basis for analyzing the remaining 75 Scenarios (Miles & Huberman, 1984). In order to ensure consistency in interpretation, the researcher coded all 90 scenarios three times, one week apart, without reference to previous codes.

Table 3.2

Code Abbreviations and Labels for the Future Scenario Writing

CF	= Cognitive Factual
CP	= Cognitive Problem-Solving
CE	= Cognitive Elaboration
AEP	= Affective Emotions Positive
AEN	= Affective Emotions Negative
AI _n	= Affective Internal Control
AX	= Affective External Control
IPV	= Intuitive and unusual Point of View
IF	= Intuitive Fantasy
SM	= Sensing Movement
SV	= Sensing Visually
SA	= Sensing Auditorially
H	= Humour

The Grid and Emerging Codes

Five types of codes emerged. They were related to thinking, feeling, intuition, sensing physically and humour and are briefly defined below:

1. Humour

Humour emerged on the grid as a category distinct from Jung's four mind functions: thinking, feeling, intuition and sensation. Torrance (1979) had noted that, "Humor seems to integrate or synthesize physiological, psychological and social processes" (p.188). Humour (H) is present when the writer integrates two or more mind functions to amuse the reader by unusual combinations or surprise such as puns, word play, ridicule, satire, parody, perceptual or conceptual incongruity, or incongruities which arise naturally so as to point out a fundamental absurdity in human behaviour or character (Alieldin, 1978; Moody, 1978; Torrance & Ball, 1984). Because of its integrative nature, the judges were unable to place humour under a specific mind function and therefore a special category was created.

2. Thinking

Cognitive Factual (CF) acknowledges the student's expression of factual information.

Cognitive Problem-solving (CP) acknowledges the student's expression of problem-solving abilities.

Cognitive Elaboration (CE) provides extra details which enhance basic story line.

3. Feeling

Affective Emotional expression Positive (AEP) talks positively about self or future.

Affective Emotional expression Negative (AEN) talks negatively about self or future.

Affective Internal locus of control (AIn) expresses empowerment over self or events.

Affective External locus of control (AX) expresses feelings of being controlled or of feeling a sense of helplessness.

4. Intuition

Intuitive and unusual Point of View (IPV) tells part of the story from an original and unusual point of view or vantage point.

Intuitive Fantasy (IF) story includes references to fictional characters, machines or events reminiscent of myths, fairy tales or science fiction such as talking pets.

5. Sensation or Sensing Physically

Sensing Movement (SM) is present when the writer expresses movement such as flying, jumping, shooting, fighting, zooming off.

Sensing Visually (SV) is present when the writer expresses self in a particularly visual description.

Sensing Auditorially (SA) is present when the writer describes sound effects or enters into conversation indicating that he or she is hearing the characters.

Reliability of Future Scenario Writing

The development of an instrument to assess creative thinking through analysis of written work would not only contribute to the field of cognitive science but also could assist teachers to look beyond writing mechanics to children's humour and creativity. It was important, then, to establish cross-rater reliability of the emergent codes and categories.

Cross-rater reliability

Three judges were selected because of their expertise in the fields of gifted education and learning disabilities rather than their expertise in protocol analysis, since the former could be a factor in improving cross-rater reliability (Schael, 1990). The judges were faced with choosing one of several alternatives (codes) of a possible thirteen regarding intuitions, feelings, sensations, cognition and humour. After reading the scenario for context, all three experts were taught how to score creativity as expressed in scenario writing. A generic title was awarded one point, a descriptive title was awarded two points, and an abstract title that captured the essence of the story was awarded the maximum, three points. There remained thirteen creative thinking characteristics for the expert judges to learn to recognize and score. A rating of 2 was given for repeated evidence of a strength (occurring three or more times). A rating of 1 was given for some evidence of a strength (occurring twice only). Zero was given in the absence of

evidence of the strength in scenario writing.

Four Stages in training judges for assessing FSW

In about two hours, thirteen codes were taught to the three judges in four stages. Stage one consisted of a thorough discussion of the five main categories that had emerged on the protocol grid: humour, thinking, feeling, intuition, and physical sensation. Discussion was designed to reduce the various semantic problems regarding definitions for humour (H) and for the subcodes already defined under the four mind functions: CF,CP,CE; AEP,AEN,AX,AIn; IPV,IF; SM,SV, and SA (Table 3.2). It was explained how the coding of creative thinking characteristics integrated the two models separately developed by Paul Torrance and Barbara Clark.

The second stage of the training session was the modeling of a prototype scenario as shown in Appendix C (Miles & Huberman, 1984). The experts familiarized themselves with the scenario then were shown which codes had emerged and why. Much discussion was encouraged in order to clarify semantics and concepts.

The third stage required the experts to code a second scenario while thinking aloud and questioning when necessary. During this metacognitive session, it was noted that all three judges thought first in categories and then in specifics, as illustrated by the documented comments: "That's an intuitive statement, an unusual point of view; let me see; what was the code for that?" "It is also fantasy. May I put two codes for the same few lines?"

Once the trainees were comfortable with both categories and subcodes, they entered the fourth and final stage in which they worked independently on six scenarios without consultation. Judges noted whether characteristics were a strength (3 or more occurrences) or simply evident (2 occurrences) in each scenario. Since training had clarified semantic problems, decisions were fairly congruent with both agreed-upon definitions and the researcher's coding. In this study, as in Schael's (1990), an ill-defined task without correct answers was being encoded.

Trying to trace underlying cognitive processes such as creative thinking patterns while story writing requires inferences. The depth of the encoding varied for several reasons: the experience of the judge with written work of gifted and learning disabled children; the perceptive or judgmental aspect of the judge's personality; and the amount of context that had to be considered when coding a segment. Differences among judges were most apparent in high level encoding where the evidence provided by each statement was not wholly independent of that drawn from context or other statements.

In low level encoding, where narrow use of context was possible, closer agreement was found among the four judges. Judges one and two found one characteristic different from each other and the researcher on each scenario. Agreement with the researcher was 83.3 percent and 91.6 percent respectively. Judge three found one creative characteristic

more than the researcher on each of five scenarios and for four of the five added CF which she perceived as factual knowledge of the future extrapolated from what is now known. Agreement of judge three with the researcher was 68.2 percent.

Schael's study (1990) reported a wide range of agreement among judges when considering their final written decision (54.1 to 83.2 percent). She found that knowledge base is a relevant factor when choosing judges to apply a grid to verbal protocols. Also, Schael suggested that persons inexperienced in protocol analyses provided a richer bank of information by revealing every step of the judgment process. Since this study used experts in the education of exceptional children who knew nothing about protocol analysis, and the training was designed to reduce semantic problems, these factors, along with the fact that there were far fewer judges, may have contributed to the higher average of agreement than Schael's when judging codes based on a grid.

In summary, the four stages of training were helpful in reducing semantic confusion. Judges learned to note whether characteristics were a strength (a score of 2 for three or more occurrences), or evident (a score of 1 for two occurrences) in the scenarios. Agreement of codes with the researcher ranged from 68.2 to 91.6 percent and averaged 81 percent. These percentages were in accordance with published reliability reports of protocol analysis (Ericsson & Simon, 1984). It was concluded that such an ill-defined problem as

a creative story could be encoded reliably. Once the total number (90) of Future Scenarios was analyzed, it would be possible to compare creative thinking as it emerged on both types of instruments, figural drawings and creative story writing. The Future Scenario Writing (FSW) was used to address the third research question, and along with the TTCT, it addressed question 4: 3) How does Future Scenario Writing add information to the literature regarding the integration of thinking, feeling, intuition, physical sensing and humour in the three groups of exceptional children? 4) Are children who are gifted/LD more similar to gifted or to learning disabled children in their pattern of creative thinking?

Procedures for Data Collection

In order to elicit the cooperation of the four Boards, it was important to inform them fully of the research procedures. Administrative personnel were contacted and sent an abstract of the study (Appendix H), letters which might be used to inform parents (Appendix I), consent forms for parents and for "volunteering" teachers (Appendices D, G) and the study by Waldron and Saphire (1990) to assist them in identifying children who were gifted with learning disabilities. Permission to proceed with the research was received from all four Boards.

Coordinators of special education and their consultants selected the students, obtained parent and teacher

permission, arranged transportation and the use of computers, organized the groups and completed the information sheets on each participant. The size of the group depended on whether a Board brought together all 24 children or whether the Board preferred to keep the groups small and in their own schools. One urban and one rural Board chose each alternative.

Full information was sent to the parents and students regarding their participation in the study. Schools required information on the extent of the interruption to daily routines and to content instruction. Table 3.3 delineates the involvement of students and teachers, the assessment instruments, and the sensitive issues.

Table 3.3

Information Regarding Research Design

1. What is the overall duration of the research?
Two half days per group.

2. Student Involvement

Age	Grade	Sex	No.	Language
9-14	5-8	M/F	8 GT 8 LD 8 G/LD	English

3. Number of Testing Sessions? 3 Duration? 1. 45 minutes
2. 45 minutes
3. 1-3 hours

4. Instruments to be Used: Method Time Place
| TTCT Figural Form B | Group | 45 min. | Class |
| Planning Future Scenario (FSW) | Group | 45 min. | Class |
| Writing Scenario | Group | 1-3 Hr. | Class |

5. Information required from student records?
Breakdown of WISC-R and academic results on enclosed student information sheet.

- 6a. Describe teacher involvement?
Helping consultants select children;
Allowing 2 half days of missed classes;
Preparing children for concept of "blind" study.

- 6b. Five teachers per Board will be asked to volunteer one-half hour to be interviewed re creativity

7. Special requirements of school resources or personnel?
Location required for session 3 where computers and tape recorders are available.
Request parent consent before completing information sheets with assistance of school psychologist.

8. Parental Involvement?...Consent only. Feedback forthcoming.
9. Sensitive issues, questions or procedures in the research?
G/LD children may be in regular classrooms, LD classes or in gifted program with resource assistance. Researcher will assess the 24 children "blindly" to avoid bias. Board personnel will know whether various children in sessions are gifted, learning disabled or possibly gifted with learning disabilities.

TTCT= Torrance Test of Creative Thinking.
Questions used by the Ottawa Board of Education, 1991

Although there were three data collection sessions, the first two were arranged to take place in the same half day. The planning session for Future Scenario Writing followed brainstorming in which the researcher used the same instructions (Appendix L) and examples noting that "spelling did not count". Before leaving session two, the pupils were to have selected whether they wished to tape their Scenario the next day, type it, write it by hand or use the personal computer with a spell check. Between sessions two and three, the researcher arranged the appropriate number of computers and tape recorders with school administrators.

In order to reduce bias as much as possible, the researcher chose to be unaware of which children were designated gifted, learning disabled or gifted with learning disabilities. Since the children were told by their teachers that the creativity study was "blind", in that the researcher would not know their designation, they were determined to be well behaved and as creative as possible. Many of the

children expressed relief that phonetic spelling was acceptable in titles on the TTCT Figural Form B and in their Future Scenario Writing. The same researcher administered both instruments to all groups using strategies and techniques learned over twenty years as a teacher-diagnostician to build trust and a comfortable atmosphere.

After all creativity assessments were completed, the researcher was given the information sheets which indicated whether the subjects were gifted, learning disabled or gifted with learning disabilities. The sheets also contained the most recent academic test results of each subject and a report of the subtests of an individually administered intelligence test.

Teacher Interviews

One of the purposes of this study was to explore teacher knowledge of creative thinking patterns and how this knowledge added to their curriculum differentiation for exceptional children. It is important that teachers understand the current patterns of creative thinking in order to develop more fully this "crucial aspect of integrated expertise" (Keating, 1989). Also, it is important to ascertain whether teachers who work with children who are learning disabled and gifted with learning disabilities use the traditional reductionist model which teaches unrelated skills, or whether they have adopted an interactive, dynamic

teaching perspective which centres on knowledge of the student with his or her strengths, "knowledge of how to design meaningful experiences around who they (the students) are rather than who they are not" (Poplin, 1988 p.415). In order to know whether teachers would be willing to take mind functions and creative thinking into account when developing integrated education approaches for exceptional children, it was important to examine, through the focused interview, the reductionist/constructivist assumptions underlying their programming (Poplin, 1981, 1985, 1988).

Teacher interviews were arranged in the four Ontario Boards of Education. Twenty teachers, five in each Board, were interviewed on audio tape. These teachers were not those of the sample children nor were they teachers trained in enrichment strategies. Seven classroom teachers, eight resource, and five special class teachers were asked to be interviewed for about half an hour about creative thinking. They signed consent forms which promised confidentiality and anonymity (Appendix D).

Once the researcher had established rapport, the same seven questions were asked (Appendix E), and the subjects were encouraged to ask questions and to use the recorder pause button whenever they required time to think about a response. The teachers were most willing to express their viewpoints in the half-hour focused interview (Spradley, 1979). Data analysis was begun after all twenty interviews were transcribed verbatim. Answers were grouped, colour

coded as to whether they were given by a classroom teacher, resource, or special class teacher and noted for frequency of occurrence. Since the literature is sparse regarding creative thinking characteristics of learning disabled and gifted/LD children, these teachers' experiences could be extremely valuable.

The incorporation of the findings of this study relies heavily on the perceived needs of teachers who deliver services to these exceptional children. Data from teacher interviews were used to address the fifth research question: Do teacher interviews disclose awareness of creative characteristics in children who are learning disabled or who are gifted/LD? Is there an interest in incorporating students' creative thinking strengths when individualizing instruction or planning cooperative group learning activities?

Methodology Chosen to Operationalize the Research Questions

The research questions were operationalized by both quantitative and qualitative methodology. Since the revised Wechsler Intelligence Scale for Children (WISC-R, 1974), and the six standardized scores of the Torrance Tests of Creative Thinking Figural Form B (1990) supplied quantitative information, it was possible to analyze the data gathered on these instruments quantitatively. The thirteen creative strengths of the TTCT, the thirteen creative characteristics of the FSW as well as the teacher interview data were

analyzed qualitatively.

The quantitative methodology chosen to operationalize the first and second research questions was multivariate analysis of variance (MANOVA) with descriptive discriminant analysis (DDA) used as a follow-up to a significant MANOVA (Howarth & Zumbo, 1989; Huberty, 1984; Tabachnick & Fidell, 1989; Thomas, 1992). Given that the numerical value of the test statistic (Roy's Greatest Characteristic Root) used in testing the overall difference among several group means in MANOVA is the exact same value as in DDA (Howarth & Zumbo, 1989), a statistically significant DDA implies a statistically significant MANOVA. In fact, DDA is an analytical extension of MANOVA. Therefore, in what follows in chapter 4, only DDA will be tested statistically; the MANOVA need not be conducted.

As suggested by Thomas and Zumbo (1993), a canonical discriminant function analysis was conducted with the SPSSX computer program. The number of discriminant functions possible is determined, in this context, as one less than the number of groups. However, both of the functions need not be statistically significant.

When a statistically significant DDA is found, three questions need to be addressed:

- 1) construct identification, 2) patterning of the group centroids, and 3) variable importance.

Construct identification aims to identify linear combinations of variables that represent theoretically

important constructs. This is conceptually similar to factor labeling in factor analysis (Tabachnick & Fidell, 1989). That is, the discriminant function is labeled according to the loadings, correlation between the variables and the function.

The patterning of group centroids is addressed graphically. Group centroids are the group mean of each discriminant function or construct. The patterning of the group centroids aims to address the way in which the groups can be spatially represented in the dimensional space (Howarth & Zumbo, 1989). A statistically significant DDA implies that the groups differ on one or both functions. Therefore, spatially representing the group centroids allows one to visualize where the differences among the groups exist. Two points are noteworthy. First, this is a graphical descriptive analytic method. Second, the axes on the spatial plots are in units of z-scores, standard scores.

Variable importance aims to identify the subset of variables which together account for group difference and furthermore rank the variables in the discriminating subset according to their importance, or contribution to group difference (Thomas, 1992). Based on a geometric argument, Thomas derived a new set of coefficients to address the selection and ordering of variables. These coefficients were termed parallel discriminant ratio coefficients (DRCs). DRCs were constructed to provide analytic information on 1) the set of non-redundant variables that essentially contributed

to the multivariate difference; and 2) the relative importance of individual variables to each statistically significant discrimination hypothesis. It is noteworthy that DRC sum to one and may be positive or negative. Furthermore, as Thomas (1992) and Thomas and Zumbo (1993) acknowledge, DRCs are data analytic indices hence have a small judgmental element in determining the rank orderings. Small differences in the magnitude of DRCs is indicative of a tie in the ranking. This judgmental element is endemic of any data analytic approach (Tukey, 1969, 1977).

Operational definitions have been offered for the five global variables, the thirteen creative strengths in the TTCT and the thirteen creative thinking characteristics in the FSW. Where the characteristics overlap, the definitions are equivalent, i.e. humor/humour, fantasy/intuitive fantasy, and unusual visualization/intuitive and unusual point of view. Also, the criteria for scoring these variables was highly similar. Such factor equivalence allowed for within and between group comparison of the two creative thinking tasks (question 4.).

Table 3.4 summarizes the research questions and the corresponding methodology chosen to operationalize them.

Table 3.4
Research Questions and Corresponding Methodology

Research Questions	Methodology
1 Are there patterns in the WISC-R which might differentiate children who are gifted, learning disabled and gifted with learning disabilities?	Descriptive Discriminant Analysis; Variable ordering.
2 What conclusions can be drawn from the data on creative thinking that will be helpful in refining criteria for the identification of children who are gifted/LD	Descriptive Discriminant Analysis TTCT, (S); Variable ordering. Qualitative comparison of the number of children who exhibit various creative strengths TTCT Figural Form B and Future Scenario Writing.
3 How does Future Scenario Writing add information to the literature regarding the integration of thinking, feeling, intuition, physical sensing and humour in the three groups of exceptional children?	Qualitative comparison of the number of children who exhibit thirteen emergent creative strengths in their Future Scenario Writing (FSW).
4 Are children who are gifted/LD more similar to gifted or to learning disabled children in their pattern of creative thinking?	Extraction of similarities and differences among the groups in performance on TTCT Figural Form B and FSW creative thinking strengths.
5 Do teacher interviews disclose awareness of creative characteristics in children who are learning disabled or who are gifted/LD? Is there an interest in incorporating students' creative thinking strengths when individualizing instruction or planning cooperative group learning activities?	Focused individual interviews audio- taped, transcribed. Responses grouped, colour coded as to source (classroom, resource, or special class teacher) and noted for frequency of occurrence.

The following chapter answers the research questions by analyzing the data obtained from this study.

Chapter 4

RESULTS OF DATA ANALYSIS

Chapter 4 answers the five research questions by analyzing the collected data. Firstly, section one examines the deviation IQs of the WISC-R, then six discriminatory subtests using descriptive discriminant analyses (DDA), followed by an analysis to determine variable ordering. Cognitive patterns were explored for differentiating the three groups of exceptional children. Secondly, six TTCT variables were analyzed using a DDA and variable ordering. The thirteen creative strengths of the TTCT were explored qualitatively and compared to the creative strengths of the three groups on Future Scenario Writing (FSW) to determine differentiating creative thinking patterns. Thirdly, a comparison of the three groups' performance on the FSW was made to determine how the Clark/Torrance theoretical framework added information to the literature on creative thinking. Fourthly, a comparison of similarities and differences in performance of the three groups on both instruments examined whether gifted/LD were more similar in creative thinking to gifted or to LD children. Finally, teacher interviews were analyzed in order to determine whether classroom, LD and resource teachers were aware of creative characteristics and interested in incorporating creative thinking into programs for the three groups of exceptional children.

Analysis of the WISC-R

Research question 1: Are there patterns in the WISC-R (1974) which might differentiate children who are gifted, learning disabled (LD) and gifted with learning disabilities (gifted/LD)?

The means and standard deviations of all WISC-R subtests for the three groups (Appendix J) illustrate the extent to which the students in each identified group differed among themselves within the group. Table 4.1 shows the means and standard deviations of the Deviation IQs on the WISC-R (1974), Verbal, Performance and Full Scale.

Table 4.1

Means and Standard Deviations for Three Groups of Children on the WISC-R (1974)

Predictors	Groups		
	Gifted n = 23	LD n = 25	G/LD n = 28
Verbal	128.96(10.56)	101.12(9.36)	127.00(10.09)
Performance	129.30(10.23)	101.72 (13.78)	128.46(10.26)
Full Scale	132.17(8.82)	101.24 (11.07)	131.14(6.67)
LD = Learning Disabled; G/LD = Gifted with Learning Disabilities.			

It is evident from examining the means of the Deviation IQs that there were no large discrepancies between Verbal and Performance Scales for any of the groups. The Full Scale IQ was very similar for the gifted and gifted/LD groups but different from the LD group. To determine which WISC-R variables were significant for group separation, two distinct

descriptive discriminant analyses (DDA) were conducted and followed by variable ordering.

The variables of the first DDA were the three global Intelligence Quotients of the WISC-R, Verbal, Performance, and Full Scale. Those of the second DDA were WISC-R subtests Information, Comprehension, Arithmetic, Digit Span, Block Design and Coding. Analysis of the WISC-R was split into two distinct DDAs because they addressed very different questions. The first DDA revealed two uncorrelated functions as follows:

- 1) The first function showed a canonical correlation of 0.85764 and a Wilks' Lambda of 0.25006, $p < 0.001$ with 6 degrees of freedom, Chi-squared value of 99.794.
- 2) The second function showed a canonical correlation of 0.23326 and a Wilks' Lambda of 0.94559, $p < .1335$ with 2 degrees of freedom, Chi-squared value of 4.0280.

The two functions accounted for 97.97 percent and 2.03 percent respectively of the between-group variability. Only the first function was significant and, as mentioned in chapter 3, a statistically significant DDA implies a statistically significant MANOVA (Howarth & Zumbo, 1989). The remainder of this analysis will focus on the one significant function by addressing three aspects:

- 1) construct identification, 2) patterning of the group centroids, and 3) variable importance (ranking).

Table 4.2 illustrates the pooled within-group correlations between discriminating variables and canonical

discriminant functions ordered by the size of the correlation within the function.

Table 4.2

Pooled Within-group Correlations Between WISC-R (1974)
Predictors and Canonical Discriminant Functions

Predictor	Function 1.	Function 2.
Full Scale	0.97490	0.18375
Verbal	0.76836	0.32625
Performance	0.67629	0.11531

The greater the loading, the more the variable is a pure measure of the factor. All three variables have more than 40 percent overlapping variance which is very good (Tabachnick & Fidell, 1989). Full Scale, Verbal and Performance were correlated 0.97, 0.76 and 0.67 respectively with the first function, therefore, they identify linear combinations of variables that represent theoretically important constructs.

Patterning of the group centroids are summarized numerically in Table 4.3 and visually in Figure 4.1. The group centroids, measured in terms of z-score units, illustrate how close the gifted and gifted/LD groups were in cognitive abilities.

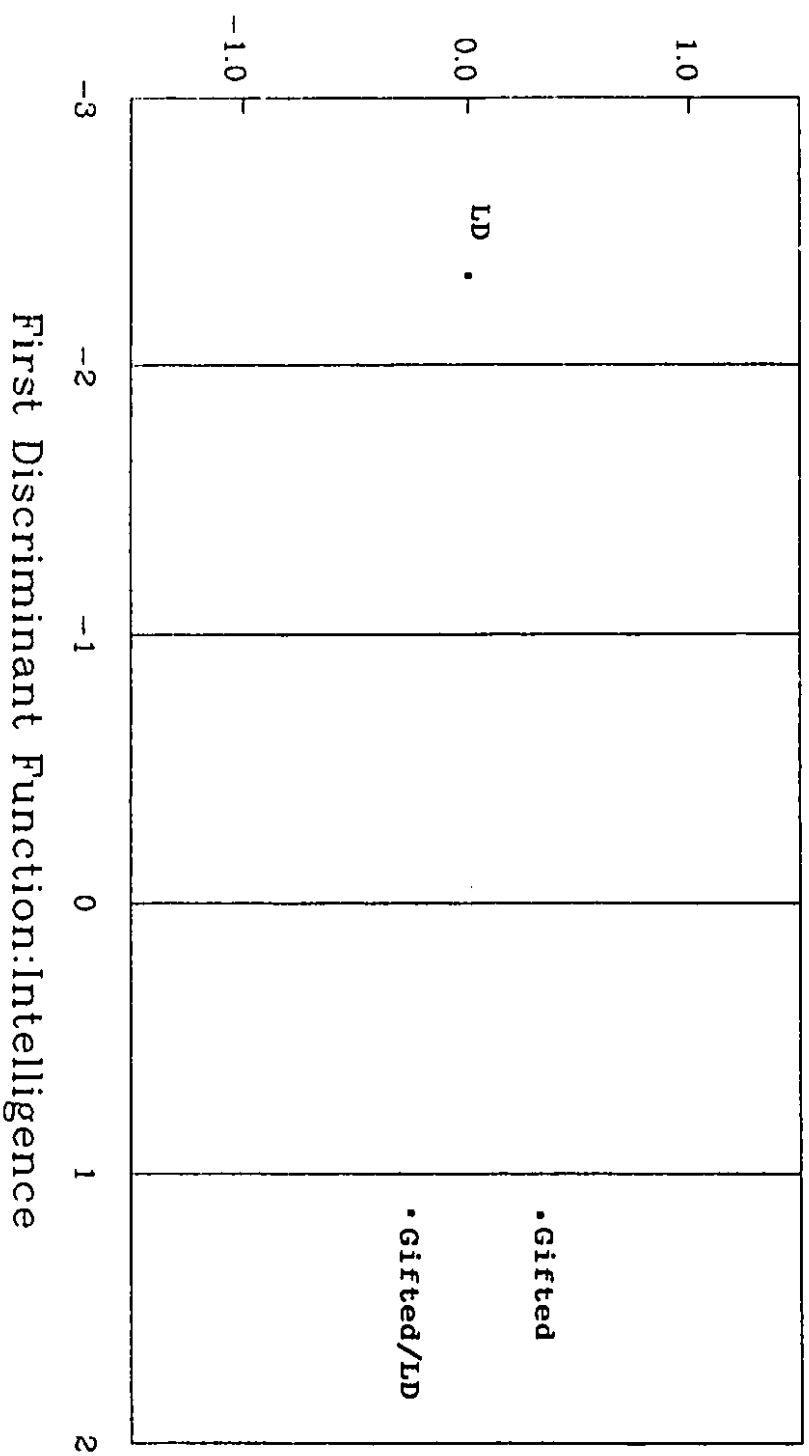
Table 4.3

Canonical Discriminant Functions Evaluated at Group Means:
Group Centroids (Full Scale, Verbal, Performance)

Group	Function 1.	Function 2.
Gifted (GT)	1.14954	0.31626
Learning Disabled	-2.33452	0.00079
Gifted/ LD (G/LD)	1.14013	-0.26049

The first function, intelligence or cognitive ability, maximally separated the LD from the gifted and gifted/LD groups. The separation of more than 3 standard deviations illustrates a significant difference in ability as measured by the Deviation IQs of the WISC-R. From the spatial configuration on Figure 4.1, it is apparent that global measures of intelligence did not separate the gifted groups.

Figure 4.1
Group Centroids: Verbal/Perf / Full Scale



Based on the descriptive discriminant analysis, 73.68 percent of the group was correctly classified. As Table 4.4 illustrates, 61 percent of the gifted, 92 percent of the LD and 68 percent of the gifted/LD matched the predicted group membership on the basis of the three variables. The table shows that the overlap was between the gifted and gifted/LD groups.

Table 4.4

WISC-R Predictors: Verbal, Performance, Full Scale
Classification of Actual Group

Actual Group		No. of	Predicted Group Membership		
		Cases	1	2	3
Gifted	1	23	14 60.9%	1 4.3%	8 34.8%
Learning Disabled	2	25	1 4.0%	23 92.0%	1 4.0%
Gifted/ LD	3	28	8 28.6%	1 3.6%	19 67.9%
Percent of Grouped Cases Correctly Classified: 73.68%					

As shown above, over one-third of the actual gifted group had been classified gifted/LD and 28.6 percent of the actual gifted/LD group had been classified gifted on the basis of the three global scores of the WISC-R (1974).

The variables that accounted for separating the LD from the other two groups and their ranking in importance (Thomas, 1992) are shown in Table 4.5.

Table 4.5

SDFCs, SCs, Parallel DRCs and Ordering of the WISC-R Variables

VARIABLE	SDFC	SC	PARALLEL DRC	DISCRIMINATORY?	ORDERING
+VERBAL	-1.1291	0.7684	-0.8676	YES	2
+PERFORMANCE	-1.3469	0.6763	-0.9109	YES	2
FULL SCALE	2.8499	0.9749	2.7784	YES	1
			0.9999		
+ close values are tied					
SDFC = canonical correlation					
SC = structural coefficient					
DRC = discriminant ratio coefficient					
Parallel DRC = SDFC x SC					

It is noted that the variable most important for group separation of LD from the other two groups was Full Scale IQ. Although the structural coefficient of the Verbal variable was slightly larger than that of Performance, small differences in the magnitude of DRCs was indicative of a tie in the ranking (Thomas & Zumbo, 1993).

These findings are not consistent with those of Schiff, Kaufman and Kaufman (1981) who reported higher Verbal than Performance IQs with a mean discrepancy of 14.7 points in LD students with superior ability. However, the findings were consistent with those of Waldron and Saphire (1990) who found no discrepancy between Verbal and Performance scales in profiles of gifted/LD students.

The main focus of the second descriptive discriminant analysis was guided by the findings of Waldron and Saphire (1990), who noted that the WISC-R subtest scatter was slightly different in LD and gifted/LD children. The predictors suggested by the literature were four from the Verbal Scale: Information, Arithmetic, Digit Span and Comprehension, and two from the Performance Scale: Block Design and Coding (Bannatyne, 1974; Barton & Starnes, 1989; Baum, Owen & Dixon, 1991; Dixon, 1983; Kaufman, 1975; Schiff, Kaufman & Kaufman, 1981; Waldron & Saphire, 1990). These subtests are defined in chapter 3 p.48-50.

There were 64 cases in the second analysis because thirteen students had not been administered the optional subtest, Digit Span: 7 gifted, 1 LD and 5 gifted/LD.

The Digit Span mean of the 16 gifted students was 13 and of the 24 LD and 24 gifted/LD was 8 and 10 respectively. Since these means are consistent with those in several above studies, the smaller number of gifted students should not affect the results seriously.

Table 4.6 shows the means and standard deviations of the three groups on the six predictor variables. As previously noted, the means and standard deviations of all WISC-R and WJPEB subtests in Appendix J illustrate that the students in each identified group were different among themselves within the group. It is important to keep this fact in mind as group differences are discussed.

Table 4.6

Group Means and Standard Deviations on Six WISC-R Subtests

[illegible]

The second descriptive discriminant analysis (DDA) revealed two uncorrelated functions as follows:

- 1) The first function showed a canonical correlation of 0.873 and a Wilks' Lambda of 0.167, $p < 0.001$ with 12 degrees of freedom, Chi-squared value of 104.67.
- 2) The second function showed a canonical correlation of 0.544 and a Wilks' Lambda of 0.703, $p < 0.001$ with 5 degrees of freedom, Chi-squared value of 20.554.

Both functions were significant and accounted for 88.41 and 11.59 percent of the variance respectively. Table 4.7 illustrates the pooled within-group correlations between discriminating variables and canonical discriminant functions ordered by the size of the correlation within the function. Block Design, Comprehension and Information were correlated .62, .58, and .52 respectively with the first function and Arithmetic, Digit Span and Coding correlated .50, .50, and .46 respectively with the second function. It was noted that Digit Span correlated highly also with the first function at 0.44.

Table 4.7

Correlations Between Discriminating Variables
and Canonical Discriminating Functions

	Function 1.	Function 2.
Block design	0.62032	-0.05500
Comprehension	0.57778	-0.30172
Information	0.52209	-0.15554
Arithmetic	0.29224	0.50061
Digit Span	0.44307	0.49719
Coding	0.20561	0.46441

In this study the first function was interpreted as reasoning, awareness, observation, and the second function as manipulation of arbitrary symbols in sequence within short-term memory (Margaret B. Rawson, personal communication, August, 1992). Findings are summarized numerically in Table 4.8 and visually in Figure 4.2.

Table 4.8

Canonical Discriminant Functions Evaluated at Group Means:
Group Centroids of six Subtests of WISC-R

Group	Function 1.	Function 2.
Gifted (GT)	1.47	0.95
Learning Disabled	-2.26	0.04
Gifted/LD (G/LD)	1.27	-0.68

From the spatial configuration of the group centroids, it is apparent that the first function maximally separated the gifted and gifted/LD from the LD group and the second function, retaining an arbitrary sequence, separated all three groups. The greatest difference was between the gifted and gifted/LD groups, however, the difference of .72 of a standard deviation between the LD and gifted/LD is not trivial. Spatial reasoning (Block Design), long term memory (Information), and societal awareness (Comprehension) were much stronger in children who are gifted/LD than was their ability to manipulate the visual (Coding) or auditory symbols (Digit Span and Arithmetic) which may be involved in memorizing without understanding.

Based on these two discriminant functions, 85.94 percent

of the group was correctly classified. Seventy-five percent of the gifted, ninety-two percent of the learning disabled, and eighty-eight percent of the gifted/LD children matched the predicted group membership on the basis of the six predictors from the WISC-R (1974): Information, Comprehension, Arithmetic, Digit Span, Block Design and Coding (Table 4.9).

Table 4.9

Six Subtests of WISC-R (1974) Classification of Actual Group

Actual Group			Predicted Group Membership		
		No. of Cases	1	2	3
Gifted	1	16	12 75.0%	0 0.0%	4 25.0%
Learning Disabled	2	24	2 8.3%	22 91.7%	0 0.0%
Gifted/ LD	3	24	2 8.3%	1 4.2%	21 87.5%
Percent of Grouped Cases Correctly Classified: 85.94%					

The variables which accounted for these group differences and their rankings in the discriminating subset according to their importance (Thomas, 1992) are shown in Tables 4.10 and 4.11. Examination of these Tables shows that Arithmetic and Coding were not important discriminators when separating the LD from the two gifted groups. The rank ordering was Block Design followed by Comprehension, then a tie for Information and Digit Span.

Figure 4.2

Group Centroids: 6 WISC-R Subtests

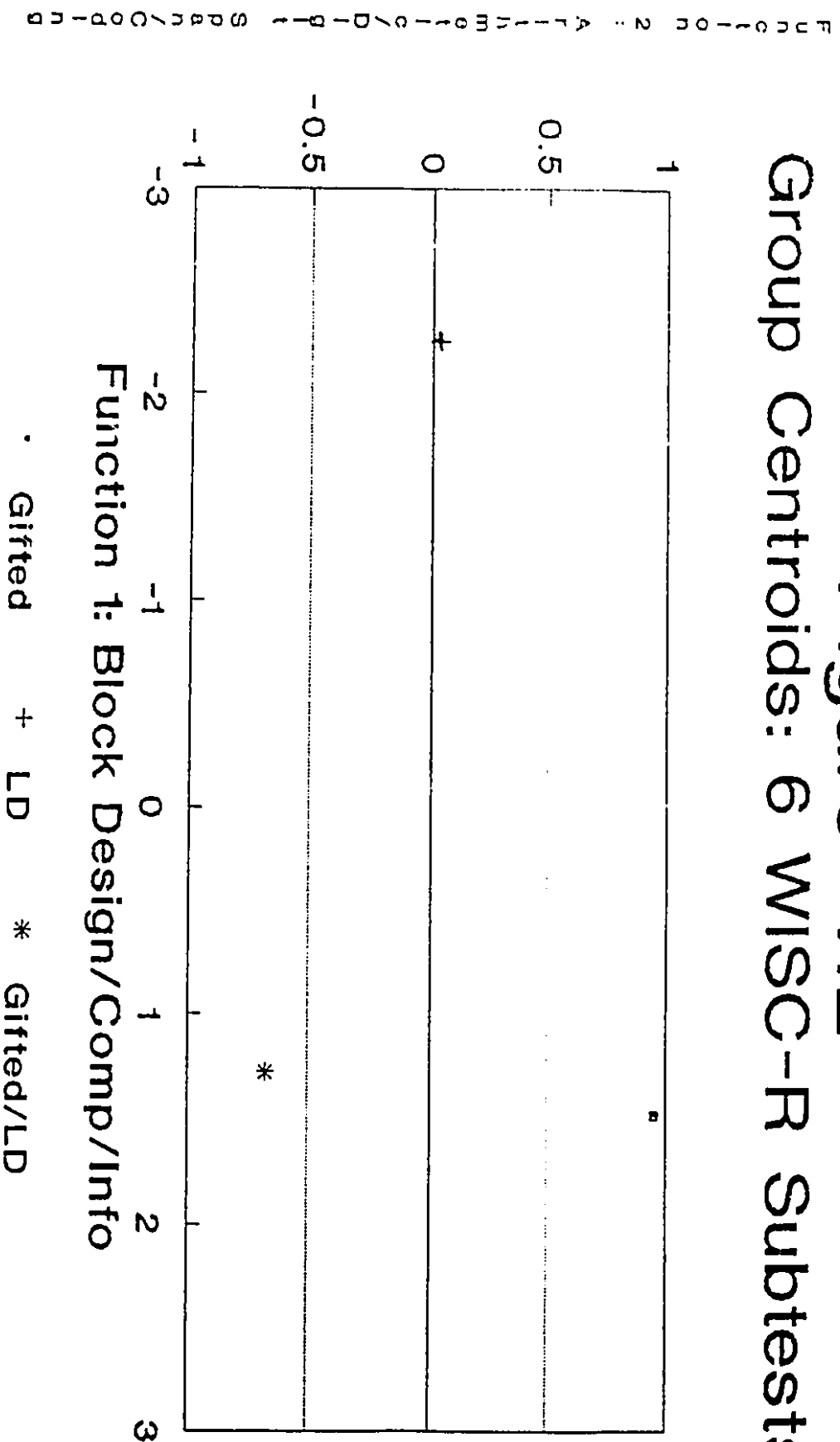


Table 4.10

SDFCs, SCs, Parallel DRCs and Ordering of Six WISC-R Subtests *(1)

VARIABLE	SDFC	SC	PARALLEL DRC	DISCRIMINATORY?	ORDERING
+INFORMATION	0.3076	0.5221	0.1606	YES	3
COMPREHENSION	0.4823	0.5778	0.2787	YES	2
ARITHMETIC	-0.0141	0.2922	-0.0041	NO	
+DIGIT SPAN	0.4137	0.4430	0.1833	YES	3
BLOCK DESIGN	0.5955	0.6203	0.3694	YES	1
CODING	0.0592	0.2056	0.0129	NO	
			1.0000		

* = First Function separates LD from gifted and G/LD

+ close values are tied

SDFC = canonical correlation

SC = structural coefficient

DRC = discriminant ratio coefficient

Parallel DRC = SDFC x SC

Table 4.11

SDFCs, SCs, Parallel DRCs and Ordering of Six WISC-R Subtests *(2)

VARIABLE	SDFC	SC	PARALLEL DRC	DISCRIMINATORY?	ORDERING
INFORMATION	-0.3637	-0.1554	0.0565	NO	
COMPREHENSION	-0.3517	-0.3017	0.1061	YES	4
ARITHMETIC	0.6392	0.5006	0.3199	YES	1
+DIGIT SPAN	0.5489	0.4972	0.2729	YES	2
BLOCK DESIGN	-0.2251	-0.055	0.1238	NO	
+CODING	0.4998	0.4644	0.2320	YES	2
			0.9999		
*Second Function separates gifted from G/LD + close values are tied SDFC = canonical correlation SC = structural coefficient DRC = discriminant ratio coefficient Parallel DRC = SDFC x SC					

However, in the second function, which separated all three groups (Table 4.11), Information and Block Design were not discriminatory. The rank ordering of variables was Arithmetic, a tie for Digit Span and Coding, then lastly, Comprehension. Since Arithmetic, Digit Span and Coding do differentiate the two gifted groups, a scaled score of 10 in these subtests can be considered to be significantly below the gifted/LD's own average (see Appendix J and K). Findings are consistent with those of Barton and Starnes (1989) who reported that gifted/LD groups were "most similar to the gifted on Verbal Conceptualization measures (see chapter 3, p.47) and deviate most from the gifted on Sequencing measures, most notably Coding" (p.26). The variable ordering component of this study, allowing closer examination of the three Sequencing variables, showed that, although the means were similar in both studies, Arithmetic was ranked as more discriminating than Coding in separating the gifted from the gifted/LD group.

In conclusion, there are patterns in the WISC-R which may be helpful in identifying differences among the three groups of exceptional children in this study. Consistent with Waldron and Saphire's (1990) findings, this study found discrepancy not between Verbal and Performance Scales but in the child's own pattern of strengths and needs as evident in the WISC-R subtests. On one hand, both gifted and gifted/LD were strong in Block Design, Information and Comprehension; on the other hand, the gifted/LD children were below their

own averages in Arithmetic, Digit Span and Coding (Kaufman, 1979, Appendix K). Only five LD children had discrepancies between Verbal and Performance Scales (Appendix J, p. 209). The LD were significantly lower than the gifted in all six subtests. It is important for diagnosticians to administer the optional subtest Digit Span one of the three subtests that discriminated the gifted from the gifted/LD children.

Analysis of the Torrance Tests of Creative Thinking Form B

Question 2: What conclusions can be drawn from the data on creative thinking that will be helpful in refining criteria for the identification of gifted/LD children?

In order to differentiate creative thinking patterns among the three groups of exceptional children, six variables of the Torrance Tests of Creative Thinking, Figural Form B (TTCT, 1990) were analyzed using a DDA plus variable ordering. Also, the thirteen creative strengths of the TTCT (Appendix M) were explored qualitatively as well as the creative thinking characteristics which emerged on the Future Scenario Writing (FSW).

The analysis of the TTCT was begun by obtaining means and standard deviations on the independent measures. These variables were converted to normalized standard scores which allowed uniform interpretation across grades (5 - 8), forms, scores, and ages (9 - 14). "The evidence of skewness in the distributions across grades for all major scores negated the selection of any linearly derived standard score (as the T-

score)" (Torrance, 1990, p.19). The mean of each variable's score is 100, 50th percentile, and the standard deviation for most grade levels is 14 (Torrance, 1990) Appendix M has an example of the streamlined scoring sheet (1990).

Table 4.12 illustrates the means and standard deviations on six variables for the three groups of exceptional children.

Table 4.12

Means and Standard Deviations on the TTCT Predictors
for the Three Groups of Exceptional Children

Predictors	Groups		
	Gifted	Learning Disabled	Gifted/LD
Fluency	107.93(16.16)	100.40(20.49)	99.30(15.89)
Originality	106.70(18.08)	99.67(19.55)	102.50(17.34)
Abstractness of Titles	115.50(15.98)	103.23(21.85)	101.43(18.60)
Elaboration	102.83(13.82)	94.00(13.05)	97.13(13.90)
Resistance to Closure	106.13(21.84)	111.93(19.73)	107.37(15.96)
Creativity Index	120.07(9.79)	111.97(14.69)	113.17(12.27)
n = 90; TTCT = Torrance Test of Creative Thinking			

It is noted that the gifted children scored more than a standard deviation above the mean on both Abstractness of Titles and Creativity Index. The LD children scored the highest in Resistance to Premature Closure and the remaining means were within the average range for all three groups. To determine whether differences were significant, data were analyzed by a descriptive discriminant analysis (DDA) followed by variable ordering.

The main focus in the data analysis was guided by studies of Paul Torrance who found that certain creative characteristics were highly predictive of creative adult accomplishment (1972a, 1981). It was not known or anticipated which, if any, of the six predictors might be important for group separation. Therefore, without prior assumptions, variables were selected by a stepwise discriminant function analogous to stepwise regression analysis (Howarth & Zumbo, 1989; Tabachnick & Fidell, 1989). The variable selection method used finds a set of variables which maximizes the discriminating power as defined by a minimization of Wilks' Lambda at each step of the analysis. The variables with the smallest Lambda value selected for entry by the descriptive discriminant analysis, in order of entry, were: Titles (0.0097), Elaboration (0.0141), Closure (0.0188), and Fluency (0.0142).

The descriptive discriminant analysis revealed two uncorrelated functions as follows:

- 1) The first function showed a canonical correlation of 0.43 and a Wilks' Lambda of 0.79, $p < 0.0142$ with 8 degrees of freedom, Chi-squared value of 19.134.
- 2) The second function showed a canonical correlation of 0.16 and a Wilks' Lambda of 0.975, $p < 0.54$ with 3 degrees of freedom, Chi-squared value of 2.1447. This function was not statistically significant.

A multivariate difference existed between the groups since the first function was significant and accounted for

89.64 percent of the variance. This first function, Abstractness of Titles, Creativity Index, Elaboration, Fluency and Originality, was interpreted as creative characteristics. The remainder of this analysis will focus primarily on the significant function by addressing:

1) construct identification, 2) patterning of the group centroids, and 3) variable ordering.

Table 4.13 illustrates the pooled within-group correlations between discriminating variables and canonical discriminant functions ordered by the size of the correlation within the function. Titles and also Creativity Index have 40 percent overlapping variance which is very good. Elaboration has 30 percent overlapping variance which is good (Tabachnick & Fidell, 1989).

Table 4.13

Pooled Within-Group Correlations Between Predictors and Canonical Discriminant Functions for six TTCT Variables

Predictor	Function 1.	Function 2.
Titles	0.695	0.492
C. Index	0.641	0.296
Elaboration	0.567	-0.407
Fluency	0.459	0.324
Originality	0.296	0.153

Resistance to Premature Closure	-0.209	0.547

Findings are summarized numerically in Table 4.14 and

visually in Figure 4.3. From the spatial configuration of the group centroids in Figure 4.3, it is apparent that creative characteristics, the first discriminant function, differentiated the gifted group from the other two groups of exceptional children.

Table 4.14

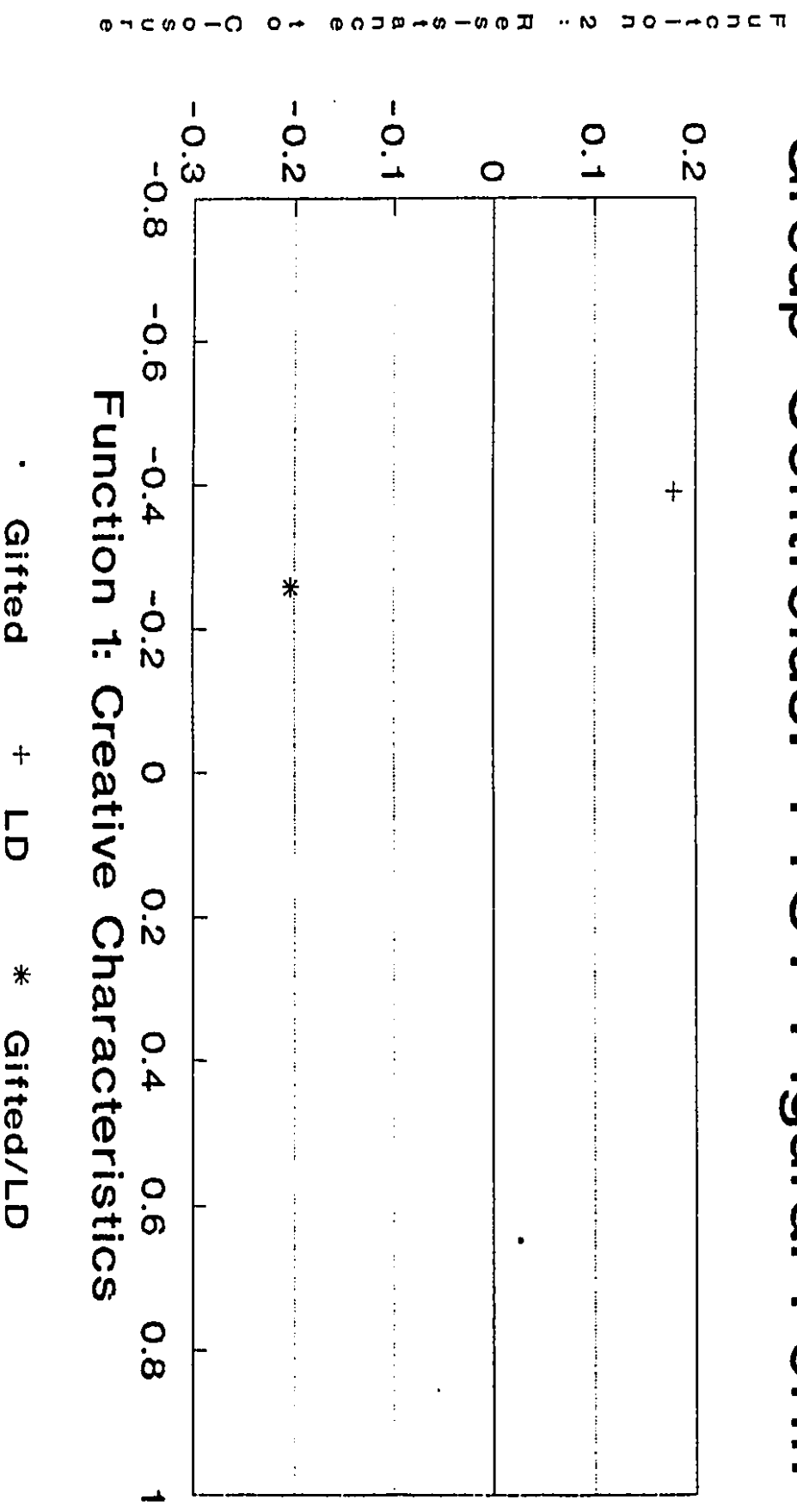
Canonical Discriminant Functions Evaluated at Group Means:
Group Centroids (TTCT)

Group	Function 1.	Function 2.
Gifted (GT)	0.65	0.03
Learning Disabled (LD)	-0.39	0.18
Gifted/LD	-0.26	-0.20
TTCT = Test of Creative Thinking		

The second function, resistance to premature closure, is stronger in the LD (0.18) than the gifted/LD (-0.20), a difference which is educationally but not statistically significant (J. Maker, personal communication, February, 1993). It may be that LD children are more open to the flow of ideas and alternatives and more able to tolerate ambiguity than was previously thought.

Figure 4.3

Group Centroids: TTCT Figural Form B



The considerable overlapping of creative thinking characteristics is illustrated in Table 4.15 which shows the relationship between the actual groups of exceptional children and their predicted group membership on the basis of the six TTCT predictors.

Table 4.15

Torrance Test of Creative Thinking (TTCT) Predictors
Classification of Actual Group

Actual	Group	No. of Cases	Predicted Group Membership		
			1	2	3
Gifted	1	30	17 56.7%	8 26.7%	5 16.7%
Learning Disabled	2	30	7 23.3%	12 40.0%	11 36.7%
Gifted/ LD	3	30	10 33.3%	9 30.0%	11 36.7%
Percent of Grouped Cases Correctly Classified: 44.44%					

In many respects, the learning disabled group was as creative as the other two groups. In the completion of TTCT Figural Form B, the global predictors separated the gifted from the LD and gifted/LD groups. The variables which accounted for this separation and their ranking in importance (Thomas, 1992) are shown in Table 4.16.

Table 4.16

SDFCs, SCs,		Parallel DRCs and Ordering of TTCT Variables			
VARIABLE	SDFC	SC	PARALLEL DRC	DISCRIMINATORY?	ORDER
+FLUENCY	0.6224	0.4586	0.2854	YES	2
ORIGINALITY	0.1129	0.3242	0.0366	NO	
TITLES	0.6774	0.6948	0.4706	YES	1
+ELABORATION	0.4831	0.5625	0.2717	YES	2
RESISTANCE TO					
CLOSURE	-0.4957	-0.2058	0.1020	YES	5
CREATIVITY					
INDEX	-0.2679	0.6210	-0.1664	YES	4
			1.0000		
+ close values are tied SDFC = canonical correlation SC = structural coefficient DRC = discriminant ratio coefficient Parallel DRC = SDFC x SC					

The variable ordering confirms that originality was not a discriminating factor in separating the groups. The most important variable was Abstractness of Titles followed by a tie between Fluency and Elaboration, then Creativity Index followed by Resistance to Premature Closure. The variable ordering component added considerable information to the descriptive statistics in Table 4.12. It is important to note that although Abstractness of Titles, a verbal cognitive skill, is the most discriminatory, both Fluency and Elaboration of a context were also cognitive aspects of creativity within the Clark/Torrance theoretical framework (Figure 2.2 p.24).

Analysis of the Creative Strengths on the TTCT

In order to differentiate more clearly the LD and gifted/LD groups, it was important to examine in detail the thirteen creative strengths of the TTCT. These characteristics, defined in chapter 3 (p.52-54) were added by Torrance to expand divergent productive abilities to include more of the essence of creativity (Torrance, 1979, 1990).

A comparison of the number of children in each group who exhibited these creative strengths added information to the DDA thus addressing the second research question (p.79). Figure 4.4a illustrates the number of children in each of the three groups for whom a characteristic was a strength (three or more occurrences) in Figural Form B. Figure 4.4b illustrates the number of children who showed 'some evidence'

of the creative strength in figure completion (one or two occurrences). Figure 4.4c collapses strengths and evidence weighting the latter data 0.5. If three or more children in any one group including those who showed 'some evidence' should exhibit a greater strength in a characteristic, this represents a difference of 10 percent which will be deemed a significant trend (Miles & Huberman, 1984, p. 244).

On Figures 4.4a, 4.4b, and 4.4c, HUMOR is H; THINKING creative strengths are SA, ET, S/IF and S/C; FEELING is EE; INTUITION strengths are EB, FA and UV; and PHYSICAL SENSING creative strengths are RI, CI, IV and MA (Figure 2.2, p. 23) as defined on pages 52-54.

HUMOR was expressed in drawings as a strength in one gifted student (Figure 4.4a) and as some evidence in five gifted/LD students (Figure 4.4b). When data were collapsed (Figure 4.4c), the gifted/LD, though few in number were somewhat stronger in perceiving and depicting conceptual and perceptual incongruity than either of the other two groups.

Figure 4.4c indicates that in a few creative strengths, the gifted/LD and LD groups were differentiated by three or more students. For example, more gifted/LD than LD students were able to synthesize and combine figures (S/IF and S/C), creative strengths which were within the THINKING category. Also, more gifted/LD than LD were able to express emotions (FEELING) in their drawings (EE). In the PHYSICAL SENSING category, there was a trend for the gifted/LD to be stronger in richness of imagery (RI) and for the LD to be stronger in

internal visualization (IV).

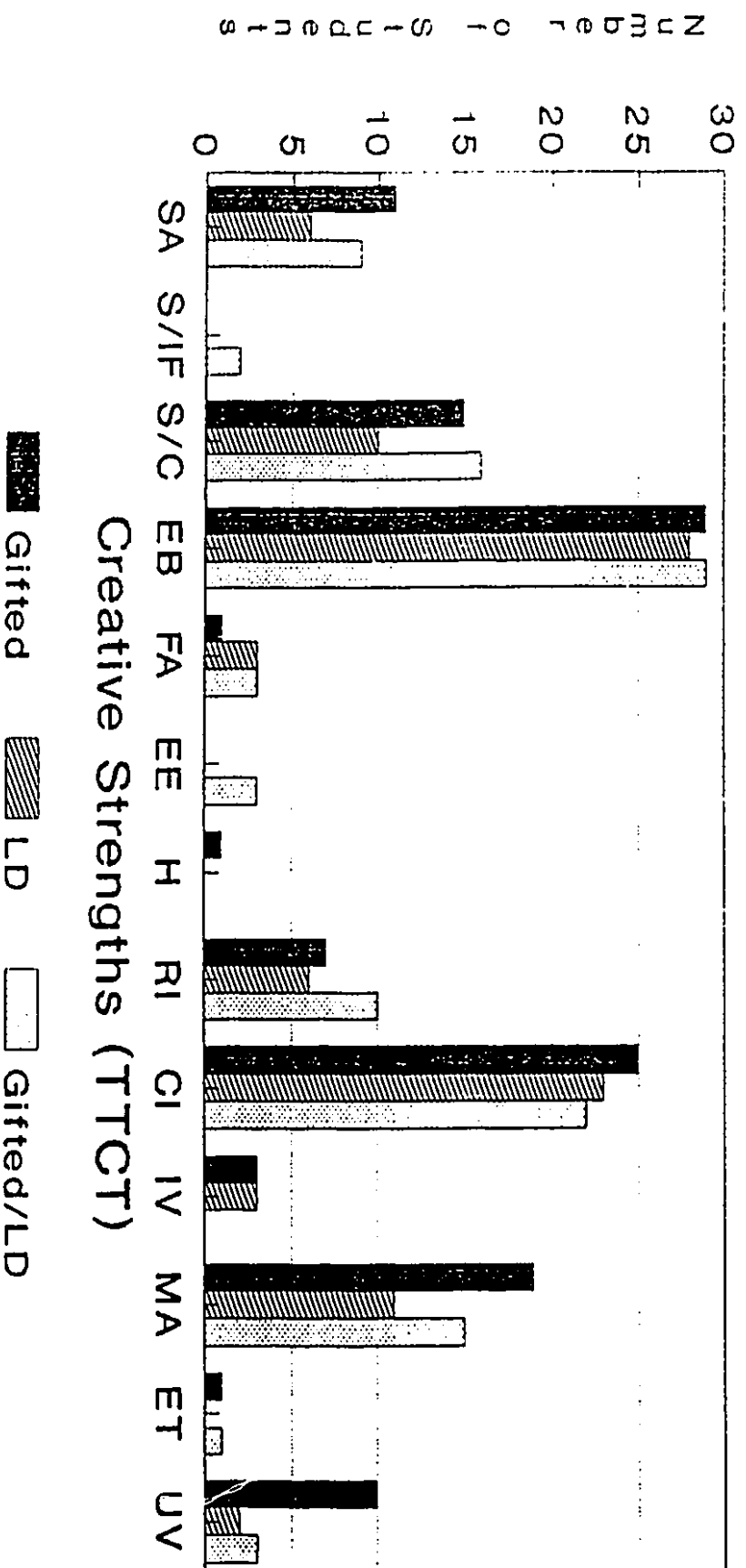
In several creative strengths, the gifted group was differentiated from the LD group by three or more students thus indicating a significant trend. Such was the case in two creative strengths within the THINKING category, SA and S/C and two within the the PHYSICAL SENSING category, RI and MA where more gifted than LD students tended to exhibit these characteristics.

The gifted and gifted/LD groups were similarly differentiated on a few creative strengths. For example, the gifted/LD group was stronger in synthesizing incomplete figures (S/IF) and the gifted group was stronger in two creative strengths within the PHYSICAL SENSING category, IV and MA and one within the INTUITIVE category, UV. These two groups were more similar to each other than to the LD group in S/C and RI. In INTUITIVE creative strengths (EB, FA and UV), the LD group performed well. This group was comparable to both gifted groups in EB and UV and slightly better in expressing Fantasy (FA).

A summary of the comparison of the three groups on these TTCT Creative Strengths is available in Appendix N.

Figure 4.4a

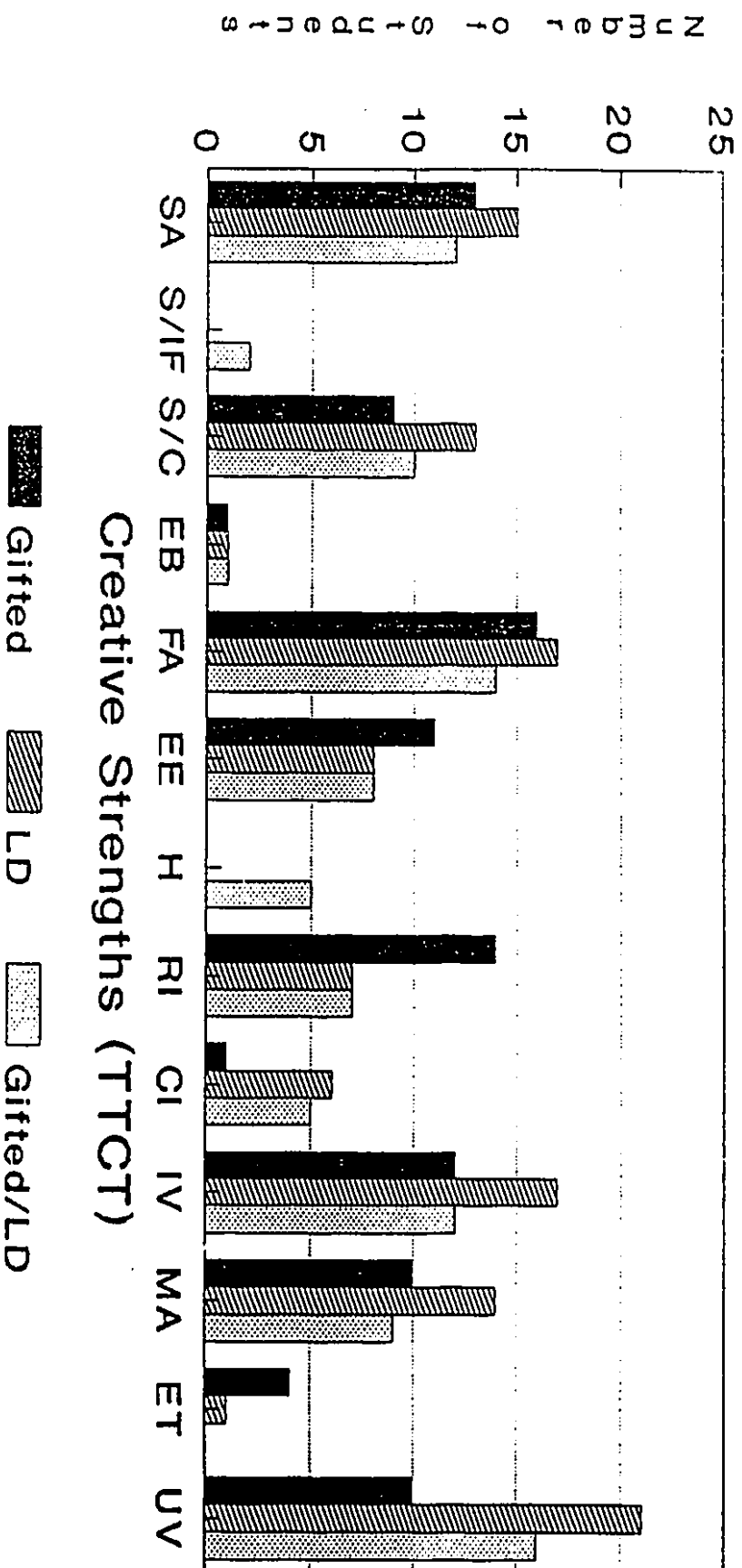
Strengths in Creative Thinking (TTCT)



n = 30 in each group

Figure 4.4b

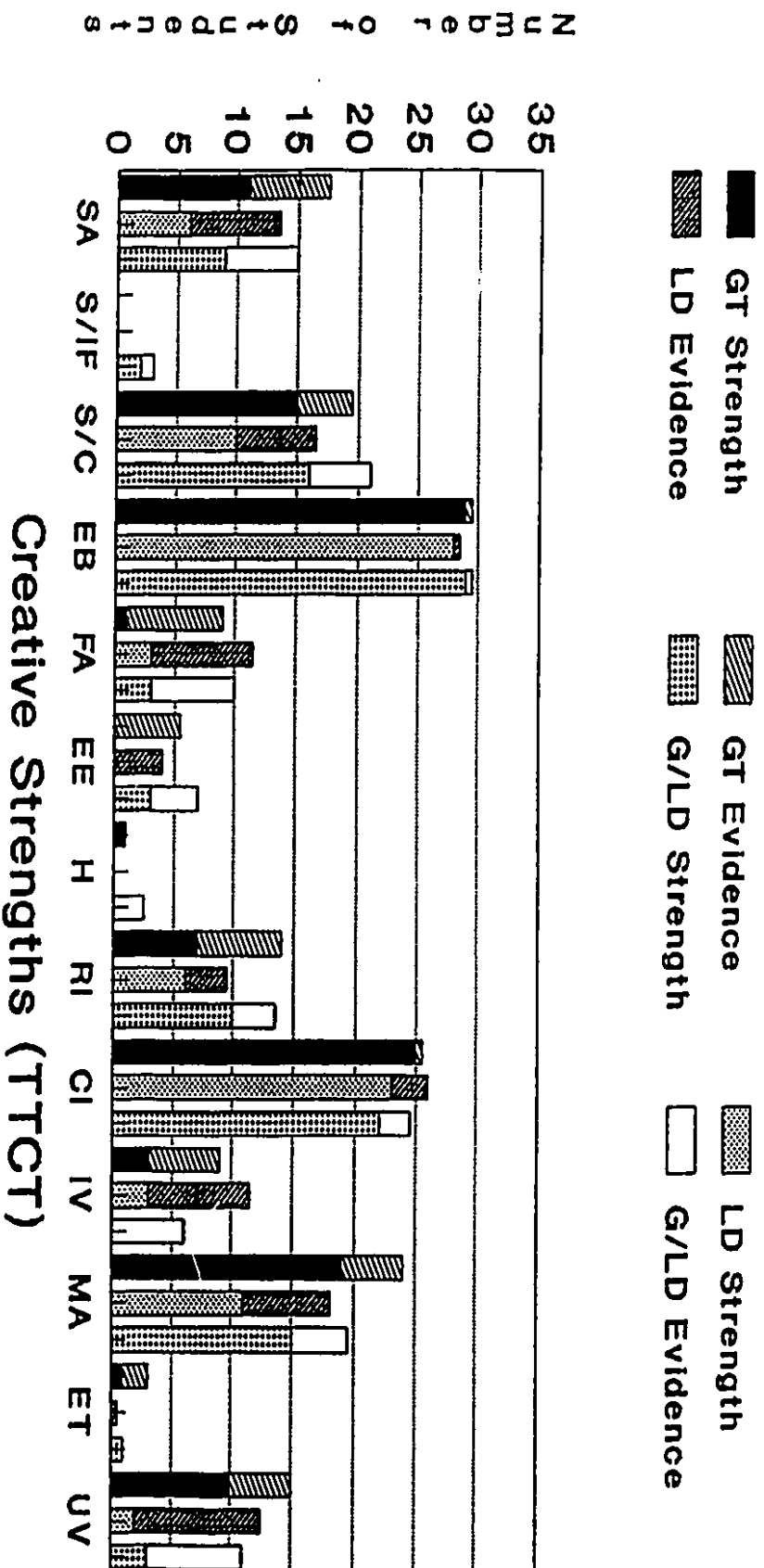
Some Evidence of Characteristics(TTCT



One or two incidences in TTCT booklet

Figure 4.4c TTCT

Combined Strengths/Some Evidence



Some Evidence value = 0.5
 GT-gifted; LD-learning disabled

Analysis of Creative Thinking Patterns as they Emerged in Future Scenario Writing (FSW)

Analysis of the ninety scenarios continued to add information to the answer of research question 2 and also addressed question 3. Question 2 was: What conclusions can be drawn from the data on creative thinking that will be helpful in refining criteria for the identification of gifted/LD children? Research question 3 was: How does Future Scenario Writing add information to the literature regarding the integration of thinking, feeling, intuition, physical sensing and humour in the three groups of exceptional children?

Fluency

There has been considerable demonstration that the more alternatives a person produces and considers, the more viable those solutions are likely to be, and also the greater the likelihood of success in solving problems (Parnes, 1967; Parnes, Noller & Biondi, 1976; Torrance, 1979). When ideas flow rapidly, thought is fluent. The Fluency score is based upon the total number of relevant responses and thus is important in assessing creative potential.

In the FSW, there was a marked difference in the thought fluency of the three groups of exceptional children. Once the scenarios were transferred to the Ethnograph in forty character lines, the lines were numbered. It was found that the mean line count for the 30 LD children's scenarios was

40.07 lines, for the 30 gifted/LD children's scenarios, 63.4 lines and for the 30 gifted children's scenarios, 94.83 lines. All of the LD and gifted/LD children were language/writing disabled in terms of their IPRCs or consultant designations. Since the scenarios were audio-taped by choice by five LD, four gifted/LD and three gifted, taping did not seem to be a factor in the length of story expressed. Spelling errors were allowed; the LD wrote 42 percent and the gifted/LD wrote 67 percent of the amount written by the gifted children.

Abstractness of Titles

In order to rate the quality of scenario titles, a generic one (The Future) was given one point, a descriptive one (The Jungle Sickness), two points and an abstract one which captured the essence of the creative story (The Coming of Darkness) was given the maximum of three points. Abstract titles were written by three LD, seven gifted and eight gifted/LD. The two latter groups were more able to verbalize abstractly than the LD group.

Analysis of Remaining Creative Thinking Characteristics (FSW)

The remaining creative characteristics, defined in chapter 3 pp.64 - 66, were scored similarly. Two points were awarded if the student had 3 or more occurrences of that particular creative strength in the scenario (Figure 4.5a) and one point was awarded for the occurrence of a

characteristic twice (Figure 4.5b). Figure 4.5c collapses strengths and some evidence weighting the latter data 0.5. If three more children in any one group including those with 'some evidence' exhibited a greater strength in a characteristic, this represented a difference of 10 percent which, for the purposes of this study, will be deemed a significant trend (see Appendix N).

On Figures 4.5a, 4.5b and 4.5c, HUMOUR is H; THINKING creative characteristics are CF, CP, and CE; FEELING characteristics are AEP, AEN, AIn, and AX; INTUITION characteristics are IPV and IF; and PHYSICAL SENSING creative characteristics are SM, SV, and SA. These creative strengths are defined on pp. 63-65.

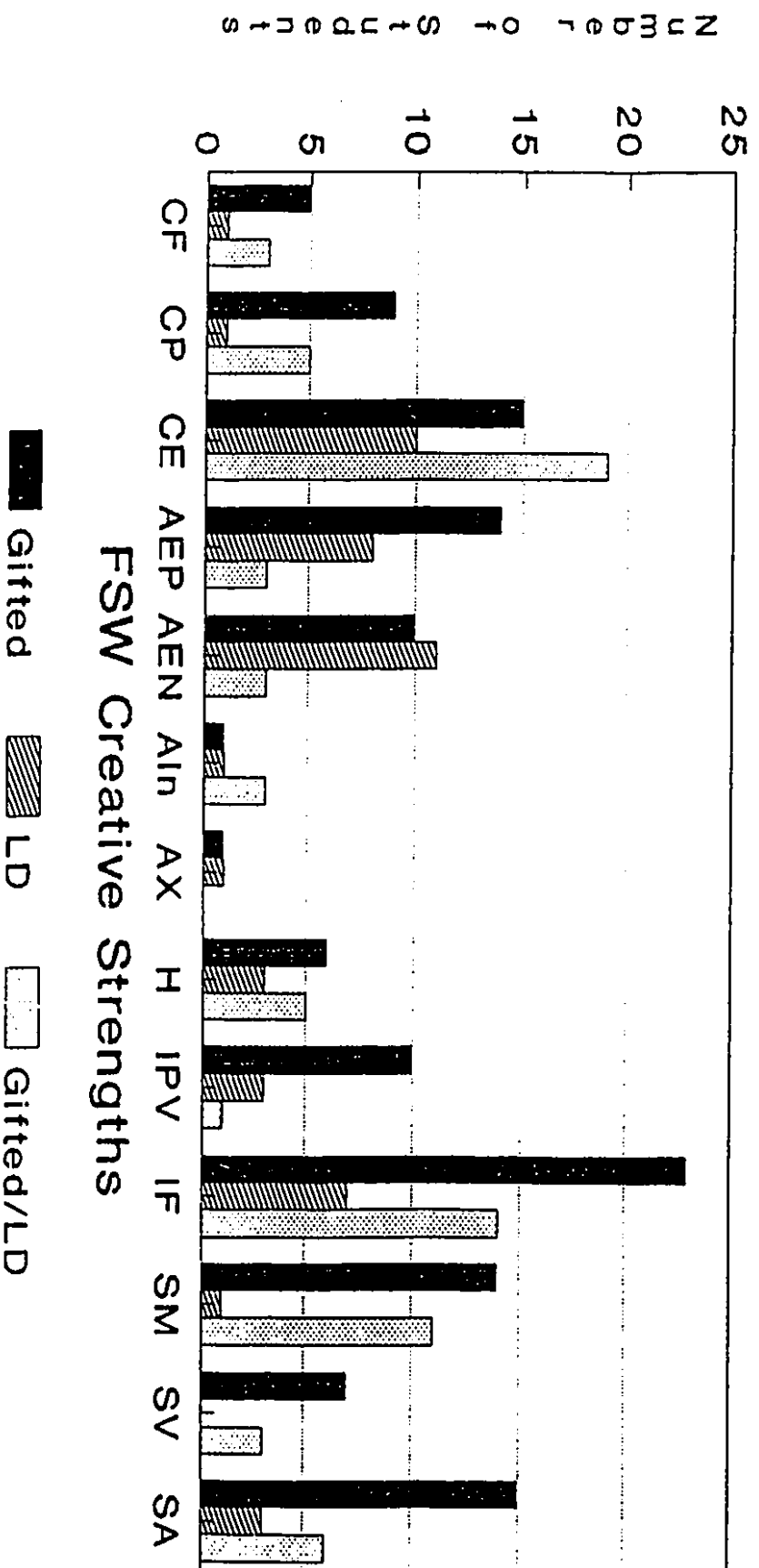
HUMOUR was a strength in the scenario writing for six gifted and five gifted/LD students (Figure 4.5a). However, when those with some evidence of humour (Figure 4.5b) were collapsed into one graph and weighted 0.5 (Figure 4.5c), there was a trend for the gifted to be strongest in this creative characteristic and for the gifted/LD to be stronger than the LD.

Close examination of Figures 4.5a, 4.5b, and 4.5c indicates the creative strengths that differentiated the groups of exceptional students by three or more persons. These are explored within the Clark/Torrance theoretical framework.

Within the THINKING category, there was a trend for the gifted students to be stronger than the LD in all three

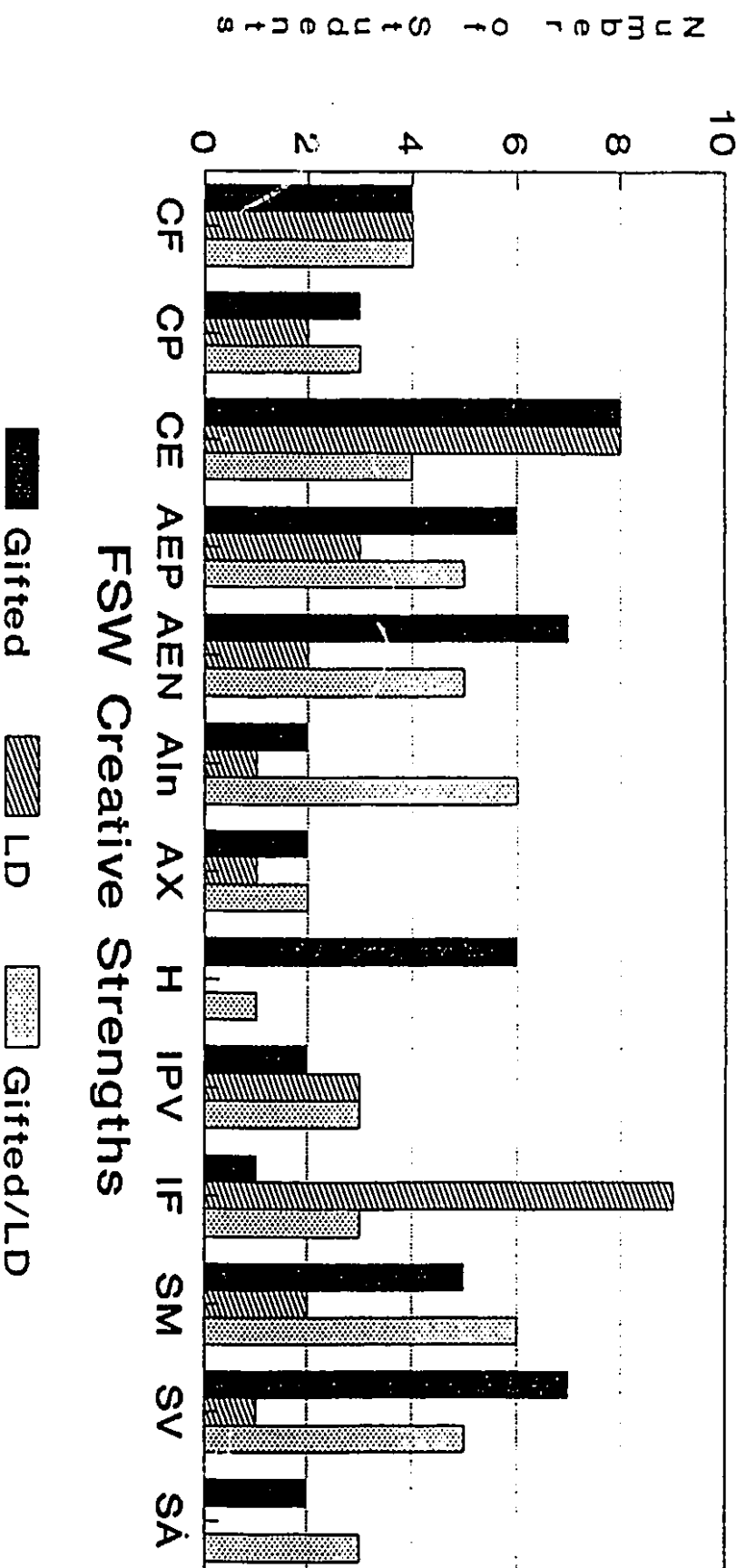
Figure 4.5a

FSW Strengths in Creative Thinking



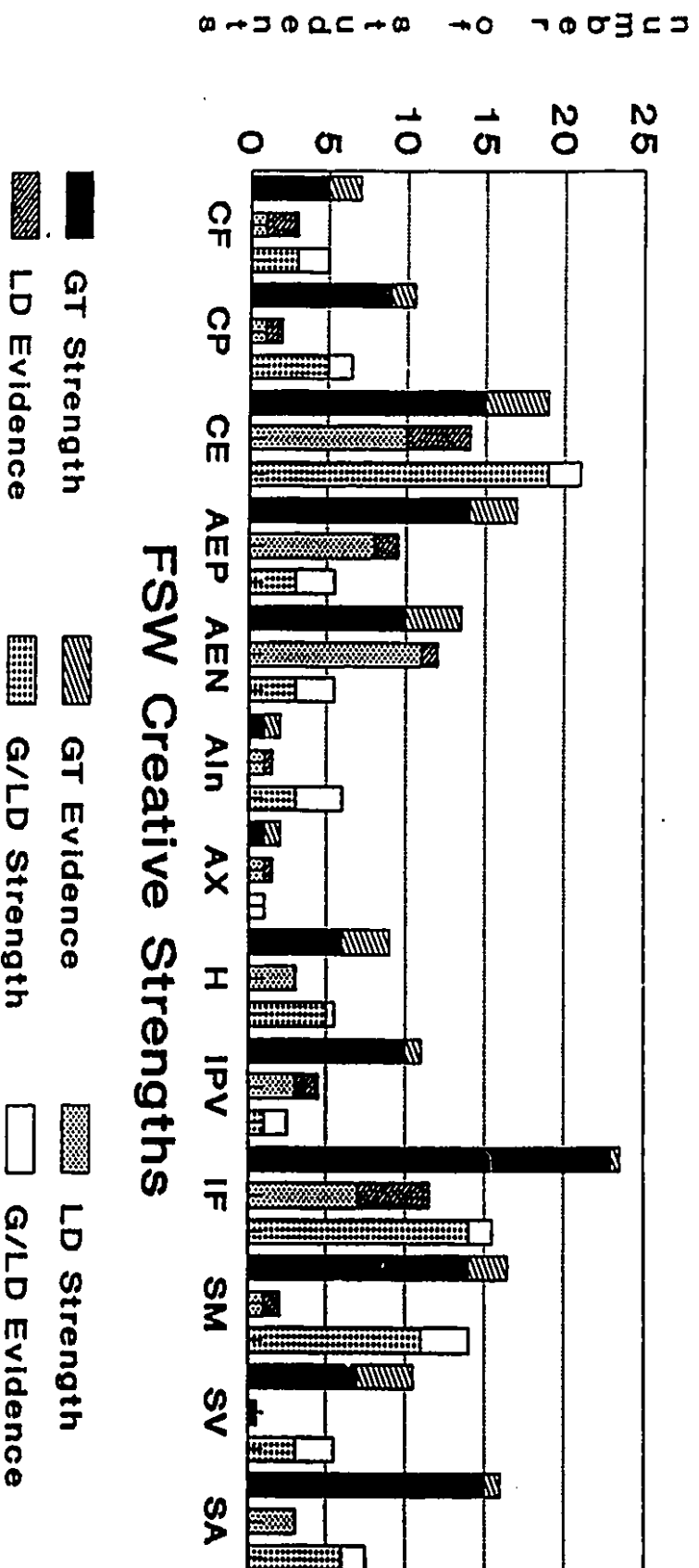
score of 2 for 3 or more occurrences

Figure 4.5b
(FSW) Some Evidence of Characteristic



score of 1 (for 2 occurrences)

Figure 4.5c FSW Combined Strengths/Some Evidence



Some Evidence value=0.5 stacked
 GT=glitted; LD=learning disabled
 n=30 in each group

areas: Cognitive Factual Information (CF), Cognitive Problem Solving (CP) and Cognitive Elaboration (CE). When the gifted were compared with the gifted/LD, the former were stronger in CP, somewhat stronger in CF and somewhat weaker in CE. In comparing the gifted/LD with the LD students, the gifted/LD were stronger in CP and CE and somewhat stronger in CF.

Within the FEELING category, there was a trend for gifted students to be stronger than LD in positive feelings about themselves and/or the future (AEP), to be somewhat stronger in negative feelings (AEN) and fairly similar in empowerment or decision-making within the framework of their future scenarios (AIn) and in expressing the feeling of being controlled by others or circumstances within the framework of their stories (AX). When comparing the gifted with the gifted/LD students, there was a definite trend for the former to be stronger in both AEP and AEN. The gifted/LD students showed little evidence of feeling controlled (AX) but were stronger than the gifted in taking control (AIn).

In comparing the gifted/LD with the LD within the FEELING category, the LD were stronger in both positive and negative feelings (AEP, AEN). The gifted/LD were stronger in AIn; whereas, there was little difference between the groups in AX.

Within the INTUITIVE category, there was a trend for the gifted to be stronger than the LD and the gifted/LD in expressing an intuitive and unusual point of view (IPV) and also in expressing fantasy (IF). When comparing the LD with

the gifted/LD, the LD were somewhat stronger in IPV; whereas, the gifted/LD students were stronger in FA.

Within the PHYSICAL SENSING category, there was a trend for the gifted students to be stronger than the LD in Sensing Movement (SM), Sensing Visually (SV) and Sensing Auditorially (SA). Also, the gifted group was somewhat stronger than the gifted/LD in SM and definitely stronger in both SV and SA. In comparing the LD and gifted/LD, there was a trend for the gifted/LD to be stronger in all three areas, SM, SV and SA.

Analysis of Future Scenario Writing (FSW) added to the information for question 2 and answered question 3. Results indicated that, not unexpectedly, the gifted students were the most fluent thinkers. To ensure fairness of production in equalizing the data base on frequency counts, the students were told that spelling correctly was not essential. They were also given a choice of writing the scenarios by hand or on computers as well as dictating them onto audio tape. The latter was chosen by three gifted, four gifted/LD and five learning disabled students. Although LD and gifted/LD students are similar in their lack of sentence structure, organization of thought and poor spelling, teachers may, as a result of this study, look beyond these mechanics and discover, in gifted/LD, cognitive, physical sensing, and humour similarities with gifted students (see Appendix N).

Comparison of Patterns in the TTCT and Scenario Writing

It was entirely probable that creative thinking performance varied in the three groups when they were creating with figural forms and with story writing. Therefore, it was important to compare creative thinking patterns as they showed on both instruments.

Question 4: Are children who are gifted/LD more similar to gifted or to learning disabled children in their pattern of creative thinking?

The above question will be answered by a systematic comparison within and across groups summarizing strengths and weaknesses, similarities and differences in creative thinking characteristics. Both the TTCT and FSW were examined. As explained in Chapter 3 on p.78, where the characteristics overlapped, the definitions were equivalent, for example in humor/humour, fantasy/intuitive fantasy, and unusual visualization/intuitive and unusual point of view. Definitions of characteristics assessed by the TTCT are in Chapter 3 pp.52-54; definitions of characteristics assessed by the FSW are on pp.64-66.

The criteria for scoring the TTCT Creative Strengths and FSW creative thinking characteristics were very similar. The only difference was in awarding points for "some evidence". On the TTCT, students were awarded one point if the creative strength occurred once or twice in the TTCT booklet. On the FSW, students were awarded one point if the characteristic occurred twice within the scenario.

Within-group comparisons will be made by describing strengths and weaknesses of each group across the TTCT and FSW. For example, the gifted group was separated from the other two groups by the descriptive discriminant analysis (DDA) of six variables. The ordering of importance of the variables indicated that the most important ones for group separation were such cognitive aspects of creative thinking as Abstractness of Titles, Fluency and Elaboration (Figure 2.2 p.23). Since originality was not a discriminatory factor, it is possible that all three groups gave responses which were statistically infrequent. Analysis of the 13 Creative Strengths (TTCT) indicated that, although similar to the other groups, the gifted group was strong in extending boundaries (EB) and in colourfulness of imagery (CI). The gifted showed strengths in showing movement or action (MA), unusual visualization (UV), in storytelling articulateness (SA) and synthesizing circles (S/C). In the FSW, fantasy (IF) was the gifted group's strongest creative strength. This was followed by strengths in positive feelings (AEP) cognitive elaboration of a story line (CE), negative feelings (AEN), sensing movement (SM), sensing auditorially (SA), expressing cognition (CP, CF) and a sense of humour (H). In fact, the gifted expressed all aspects of creative thinking well in their Future Scenario Writing. In the FSW, very few gifted children felt either in control of their lives (AIn) or controlled by others or circumstances (AX) in spite of their ability to express positive (AEP) and negative (AEN)

feelings about themselves and/or their future.

The within-group comparison of the LD group on the two tasks suggested some similarities. On the DDA, this group was higher than the other two on resistance to premature closure. The difference was not statistically significant, but it might have educational significance since the LD group was relatively strong in other intuitive aspects of creative thinking on the TTCT such as fantasy (FA) and unusual visualization (UV). The LD group was fairly equal to the gifted groups in originality (DDA), in extending boundaries (EB) and colourfulness of imagery (CI) and strong in internal visualization (IV). It seemed that a figure completion task such as the TTCT was a medium through which the LD students were able to express varying aspects of creative thinking. However, the LD group did not express humour (H), or such cognitive aspects as synthesizing figures (S/IF) nor selecting abstract titles for their drawings (ET). In the FSW, few in the LD group were able to express such cognitive aspects of creativity as CF or CP. Also, the LD group was low in ability to express such physical sensing aspects of creativity as sensing movement (SM), sensing visually (SV) and sensing auditorially (SA). Hence this suggests a need for multisensory instruction in teaching this group. In the feeling aspect of creative thinking, the LD group was able to express positive (AEP) and particularly negative (AEN) feelings about themselves and the future, and the same few number of students felt in control of their lives (AIn) as

felt controlled by others or circumstances (AX). In the scenarios, the LD group was able to express 'some evidence' of intuitive aspects of creative thinking such as intuitive fantasy (IF).

The within-group comparison of the gifted/LD group on the two creative thinking tasks indicated considerable variability. The DDA of the TTCT suggested that the gifted/LD were neither strong in creative thinking characteristics nor in resistance to premature closure (Figure 4.3). Close examination of the Creative Strengths, however, showed that the gifted/LD expressed strengths, as did the other two groups, in extending boundaries (EB) and in colourfulness of imagery (CI). This group showed strength in movement or action (MA), synthesizing circles (S/C), storytelling articulateness (SA) and richness of imagery (RI). Humour was a strength in only one gifted student while it was evident in the TTCT booklets of 5 gifted/LD students. Of the ninety subjects, only two, who were gifted/LD, showed strengths in synthesizing incomplete figures (S/IF) and two others showed some evidence of this trait. The gifted/LD were weakest in giving expressive titles to their drawings (ET). In the FSW, the gifted/LD group was strongest in elaborating a story line (CE), in expressing fantasy (IF) and then in sensing movement (SM). More than five students revealed ability to sense auditorially (SA), to problem solve (CP), to sense visually (SV) and to express humour (H), positive and negative feelings (AEP, AEN) and feelings of

being in control of their lives within the context of FSW (AIn).

The comparison of strengths and weaknesses across groups on the two creativity tasks was helpful in determining whether the gifted/LD were more similar to gifted or to LD in their pattern of creative thinking within the Clark/Torrance theoretical framework. On both the TTCT and FSW, the gifted group was strongest of the three groups in most cognitive aspects of creativity such as fluency of thought, abstractness of titles and storytelling articulateness (Figure 4.4c), cognitive factual information and problem solving (Figure 4.5c). More gifted and gifted/LD students exhibited repeated evidence of cognitive strengths than LD students (Figures 4.4a and 4.5a).

Humour was a strength for only one gifted student on the TTCT, was evident in the drawings of five gifted/LD, was a strength in scenarios (FSW) of six gifted, five gifted/LD and was evident in the writing of six gifted and one gifted/LD. Since humour was not apparent in the LD students' drawings and was a strength for only three scenario writers, it was concluded that the gifted/LD group was more similar to the gifted than the LD in expressing a sense of humour (Figures 4.4a, 4.4b, 4.4c, 4.5a, 4.5b, 4.5c).

Emotional expressiveness (EE) was a strength for the gifted/LD on the TTCT when compared to the LD group but only slightly stronger than the gifted group. Using the Clark/Torrance framework to examine feeling or affect, it was

apparent that all groups expressed feelings in the FSW. The gifted group was strongest in expressing positive (AEP) feelings about themselves and the future. The LD group was only slightly below the gifted group in negative affect (AEN) (Figure 4.5c). Importantly, few students in the three groups of exceptional children felt controlled by others or by circumstances within the context of scenario writing (AX) and the gifted/LD felt most in control (AIn). However, the few who had positive feelings among the gifted/LD, and the strength of negative feelings of both gifted and LD groups suggests that educators need to address the affective needs of these exceptional children more effectively.

Physical sensing was expressed on the TTCT by movement/action (MA), visualizing things internally (IV), visualizing richly (RI) and colourfully (CI) and on the FSW by sensing movement (SM), sensing visually (SV) and sensing auditorially (SA). On the TTCT, the three groups were similar in CI; in internal visualization (IV), the LD were stronger than the gifted/LD and slightly stronger than the gifted. The gifted group was highest in expressing movement on both the TTCT and FSW and the gifted/LD group was more similar to the gifted than LD on both tasks. The gifted/LD were strongest in richness of imagery although 14 gifted students showed some evidence of this characteristic thus bringing the numbers of the two gifted groups to similar levels (Figure 4.4c). In sensing visually and auditorially (FSW), the gifted group was strongest and the gifted/LD more

similar to the gifted than LD group when both strengths and 'some evidence' were considered (Figures 4.4c).

Hence gifted/LD children were more similar to gifted than to LD in several aspects of creative thinking: cognition, humour and physical sensing. If this information is to assist teachers to recognize differences among the groups for programming purposes (Appendix N), it was important to determine whether teachers recognized creative thinking and whether they would use knowledge of students' creative strengths in individualizing curricula and in planning cooperative activities for them.

Analysis of Teacher Interviews

Focused interviews were conducted in four Boards of Education with twenty teachers: seven regular classroom teachers (35%), eight resource teachers (40%), and five teachers of self-contained classes of eight learning disabled children (25%). All of the resource and special class teachers had at one time been regular class teachers. Since the literature is sparse regarding creative characteristics of children who are learning disabled (LD) and who are gifted with learning disabilities (gifted/LD), the teachers' experiences were extremely valuable. Also, it was expected that the interviews would answer the fifth research question. Research question 5: Do teacher interviews disclose awareness of creative thinking characteristics in children who are

learning disabled or who are gifted/LD? Is there an interest in incorporating students' creative thinking strengths when individualizing instruction or planning cooperative group learning activities?

Seven questions formed the basis of the individual interviews:

Question 1. What are some examples of creative ways of thinking that you have noted in children over the years?

Fifty percent of these experienced teachers (four classroom, five resource and one special class teacher) had noted over the years that creative ways of thinking in exceptional children were: intuitive leaps, original insights, interpretation of events from a different point of view, ability to take disparate ideas and join them to create a new idea, an enjoyment of language and understanding of parody, satire, and other aspects of humour. Three special class teachers mentioned that creative children solved problems in non-traditional ways and were creative with manipulative materials in Math and Science. Three resource teachers were particularly aware of negative behaviours of creative thinkers such as their ability to manipulate adults, their unwillingness to fit in with the group, and their social difficulties with both peers and teachers. Also, three resource and one special class teacher were aware that some of these students had artistic or dramatic talents which they preferred to use instead of doing written assignments. was evident in the way the children made learning relevant to

their lives and thus thought of alternative ways of presenting their knowledge of a unit of study. One regular class, two resource and three special class teachers noted that rich imaginations led to a love for science fiction and "what if?" stories, a creation of original characters, an ability to trace or explain what might seem like a verbal tangent, and creative projects that went beyond what was expected. In fact, answers to the first question indicated that teachers in general were aware of creative ways of thinking in children. Further investigation was required in order to discern whether this knowledge made a difference in their teaching.

Questions 2a, 2b, and 3 were asked in order to determine the teachers' experience in noticing these creative thinking patterns in gifted children who had learning disabilities and in learning disabled children. These two groups of exceptional children were familiar to all of the teachers interviewed.

Questions 2a, 2b, and 3:

- 2a. What are some creative characteristics in very bright children with learning disabilities (gifted/LD)?
- 2b. What are some creative ways of thinking in average ability children with learning disabilities?
- 3. What are the noticeable differences in creative thinking characteristics between children who are LD and children who are gifted with learning disabilities?

Fifty percent of the teachers reiterated the creative thinking patterns from the first question when describing creative characteristics in very bright children with learning disabilities (gifted/LD). To these, three added that the gifted learning disabled children were well informed, good conversationalists, had a global perspective and were acutely aware of environmental concerns. Also, four resource teachers pointed out that, although these children had great difficulty getting fantastic ideas on paper and organizing time and space, they compensated so creatively for their learning disabilities that they hid their difficulties behind expertise in areas such as math, computers, story telling, and science. One classroom teacher and one self contained class teacher noted that some gifted/learning disabled students were not confident enough of their ideas to share them with classmates, that some had problems with relationships at school and at home, and that many of these children were noted to have behaviour problems because they became frustrated with their inabilities more quickly than slower thinking children. On the other hand, three resource teachers noted that gifted/learning disabled children had an inner awareness of their competencies. The knowledge that they had some strengths gave them more confidence, in general, than was evident in learning disabled children.

Creative thinking characteristics of learning disabled children (LD) who were average or above in intelligence as measured by the Wechsler Intelligence Scale for Children

Revised (WISC-R, 1974) or Woodcock-Johnson Psycho-Educational Battery (1977) were seen by one classroom teacher and two resource teachers as hindered in creative expression by the personal attitude that they were failures. As one regular class teacher explained, "The attitude, 'I can't do it' destroys or hinders their creativity before they even start." Two resource teachers and two regular class teachers noted that the LD children's ideas for stories were often creative, but, because editing was a mammoth job, they avoided written work preferring to demonstrate their creativity in drama, movement, art, and gym classes. Two resource teachers said that LD children plodded along doing what they were told, putting as much time into tasks as teachers allowed. They were not, they posited, more creative in their thinking than regular children; whereas, gifted/learning disabled children, they maintained, were as creative as gifted children who had no learning problems.

Several resource and special class teachers indicated that LD children were not interested in acquiring general knowledge or extensive vocabularies. Where gifted/learning disabled children often had strengths in oral verbal areas, they found that LD children required assistance clarifying ideas, following instructions and that they required models for creative and motivational thinking.

Eleven of the teachers interviewed felt that learning disabled children were not particularly original in their thinking. An interview excerpt captures this point:

The gifted/LD children are more inclined to act out something; their strengths are often in verbal areas. Whereas, the LD focus more on their problems and need a lot of reassurance; they seem to be deficit driven.

According to 75 percent of the interviewees, some LD children were able to give artistic expression to ideas orally, but in general they did not have the same enjoyment of language or sense of humour as gifted/LD children; they were slower to grasp concepts and their ideas were lacking in depth. Also, LD children, lacking in confidence, started projects at a less complicated level than the gifted/learning disabled and were more able to complete their products. The gifted/LD children, being more aware of their weaknesses, used clues to help themselves circumvent difficulties such as telling time or memorizing multiplication tables. Often, as one teacher noted, "they grabbed hold of a creative strategy and reused it," thus hiding their difficulties so well that they were able to perform almost at grade level fairly independently and slip by undetected".

Question 4.

At the present time, how do you use knowledge of an individual's creative characteristics when planning lessons for him or her? What difference does it make to the materials you choose or the structure of the lesson?

All 20 teachers stated that knowledge of creative thinking patterns would be helpful in planning lessons,

choosing materials and in teaching these exceptional children. Since creative thinkers do not need the expansion of ideas, five teachers stated that the "approach to teaching" would involve less exposition, more discovery, and open-ended exercises. These children, they continued, required both structure and challenge. As one resource teacher pointed out, "Once they shine and feel confident, (a teacher can) slowly introduce what they (the children) need while using their interests and strengths."

Within the structure of a unit of study, the children would be given freedom and flexibility; for example, flexibility in how to share their product with the group and freedom to choose which five of the eight assignments they wished to complete. Because of personal organizational problems, the children would require guidance in apportioning their time so that work would be done on areas of deficit as well as areas of strength and talent.

Several teachers suggested that challenges or problems be posed before teaching how to solve them, thereby allowing the creative thinkers to generate ideas for problem solving and to "give them opportunities to show their talents." Three resource persons suggested that teachers be scribes and editors for children with written language difficulties so that these children "would not feel confined by their disabilities but be given freedom to be creative". If reading were the main problem, one resource teacher suggested that access be given to information through tapes,

discussions, lectures, television and human readers. Materials should be varied, challenging, relevant, and explanations unsimplified because "these children seem to be motivated once they are challenged and aware of the purpose of a lesson."

If not given satisfactory rationales, the gifted/LD children make teachers accountable by constantly questioning them. Bright LD children, four teachers noted, hate repetitiveness; therefore, teachers themselves must be creative in disguising the same old questions, problems or concepts. These children learn through different avenues such as "hands on", drama, and art. Also, by appealing to the children's creative imagination and fantasy, teachers can help them to solve problems from a different perspective, for example, as one teacher explained, from the inside as a character in the history lesson or math question.

Question 5.

Would it be helpful to know the creative thinking patterns of exceptional children in your class whether they are gifted, learning disabled, or gifted with learning disabilities?

When asked whether it would be helpful to know creative thinking patterns of exceptional children in their classes, 15 teachers (75 percent) said it would, because such knowledge would assist them to program individually, to look at the children in a positive way seeing beyond the messy

desk, clothes and work habits, to get more from the students, to recognize areas of learning needs they might not have thought of, and to save valuable time in discovering the creative thinking abilities of these children.

Of the five teachers who said that it would not be helpful to know the creative thinking patterns of the children, four were resource teachers. These teachers were afraid such knowledge would negatively colour everything the children did and they did not want to teach to that bias. They would prefer, instead, to allow the children to show what they could do and be all that they could be. One classroom teacher felt that such information would be helpful in areas of talent, but not in academic realms.

It was apparent that teachers were knowledgeable in differentiating curriculum for children they were told were creative thinkers and for children they discovered through teaching to be creative in their thinking patterns. Did they, as well, recognize in their classes children who were gifted with learning disabilities with whom they might use these strategies, approaches and materials?

Question 6.

How do you know that you might have in your class a child who is gifted with learning disabilities?

The characteristics of gifted/LD children that three special class teachers found outstanding were a higher level

of thinking and insight than classmates, but "the mechanics and conventions of the high achieving student were missing " (spelling and sentence structure). The gifted/LD liked to do what they could do and four classroom, six resource and two special class teachers maintained that their oral participation was usually better than written work. These students, good conversationalists and discussants, were able to expand strategies they found helpful. Orally, they were able "to run with an idea, elaborating it and extrapolating from it." When it came to reading and written work, three resource teachers noted that these children struggled with the fact that they could not do something that others less intelligent could do well.

Gifted/LD were recognizable by discrepancies, for example, reasoning might be significantly higher than perceptual skills. Four resource teachers noted general knowledge and in-depth interpretation of situations might contrast with inability to read and spell at grade level. Four classroom and two resource teachers noticed that creativity often showed in math where different ways of structuring information assisted them to problem-solve intuitively without going through the steps teachers were expecting. These children were not motivated to work repetitively on math concepts already mastered. Four regular class, two resource and two special class teachers noted intuitive problem solving, imagination, creativity in art work and math and a keen sense of humour in children who were

gifted with learning disabilities.

Question 7.

Is there anything that you would like to add?

When the teachers were encouraged to add comments at the end of the interview, the request repeated by three classroom, five resource and two special class teachers was that more inservice was needed for administrators, classroom teachers, and teachers of gifted children in elements of recognition and programming for children who were both gifted and learning disabled. More resources were needed to assist teachers to adjust their programs and to assist parents to understand how important it was to challenge their children intellectually as well as to show their children how to compensate for their learning difficulties. Enrichment and LD Resource teachers needed, they said, to learn from each other and to co-plan for these children. In the Boards which provided enrichment for children who were gifted/LD and in which co-planning was not evident, some classroom teachers objected to children being "rewarded" with enrichment activities when classroom assignments remained incomplete.

A further comment made by five resource teachers and one regular classroom teacher was that educators must listen to what children say on an affective level. In one school where there was a teacher designated to make time to listen to children's frustrations and negative feelings, to create, talk and plan with them, playground aggression dropped

noticeably. An advocate in a school could deal with students' social difficulties "which often spring from lack of organization and from falling short of their own and teachers' expectations." A suggestion made several times was that administrators set up a double-headed special education program which would both challenge the children intellectually and remediate their weaknesses.

One regular class and three resource teachers suggested that gifted/LD children might be identified more readily if teachers did not label as "gifted" the hard working teacher-pleasers but instead, the pupils who were bored with repetition and who thought deeply. Teachers might learn to look at what these children were doing in computers, art, or drama where creativity and giftedness might be more evident. Several suggested that teachers needed to look beyond the spelling to the "WOW's", the creative act. Once identified, the gifted/LD children, they posited, could be taught through their strengths to read and write and to become socially aware in interactions by being taught how to learn efficiently and effectively in an environment where motivational and organizational techniques were built into the lessons.

Summary

Teacher interviews in four Ontario Boards of Education disclosed an awareness of creative thinking characteristics in children who were gifted and gifted with learning disabilities but less so in children who were learning

disabled. Several teachers of the learning disabled children were not interested in knowing the children's creative potential in order to individualize instruction because they felt under pressure to remediate deficits in the little time allotted to work with the individuals. The assumptions underlying their programming seemed to be more reductionist than constructivist. The regular classroom teachers maintained that knowledge of creative abilities would be helpful in motivating all three types of exceptional children by utilizing their interests and strengths as quickly as possible. Responses from individual interviews suggested that most of the teachers had a constructivist, interactive, dynamic teaching perspective which centred on willingness to develop the whole student, regular or exceptional, by becoming aware of strengths as well as weaknesses (Poplin, 1988; Vygotsky, 1978). Most teachers had experience in differentiating instruction for individuals and welcomed a study which would assist them and their colleagues to recognize and to utilize children's creative strengths while addressing their learning needs.

The following chapter examines, interprets and qualifies these results. Educational implications suggest how this study helped to identify gifted/LD and to promote more effective programming for children who are gifted, LD and gifted/LD.

Chapter 5

SUMMARY AND CONCLUSIONS

Addressing the five research questions proposed in the introduction and refined in chapters 2 and 3, this study adds to the literature by utilizing the Clark/Torrance theoretical framework to examine cognitive and creative differences among the three groups of exceptional children. Clark's Creativity Circle (Figure 2.1) was used to integrate the literature on characteristics (Figure 2.3) and also the creative thinking literature particularly from the perspective of Torrance (Figure 2.2). In addition, the creative thinking ability research has been extended from gifted children to those who are learning disabled (LD) and gifted with learning disabilities (gifted/LD).

Cognitive abilities were examined by analyzing profiles of the subjects who had been administered the Wechsler Intelligence Scale for Children - Revised (WISC-R)(1974). Creative abilities were examined by analyzing the performance of the three groups of thirty students on figural forms (Torrance Tests of Creative Thinking, Figural Form B, 1990) and on creative stories set twenty-five years in the future (FSW), an adaptation of the work by Torrance and Torrance (1978). Since conclusions would effect a change only if teachers recognized creative thinking and its value in differentiating curricula for these children, twenty teachers

from four Ontario Boards of Education were individually interviewed.

To determine whether there were WISC-R patterns which might differentiate the three groups of exceptional children (question 1), two descriptive discriminant analyses (DDA) were conducted and followed by variable ordering. In the first DDA, intelligence significantly separated the gifted and gifted/LD groups from the LD group with the Full Scale variable as the most important discriminator with the Verbal and Performance tied for second in importance. The lack of Verbal/Performance discrepancy for any of the groups was consistent with the findings of Waldron and Saphire (1990).

The second DDA analyzing six subtests of the WISC-R significantly separated all of the groups. Reasoning, awareness and observation assessed by the subtests Block Design, Comprehension and Information, correlated with the first function separating the gifted and gifted/LD from the LD group. The order of the most important discriminating variables were Block Design and Comprehension, then Information tied with Digit Span.

In the second function, manipulation of arbitrary symbols in sequence within short term memory, assessed by the subtests Arithmetic, Digit Span and Coding, separated the gifted/LD from the gifted as well as from the LD. The discriminating variables in order of importance were: Arithmetic, Digit Span tied with Coding followed by Comprehension. Since the means on the first three variables

for the gifted/LD were "average", 12, 10 and 10, this study confirms the findings of Kaufman (1979) who emphasized the importance of assessing a student's own average on the WISC-R subtests in determining whether he or she might be gifted/LD (Appendix K). Waldron and Saphire (1990) had noted in gifted/LD students a significantly more frequent occurrence of the Organic Brain Syndrome factor (Wechsler, 1974) which comprised Digit Span, Coding and Block Design. In this study, however, Block Design loaded as a strength for children who were gifted and also for those who were gifted/LD. Findings were consistent with those of Barton and Starnes (1989) who reported that gifted/LD were "most similar to the gifted on Verbal Conceptualization measures and deviate most from the gifted on Sequencing measures, most notably Coding." (p.26). In this study, the addition of variable ordering (Thomas, 1992; Thomas & Zumbo, 1993), placed Arithmetic as a more discriminating variable than Coding in separating the gifted/LD from the LD group.

There were cognitive patterns, then, in the WISC-R which identified differences among the three groups of children. The discrepancy for LD and gifted/LD children was not between Verbal and Performance Scales, but rather in their own subtest patterns of strengths and needs. For example, the gifted/LD were similar to the gifted in reasoning, awareness and observation skills as assessed by Block Design, Comprehension and Information. They were also similar to the LD in manipulating arbitrary symbols in short-term memory as

assessed by Arithmetic, Digit Span and Coding. There were only five LD children in this study who had Verbal/Performance discrepancies. Three were high Verbal/low Performance and two were high Performance/low Verbal. It is important for psychometrists to administer the optional subtest, Digit Span, since it loaded with Arithmetic and Coding to discriminate gifted/LD from gifted children. Using the criteria derived statistically from the grouped students on the WISC-R, approximately 86 percent of the ninety subjects were correctly classified (Table 4.9, p.93).

Conclusions drawn from the data on creative thinking derived from both the TTCT and FSW should be helpful in identifying children who are gifted/LD (question 2). The DDA and variable ordering of six predictors of the TTCT significantly separated the gifted from the LD and gifted/LD on the basis of creative thinking characteristics. In order of importance, the variables were: Abstractness of Titles, a tie between Fluency and Elaboration, Creativity Index then Resistance to Premature Closure. When examined within the Clark/Torrance theoretical framework, the three most important predictors were cognitive aspects of creativity (Figure 2.2, p.23).

Within the theoretical framework of the Clark/Torrance model, there were differences and similarities between the groups of exceptional children on the TTCT. Although there was not much evidence of HUMOUR in any drawings, it was most evident in those of the gifted/LD. The gifted group was

strongest in the THINKING strength, expressiveness of titles; whereas, the gifted and gifted/LD were fairly similar in most other aspects, with the gifted/LD stronger in combining and synthesizing. In FEELING too, the gifted and gifted/LD were similar, with the gifted/LD slightly stronger overall. In INTUITIVE strengths, the LD group performed quite well on figural completion tasks. For example, the LD group was comparable to the two gifted groups in extending boundaries and unusual visualization and slightly better in expressing fantasy. In the PHYSICAL SENSING category, the gifted group was strongest in expressing movement and comparable to the gifted/LD in expressing richness of imagery; whereas, the LD group was comparable to the two gifted groups in colourfulness of imagery and stronger in internal visualization.

A summary of the comparison of the three groups on these creative thinking strengths is available in Appendix N. On the TTCT, awareness of differences in synthesizing and combining, humour and expressing feeling values in form completion may assist teachers to distinguish LD from gifted/LD children.

The creative characteristics which emerged on the Future Scenario Writing (FSW) added further insight in this regard. Also, through the FSW and Clark/Torrance theoretical framework, information was added to the literature regarding the integration of mind functions in the three groups of exceptional children (question 3).

In scenario writing, the gifted students were the most fluent thinkers. However, it is important to note that correct spelling was not required of any of the students. The LD and gifted/LD wrote scenarios 42 and 67 percent, respectively, of the length of those of gifted students. The gifted group was particularly strong in expressing fantasy, positive and negative feelings, and the three aspects of physical sensation: noting movement, describing visually and listening perceptively.

The gifted/LD group was strong in comparison to the other groups in elaboration of the story line giving a rich context and in expressing that they felt in control of their lives.

In the feeling aspect of creative thinking, the LD group was able to express positive and particularly negative feelings about themselves and/or the future. Within the scenario framework, the same few number of students felt in control of their lives as felt controlled by others or circumstances. Also, the LD group was able to express only some evidence of such aspects of creative thinking as an intuitive and unusual point of view and intuitive fantasy which were definite strengths of the gifted group. On the FSW, the LD group, relative to the other groups, did not show strengths in expressing humour, or cognitive aspects of creativity.

The theoretical framework, then, was valuable in grouping the creative thinking patterns of the three groups

in order to identify strengths and needs. Also, the Clark/Torrance model clarified whether the gifted/LD were more similar to the gifted or to the LD in patterns of creative thinking (question 4) (see Appendix N).

In the HUMOUR category, although there was not much evidence of humour in the drawings on the TTCT, it was most evident in those of the gifted/LD. In the FSW, there was a trend for the gifted to be stronger in humour than the gifted/LD who were in turn stronger than the LD (Appendix N). It is concluded that the gifted/LD were more similar to the gifted than to the LD in expressing humour.

FEELING was not expressed as a strength on the TTCT for any but a few gifted/LD students (Figure 4.4a); however, when strengths and some evidence were combined (Figure 4.4c), the gifted/LD continued to be stronger than the LD but only slightly stronger than the gifted children. On the FSW, four aspects of feeling were examined: positive, negative, feelings of internal control and of being controlled (as expressed in future scenarios). There was a trend for the gifted to be stronger than both the LD and gifted/LD and for the LD to be stronger than the gifted/LD in positive feelings about themselves and/or the future. In negative affect, the gifted were only slightly stronger than the LD, much stronger than the gifted/LD and there was a trend for the LD to be stronger than the gifted/LD. In feelings of internal control, there was a trend for the gifted/LD to express these feelings most often in their scenarios. There were few

children who felt controlled by others or circumstances, but interestingly, this was expressed by more gifted than gifted/LD students. It is concluded that the gifted and gifted/LD were not similar in expressing feelings. The gifted/LD were stronger in the TTCT (EE); whereas, on the FSW, except for internal control, the gifted and LD children expressed most positive and negative feelings. Possibly educators need to address with more care the affective needs of all three groups of exceptional children.

In the PHYSICAL SENSING category on the TTCT, the gifted and gifted/LD were similar in expressing richness of imagery and colourfulness of imagery. Both the gifted and LD tended to be stronger than the gifted/LD in visualizing beyond exteriors examining to the internal working or dynamics of 'things'. The gifted group tended to be stronger than both other groups in expressing movement or action. Thus, in completing figures, the gifted and gifted/LD were similar in imagery but not in internal visualization or expressing motion. In the FSW, the gifted group tended to be stronger than the LD in sensing movement, sensing visually and sensing auditorially. Also, the gifted/LD tended to be stronger than the LD in these variables. When compared to each other, the gifted tended to be stronger than the gifted/LD in sensing visually and in sensing auditorially and was slightly stronger in sensing movement. Examination of Figures 4.4c and 4.5c suggests that the gifted and gifted/LD are more similar in physical sensing as expressed on the FSW than on

the TTCT.

Within the THINKING category on the TTCT, the gifted were strongest in expressiveness of titles. The gifted were slightly stronger than the gifted/LD in storytelling articulateness, and the gifted/LD were strongest in synthesizing incomplete figures and slightly stronger than the gifted in synthesizing circles. In the FSW, the gifted and gifted/LD groups were stronger than the LD. When compared with each other, the gifted were slightly stronger in expressing cognitive factual information and tended to be stronger in cognitive problem solving; whereas, the gifted/LD were slightly stronger than the gifted in cognitive elaboration of a story line. Generally, in cognitive aspects of creative thinking, the gifted/LD were more similar to the gifted than to the LD children.

In INTUITIVE aspects of creativity on the TTCT, the three groups were fairly even in extending boundaries or remaining open long enough to permit the mind to make mental leaps. In expressing fantasy, the LD children were slightly stronger than the gifted and the gifted/LD children. Both the gifted and LD children were stronger than the gifted/LD in unusual visualization. On the FSW, the gifted tended to be stronger than both the LD and gifted/LD in intuitive and unusual point of view and in expressing fantasy in their scenarios. The LD were slightly stronger than the gifted/LD in expressing an intuitive and unusual point of view. It is concluded, then, that on the TTCT, the LD children showed

creative strengths in intuitive aspects of creativity and on the FSW, intuitive strengths tended to be strengths in gifted children.

When the creative thinking patterns on the creativity tasks were examined through the Clark/Torrance framework, it was concluded that strengths of the groups varied with the task requirement. Hence, both tasks should be included in a dynamic assessment.

Teacher Use of Creative Thinking Patterns

Analysis of twenty individual teacher interviews across four Boards of Education showed that classroom teachers, special class teachers and resource teachers were familiar with the three types of exceptional children in the study and had an in-depth knowledge of creative characteristics in areas of thinking, feeling, intuition and humour. Although the teachers did not mention physical sensation per se, they noted that gifted/LD children in particular, learned through such different activities as "hands on", drama and art using imagination and fantasy.

Several teachers stated that learning disabled children were not creative but "plodders", unimaginative in products that were not as creative as those of either the gifted or the gifted/LD children. As for the latter group, teacher knowledge concurred with the findings of this study in that there were similarities between gifted and gifted/LD in many creative behaviours. In contrast to teacher experience,

however, this study found strengths in learning disabled children in creative characteristics which required intuition and also which expressed feeling values.

Fifteen of the twenty teachers interviewed (75 percent), expressed a need for advance knowledge and awareness of creative potential in order to individualize instruction. Of the five teachers who said that it would not be helpful to know in advance the creative thinking patterns of children, four were resource teachers who were afraid such knowledge might encourage them to prejudge what a child was able to do. These teachers wanted to discover, through teaching, the thinking patterns in the children they were assisting. Also, they felt under pressure to remediate deficits of LD and gifted/LD children in the little time allotted to them to work with individuals. One classroom teacher felt that such information would be helpful in areas of talent but not in academic realms.

All of the teachers interviewed stated that knowledge of creative thinking patterns, whether derived from assessment or diagnostic teaching, would be helpful in planning lessons, choosing materials and in differentiating approaches for the three groups of exceptional children. Most of the teachers had a constructivist or interactive dynamic teaching perspective which centred on a willingness to develop the whole child. They were prepared to look beyond the poor spelling and sentence structure to the creative abilities of the gifted/LD children. Recognizing that these children

required a challenge while they were being taught how to read, write sentences and plan essays, the teachers recommended co-planning of enrichment and LD resource personnel. Once strengths and interests were identified, they posited, the gifted/LD children could be taught through their strengths and could become effective, efficient learners. These teachers were ready to integrate the models of Torrance and Clark for children identified as gifted with learning disabilities.

In summary, teacher interviews disclosed more awareness of creative thinking in children who were gifted and gifted with learning disabilities than in children who were learning disabled. Such lack of awareness may be due to the paucity of studies on creative thinking of LD children and/or low teacher or student expectations. Most teachers had experience in differentiating instruction for individuals and therefore welcomed a study which would assist them in recognizing and utilizing the creative strengths of their students while addressing educational needs in order to optimize learning.

Assumptions and Limitations

There were several assumptions underlying this study. One was that the Identification, Placement, Review Committees in the four Boards had accurately identified each of the three groups of children: gifted, learning disabled and gifted with learning disabilities. Another assumption was

that the two creativity instruments used were valid. It was assumed also that the ninety children performed as creatively as possible. Finally, it was assumed that the twenty teachers interviewed were typical of teachers who work with these three types of exceptional children.

Each assumption imposed a limitation on the study. The four Boards had identified the children who were gifted and learning disabled. Some of the gifted/LD children had been doubly identified; however, many had not. The assessment personnel in consultation with the teachers decided which of the gifted children had learning disabilities and which of the learning disabled children exhibited gifted behaviours.

An effort was made to address potential limitations of using the TTCT and FSW as creative thinking instruments. The literature shows that the TTCT is a reliable and valid measure of creative thinking. The FSW was adapted for this study as a measure of creative thinking in story writing. Once codes had been established, to ensure consistency, the researcher coded all 90 scenarios three times, one week apart, without reference to previous coding. Also, to ensure fairness, given the three different ability groups, the writers were not required to spell correctly and were given a choice of producing their scenarios by hand, on the computer or on audiotape. For cross-rater reliability, creative thinking characteristics were described to three judges who subsequently coded several scenarios written by children in each group. Their agreement with the researcher was 83.3

percent, 91.6 percent, and 68.2 percent averaging 81 percent which is in accordance with published reliability reports of protocol analyses (Ericsson & Simon, 1984).

When each Board was asked to name five teachers who would be willing to discuss creativity, it was expressly requested that the teachers not be drawn from the gifted program but from regular classrooms, resource rooms or special education self contained classes. Because of the recent emphasis on inclusion of exceptional children, it was assumed that these three kinds of teachers would be typical of those who work with all three types of exceptional children and that they would not be especially trained in recognizing creative thinking characteristics. It is not known whether Board personnel chose outstanding and knowledgeable teachers or whether the knowledge exemplified by the twenty teachers was typical.

Contributions and Educational Implications

The cognitive and creative thinking characteristics which differed among the three groups provide guidelines to enable assessment personnel and teachers to distinguish more accurately children who are gifted/LD from those who are gifted or are LD (see Appendix N). By effective programming, teachers will be able to counteract feelings of school failure and low self-esteem in all three groups.

Looking beyond what the children cannot do, teachers will be more conscious of the importance of utilizing student interests and creative strengths as they individualize curricula and plan cooperative learning activities to optimize integrative learning for children who are gifted, learning disabled and gifted with learning disabilities.

Since the WISC-R (1974) assessed merely cognitive functioning, it was only after administering tasks which required creative thinking that potential strengths were identified in many of the subjects. Both the TTCT (1990) and FSW might be utilized to assess the creativity domain which Lupart (1990) recommended especially for a gifted/LD assessment, "since this domain is one in which G/LD students often excel in compensation for poor performance in certain academic areas" (p.7). The holistic/contextual approach (Poplin, 1988) moves the diagnostician away from the characteristics of the learner to the interactive effects of sources of influence on any given learning situation (Brown, Bransford, Ferrara & Campione, 1983).

This study contributes data on two domains, intelligence and creativity. On the WISC-R (1974), both the gifted and gifted/LD group were significantly higher than the LD in global intelligence. The discrepancy for both LD and for gifted/LD was not between Verbal and Performance Scales but between discriminating subtests. LD children in this study fell into three groups: three with high Verbal/low Performance, two with low Verbal/high Performance and twenty

with average difference between the Verbal and Performance Scales. The gifted/LD were comparable to the gifted in Block Design, Information and Comprehension but were significantly lower than the gifted in Arithmetic, Digit Span and Coding. Although the mean scaled scores for these subtests were 12 and 10 which is considered average, these scores were significantly below the gifted/LD students' own averages (Appendix K, Kaufman, 1979). The LD group was significantly below the gifted on all six subtests.

Because the study adds information to the studies of the creativity domain, knowledge of differences should be helpful in identification and also in programming for all three groups of exceptional children. The gifted group was highest of the three in creative thinking characteristics. On both the TTCT and FSW, it was high in cognitive creative characteristics, and on the FSW this group was high in expressing humour, intuition, feelings and physical sensation. This finding confirms those of Clark (1986, 1988) who found that creativity was released by integrating all mind functions. It is evident that gifted children require stimulating and enriching hands-on experience such as computer simulations, rocketry, and magic (Hishinuma, 1991) where they can use their advanced problem solving skills, distinct learning styles, independence, initiative and intense curiosity (Wees, 1990). The wise teacher will create opportunities to spotlight the humour of gifted children and to deal sensitively with any possible tendency to feel

inadequate because of perfectionism or other debilitating factors.

On the TTCT, learning disabled children showed potential in expressing intuitive aspects of creativity and on the FSW, they were able to express positive and particularly negative feelings about themselves and the future. They were not strong in the FSW, however, in any aspect of sensation: sensing movement, sensing visually or auditorially. By encouraging LD students to express their feelings and risk intuitive thinking, teachers can improve their students' personal efficacy and sense of achievement. As well, through teaching visualization, listening perceptively and through physical movement, teachers can attend to students who require direct, multisensory instruction of sound/symbol relationships, new concepts and metacognitive learning strategies.

When an assessment confirms that a student is gifted/LD, programming should take into account those areas in which creative aspects resemble those of the gifted such as humour, cognition and physical sensation. Like the gifted, the gifted/LD require enriching and stimulating hands-on experiences where they can use their problem solving abilities, independent research skills, initiative, intense curiosity, ability to elaborate a story line and to make decisions about their lives. In addition to enriching challenges, the gifted/LD require structure. In a therapeutic climate (Rawson, 1992), they need to be shown how

new learning is tied to previous knowledge, how to develop strategies for coping with the demands of the curriculum and how to develop metacognitive and executive strategies which allow them to monitor and evaluate their own work (Ellis, Deshler, Lenz, Schumaker & Clark, 1991; Miller, 1991).

For the gifted/LD, some teachers structure various skill objectives through theme selection leading to completion of term papers or research projects with particular emphasis on critical thinking and research skills (Hishinuma, 1991). Others use contracts, computer simulations and well-supervised learning centres which allow them to choose activities and to interact with peers (Wees, 1990). Co-planning of enrichment by regular teachers and LD resource personnel with the students themselves can enhance student self-image through more focused creative expression.

Results suggest that these three groups of students are different learners. If inclusion is to meet their educational and affective needs, classes will have to be small, inservice will have to be available to teachers and administrators, and resource personnel will have to be made available to regular classroom teachers. Only through coordinated, consistent support will teachers be able to help different learners develop in the creativity domain.

Suggestions for Further Research

Further research is needed to confirm the creative thinking patterns which emerged on the adaptation of Future

Scenario Writing (FSW), and the academic and affective results of enhancing the creative abilities of these groups of exceptional children. Also it is important to determine whether knowledge of creative strengths assists teachers to distinguish LD from gifted/LD children and whether the resulting differentiation in programming is more effective in meeting the needs of these children. Will self-concept be enhanced in gifted, LD and gifted/LD children when their creative abilities form an integral part of their curricula?

The present study should assist teachers and clinicians to identify creative thinking differences between gifted and LD, gifted and gifted/LD and gifted/LD and LD children whether they are in regular classrooms, gifted programs or learning disability resource classes. With appropriate educational procedures in a therapeutic climate where interests and creative strengths are considered, these students should perceive school to be less an experience in failure. With heightened self-esteem and recognition of their creative production, these exceptional children may well remain in school and hence develop and realize their full potential.

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		Sensing Types		Intuitive Types	
		With Thinking	With Feeling	With Feeling	With Thinking
INTROVERTS	Judging	I <u>S</u> T J	I <u>S</u> F J	I <u>N</u> F J	I <u>N</u> T J
	Perceptive	I <u>S</u> T P	I <u>S</u> F P	I <u>N</u> F P	I <u>N</u> T P
EXTRAVERTS	Perceptive	E <u>S</u> T P	E <u>S</u> F P	E <u>N</u> F P	E <u>N</u> T P
	Judging	E <u>S</u> T J	E <u>S</u> F J	E <u>N</u> F J	E <u>N</u> T J

- I = Depth of Concentration
 S = Reliance on facts
 T = Logic and analysis
 J = Organization
 F = Warmth and sympathy
 N = Grasp of possibilities
 P = Adaptability
 E = Breadth of interests



The University of Georgia

College of Education
Torrance Center for Creative Studies
Department of Educational Psychology, Research and Measurement

April 23, 1991

Dee La France
330 Stone St. So.
Gananoque
Ontario K7G2A4
Canada

Dear Ms. La France:

I enjoyed talking with you about your research. It sounds very interesting!

Enclosed are the materials related to (1) our scenario competition, and (2) our research using scenarios. Feel free to use what you can.

I'd be most interested in reading your results. A qualitative analysis of this sort of data could be fascinating.

Please don't hesitate to call if I can be of any further help.

Sincerely,

Vicki Connell
Assistant Director
The Torrance Center for Creative Studies

VC/ay

Enclosures

Appendix C Examples of Future Scenario Writing

- #61 = Gifted female age 12
- #39 = LD male age 12; some spelling corrected
- #47 = LD male age 14; uncorrected
- #11 = LD female age 11; spelling corrected
- #06 = LD male age 11; spelling corrected
- #41 = Gifted/LD male; uncorrected

+ #61 F 7 16.07.79 12yrs Exc 1 Wr. 698
 The Jungle Sickness 699
 It is the year 2016. Renee 700
 Popadopolas is a prosperous lawyer. 701
 The 37 year old has 4 children, 2 702
 pairs of twins both boy/girl, 1 pair 703
 12 the other 6. She has been divorced 704
 only once. She lives with her 705
 children on a peaceful hobby farm in 706
 the country near the city of Cameron, 707
 Canada. 708
 Canada has been one of the main 709
 countries that has helped to clean up 710
 the air and water. Now the air is only 711
 the slightest bit polluted and the 712
 water has very little if any pollution 713
 at all. Zebra mussels are now one of 714
 the main problems in the world of 715

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 at all. Zebra mussels are now one of 714
 the main problems in the world of 715

CE

AEP

AEP

CF

#61

Fluency	— 1
Title	— 2
AI	— 1
AEP	— 2
CF	— 2
AEN	— 2
H	— 1
IPV	— 2
CE	— 2
CP	— 2
SA	— 1
SM	— 1

water. She is far away from the continent of Europe. (Europe is the only continent that is not at peace). Her life seems perfect but now let's take a closer look and see if her life really is as perfect as it looks.

"Mommy, do we have to go to school? The government says it's our choice!" "Now, now, the government says it's your parents choice, Stacey and Steve. Anyway you're only 6 and it's impossible for you to know whether you like school or not."

"Hurry up Stacey and Steve, we're heading out now."

"OK we're coming. Bye Mommy See you after school."

After watching the 12 year old twins, Shawn and Shawnocey hustle the 6 year old twins, Steve and Stacey out the door, Renee begins to load her hovercar for work. On her way to work, Renee thinks how lucky she is. None of her children have been struck deathly ill and all 4 were doing well at school.

When she arrives at work she receives a message from her secretary. The school has phoned and said that Stacey is not feeling well and wishes to be taken home. Renee being a mother is slightly worried and takes the day off. She hops into her hovercar and zooms to the school. When she arrives there, Stacey has gone into convulsions and the paramedics have arrived to take her to Cameron Hospital. When she gets there a doctor takes Stacey to a room and the convulsions stop within the hour. The doctor comes out and pulls Renee aside.

"We've examined her and our conclusion is that she has jungle sickness of the toes." (This may sound strange but remember this is the year 2016). The doctor continues, "The medicine is very rare and can only be found in the BC rainforest. We have already sent for it. It will take 2-3 weeks to get from BC to here. For now we're putting her in with another girl who has the same sickness. If you like you can stay although there is a chance you will catch it." Renee

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stays and within the next half hour the doctor has informed her that there will be a delay, "The loggers are clearing a runway for the plane, and someone thinks the boss may have cut the tree the medicine comes from down. The loggers aren't bad, they are very distraught over it. Their boss is money hungry." Renee stayed with her daughter day and night. Stacey's roommate was getting quite sick and the jungle sickness eventually spread through her whole body. She took a cardiac arrest while eating and died. Renee started getting more and more distraught. Eventually the medicine came but alas Stacey had to have it converted to a capsul. The day the capsul was ready Stacey took a cardiac arrest. The doctors worked hard and kept her alive. She took the capsul which killed all bacteria except the bacteria in the two toes where it started. She had them amputated. Renee who hadn't slept for days went to her house and lay down to sleep. When she woke up she decided to devote the extra time she had to save the rainforest. THE END

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4 #39 M 7 11.11.79 12yrs Exc 2 PC.

The Future

The year is 2016. The world is peaceful. There has not been a war for 26 years. Because of scientist Todd. Todd was the scientist in the world. He invented everything in the town. Well just about everything. All the people in the town thought Todd was great, and a little weird. Todd spent all of his time on fixing things.

Todd thought that a floating town would be great. But Todd said there would not be enough power to make it float in the air. So he thought of air like the stuff you breathe. He said he could make the whole town float if he did it house by house. Then after he got everybodys consent on it, he did it. It took him 3 years to do it himself. Todd made the houses really weird. The people asked, "why are the houses so weird?" Todd said, "Because they have to be that way to stay in the air."

Then he thought of transportation. So he made air boards, an anybody who was caught with a car they would be sent to jail for 1 year, and if they got couit driving a car or any vehicle it would be 5 years.

Then Todd made everything run on a computer. Each house would have their own computer to run their house. The kids were taught school by computers. The computers would teach them. Then he made the air mail, you just tell the computer where you want the mail to go, and the sling shot would take care of the rest. To receive the mail there would be a baseball glove to catch it. Then the mail would go in the building and, an air run arm would bring it to the guy in the building.

Todd was the busiest man in the world. Todd lived happily ever after. The End.

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AEP x # 39

Fluency 1

Title 1

AEP 1

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IPV 2

CE 1

AIn

IF IPV

CP

AIn

CP

CE

IPV

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+ #11 F 6 22.08 80 11yrs Exc 2 Wr.	153
The Christmas Challenge It is year	154
2016 in December. 25 years in the	155
future is not very exciting, all you	156
really do is watch 3-D T.V. and eat	157
food capsules. Oh you probably don't	158
know what food capsules are they are	159
capsules that tasted like food.	160
My name is Arran my husbands name is	161
Bod I've got two kids named Maghan and	162
Shora. Christmas is coming and no one	163
is in the Christmas spirit and I mean	164
No one! and I'm going to try to	165
change that, but I only have three	166
days till Christmas.	167
I started by putting Christmas light	169
all over the city. I was sure that	170
would work, but when I woke up the	171
lights were gone. At night I went	172
Christmas caroling but they just	173
slammed the door in my face. I was	174
starting to get worried. There was	175
only one thing left to do. I hired	176
ten hundred people to dress up in	177
Santa Claus suits and go door to door	178
and tell them what Christmas is really	179
about. It was my only hope it had to	180
work and it did people brang out their	181
Christmas trees out and go shopping	182
for presents and Christmas cooking	183
capsules. Christmas was back for	184
ever.	185

+ #47 M 8 26.12.76 14yrs Exc 2 Wr. 1094
 (as is) 1095
 It's the year 2016. I wander this 1096
 decayed world looking for a job to 1097
 keep me alive but no ones looking for 1098
 a animal doctor in these times. I 1099
 remember when people were conserved 1100
 about animal, for that matter about 1101
 life but now all animals are almost 1102
 endangered. 1103
 I've seen a lot of things as I've 1104
 travelled thats made me think, what 1105
 has are world become? It's become a 1106
 victim of the human lifestyle. We 1107
 have been destroying the world since 1108
 it was created and now it's caught up 1109
 with us. We have finally run out of 1110
 trees and are lakes are unfit to swim 1111
 in. 1112
 I remember when the family would go 1113
 down to the lake, for the day, and go 1114

 swimming and now all I have is 1115
 memories. When I was little, some 1116
 people where nice, now we have a world 1117
 of death and hate. Sometimes I feel 1118
 like committing suicide but I always 1119
 seem to find a reason to stay on this 1120
 dump of a planet. 1121
 The air is almost unbreatable, it's 1122
 like smoking a pack of cigeratts a 1123
 day. And you would be crazy to syay 1124
 in the city for the night, by morning 1125
 youwould be cripple or dead. To 1126
 survive in these times you don't trust 1127
 anyone, you don't know anyone, it's 1128
 you and you alone. 1129
 I haven't found a job for 2 weeks and 1130
 I'm on the brink of starvation. I 1131
 just hope my next job isn't as sick as 1132
 the last one. My last job a puppy had 1133
 falien into the lake and was covered 1134
 in oil, a little girl saved it and 1135
 brought it to me. I had to shave the 1136
 puppy or else it would have died but 1137
 it didn't make any difference. He had 1138
 swallowed too much oil so as he looked 1139
 at me with thoughts feared brown eyes I 1140
 shot him. We use to have so much but 1141
 now we have so iittle. Everyone 1142
 thought are world would be so modern 1143
 but look what modern has done to us. 1144
 I notice a eagle on the tip of a 1145
 mountain and I wonder how he feels as 1146
 as he scouts the world and as I look I 1147
 see him lower his head. 1148

+ #06 M 5 05.11.80 11yrs Exc 2 Wr. 101
 December 10, 2016 102
 My name is I am 35 years 103
 old. I am a hockey player. I am 104
 married I have four boys and two 105
 girls. My teammates are Louie the 106
 great one. We play for Ottawa 107
 Senators. I live in Ottawa. Many 108
 things have happened since I was 11. 109
 Such as we have discovered aliens they 110
 are friendly. We have discovered a 111
 way to replace the ozone and it won't 112
 melt. I am going to my hockey game. 113
 We are the best in the hockey league. 114
 We are playing the LA Kings. I play 115
 right wing. Louie plays centre. We 116
 haven't lost a game yet. The game 117
 starts. Louie passes to me I break the 118
 defence I pass to Maertin he passes 119
 back I shoot I score!!!!and make it 120
 one nothing. The puck flies to 121
 Maertin back at our net he shoots he 122
 scores. There is ten seconds left in 123
 the game the score is 10 to 10 the 124
 puck flies to me I shoot from centre 125
 ice it goes in their nets three 126
 seconds left in the clock. We win the 127
 grey cup 11 - 10. I drive home in my 128
 heat powered car. I get paid 300,000 129
 a year. I go home and TV. I will 130
 describe it. It is 90 by 90. I have 131
 600 channels I can watch four channels 132
 at once. I can replay and a TV show. 133
 I have a built in VCR. Speakers that 134
 are 50 by 40. And a remote that goes 135
 up to 100 feet away. I live in a huge 136
 mansion. I have 18 stories and an 137
 indoor and outdoor pools and sauna. A 138
 huge skylight oh yes I forgot I have 139
 satellite disk. I have 7 cars a huge 140
 garage three road bikes and 2 dirt 141
 bikes and a dirt bike track. I own 142
 ten acres. I have ten CD layers. 143
 Hobbies are dirt bike racing and 144
 sculpting in every way and 145
 scubadiving. I have a king sized 146
 waterbed. We have four dogs 2 female 147
 2 male and 2 parrots 1 rabbit 5 guinea 148
 pigs and a rabbit farm, chicken farm. 149
 One green house with a hot bunch of 150
 gourdes. 151

+ #41 M 7 03.11.79 12yrs Exc 3 Wr. 882
 (as is) 883
 The coming of Darkness 884
 Its the year 2016 two years after we 885
 made contact. Here's what happened. 886
 Two years ago professor Grorg Franksun 887
 had fineshed seting up a radio 888
 teliscope for the Unaversaty of 889
 Toronto and was just starting to test 890
 it when he notest a unknone object 891
 speeding through are soler sistem, at 892
 furst he thought it was a comet but 893
 after studing it for a minet he 894
 concluded that it was too small to be 895
 a comet and then decided that it must 896
 be a interstellar ship of some kind. 897

This was the break trough of a 899
 lifetime maby even two. This was 900
 great, now all there was to do is make 901
 contact but how? He puzzled over this 902
 for awhile when the remembered an 903
 artickle he had read the night before 904
 about a sonick-signaller that some 905
 Amaricans where using to send a 906
 signall to a northern galixy where 907
 there is the probability that there is 908
 life. He decied that he would take 909
 the next Concord down. When he got 910
 there Professure Jonse ans Peaterson 911
 where more than happy to cooperate and 912
 within a hour they had decied on a 913
 signall and had the sonic-signaller 914
 amed and ready to go and 5 minnets 915
 later they had it going. From where 916
 they were they had no way of telling 917
 if they were picking up the signall so 918
 they decied Professure Jones would 919
 drive to the nearest radio telliscope 920
 only two miles away and find out. 921

He took only a minet and then phoned 923
 the two up with good news they were 924
 canging corce and coming strate towards 925
 earth. 926

(the next day) 927

The three men had monaterd the 928
 progress of the ship all night and it 929
 was now only 20 minnits away the 930
 suspence was unbariball. Once they 931
 had got into orbat around earth they 932
 sent a scout ship down to the surface. 933
 It touched down just outside of 934
 Toronto. The scientists took little 935

time to get there and when they did 936
 they found a large ball with all kinds 937
 of lights and panels with one big one 938
 on the side which within seconds pop 939
 out and then a long track came down 940
 with a small green and blue creature 941
 standing on it. 942

They all said it at the same time 944
 "greatings welcome to earth" 945
 Marakilisy the alien knew english. 946
 And it said back "Glad to be hear" 947
 The next hour was spent getting to 948
 know echouther and then the question 949
 was asked where did you come from and 950
 that was the beging of the tragic 951
 story of ther big blunder. Here's the 952
 story exactly as it was told to the 953
 three men. "About one snoff ago which 954
 I think you call a decade when a great 955
 leader on are planet became very sick 956
 a underground leader came to the 957
 surface promassing alikinds of great 958
 things and that was begining of the 959
 end for are planet. He was power 960
 crasy giving alikinds of false 961
 promases and crusing everyone and 962
 thing in his path to power. He formed 963
 a great army to distroy are great 964
 leader. There was a planetary war and 965
 everyone was involved. Are world was 966
 on its way out so are only choyce was 967
 to put all are nowhow into making a 968
 space ship in case we need to leave 969
 fast. As it turns out it was a good 970
 idie because two days after they took 971
 a bomb and tryed to blow use up. 972
 Unforunatly the bomb caused a chane 973
 reaction that eventually distroyed the 974
 plaint. The survivors from the bomb 975
 got on the ship before the reaction 976
 was complet. And we have been 977
 surching for another planet that is 978
 capable of suporting life." 979
 Now they have long since left because 980
 they decided that this world is too 981
 crowded all ready. Unfortanitly we 982
 didnt lurn a lesson from them because 983
 we are now heading down the same path 984
 and probably the same fate! 985

+ #41 M 7 03.11.79 12yrs Exc 3 Wr. 882
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 furst he thought it was a comet but 893
 after studing it for a minet he 894
 concluded that it was too small to be 895
 a comet and then decided that it must 896
 be a interstellar ship of some kind. 897 IF

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 signall to a northern galixy where 907 CF
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 the next Concord down. When he got 910
 there Professure Jonse ans Peaterson 911
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 within a hour they had decied on a 913
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(the next day)

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was now only 20 minnits away the
suspence was unbariball. Once they
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It touched down just outside of
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time to get there and when they did
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of lights and panels with one big one
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leader on are planet became very sick
a underground leader came to the
surface promassing alkind of great
things and that was begining of the
end for are planet. He was power
crasy giving alkind of false
promases and crusing everyone and
thing in his path to power. He formed
a great army to distroy are great
leader. There was a planetary war and
everyone was involved. Are world was
on its way out so are only choyce was
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space ship in case we need to leave
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Unforunatly the bomb caused a chane
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947 } IF
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949 } CE
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967 } CE
968 }
969 } IF
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971 } CP
972 }

973 }
974 } AEN
975 }
976 } CF
977 }
978 }

X # 41 (wr.)

Fluency	2
Title	3
CE	2
SM	2
IF	2
H	1
CP	2
CF	2
AEN	2
IPV	1
AIN	1
AEP	1

capable of suporting life."

Now they have long since left because they decided that this world is too crowded all ready. Unfortanitly we didnt lurn a lesson from them because we are now heading down the same path and probably the same fate!

979	CP
980	AEN
981	
982	
983	IPV
984	AEN
985	

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UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

FACULTÉ D'ÉDUCATION
FACULTY OF EDUCATION

November 1, 1991

Consent form for teachers

A research project comparing creative thinking patterns in exceptional children has been approved by the Board of Education Research Committee. Results from the research will enable teachers to use pupils' creative characteristics when teaching them the skills they do not have.

The study, described by personal conversation, does not carry any risk or embarrassment; however, the Board of Education and the University of Ottawa require written consent from participants.

I therefore agree to take part in the study entitled A comparative analysis of creative thinking patterns in children who are gifted, learning disabled and gifted with learning disabilities, under the direction of Dee LaFrance, supervised by Dr. Janice Leroux, University of Ottawa.

As such, I consent to answering questions about my professional experience in accommodating creative abilities in exceptional children during a tape recorded interview at my convenience during non-teaching time, which will last no more than thirty minutes. I am aware that I will not be paid for my participation. The recorded material will assist the researcher in her analysis of creative characteristics of exceptional children and is confidential and protected under the Freedom of Information and Protection of Privacy Act, 1989 (Bill 49). The recordings will be destroyed when analysis is complete. When the results are reported, individual Boards will not be mentioned since only group data will be available. No quotations will be used in the qualitative analysis.

I understand that I may withdraw from this study at any time without professional repercussions and that I may obtain further information by calling Dee LaFrance (613) 382-4209.

Signature of Participant _____

Researcher

Edith B. LaFrance (Dee)
330 Stone Street S.
Gananoque, Ontario
K7G 2A4
(613) 382-4209

Appendix E

Questions for Teacher Interviews

(Dee LaFrance)

1. What are some examples of creative ways of thinking that you have noted in children over the years?
2. What are some creative characteristics in very bright children with learning disabilities? What are some creative ways of thinking in average ability children with learning disabilities?
3. What are the noticeable differences in creative thinking characteristics between children who are L.D. and children who are gifted with learning disabilities?
4. At the present time, how do you use knowledge of an individual's creative characteristics when planning lessons for him or her? What difference does it make to the materials you choose or the structure of the lesson?
5. Would it be helpful to know the creative thinking patterns of exceptional children in your class whether they are gifted, learning disabled or gifted with learning disabilities? Why do you feel this way?
6. How do you know that you might have in your class a child who is gifted with learning disabilities?
7. Is there anything that you would like to add?

Information form for each child in the study (Creativity)

Name _____
 Birthdate _____ Age _____ Grade _____
 Exceptionality (mark one)
 Gifted _____
 Learning Disabled _____
 Gifted with Learning Disabilities _____
 Board of Education _____
 Wechsler Intelligence Scale for Children Revised (WISC-R)
 Date administered: _____

<u>Subtest</u>	<u>Scaled Score</u>
Information _____	_____
Similarities _____	_____
Vocabulary _____	_____
Comprehension _____	_____
Arithmetic _____	_____
Digit Span _____	_____
Verbal Scale _____	_____

Picture Completion _____
 Picture Arrangement _____
 Block Design _____
 Object Assembly _____
 Mazes _____
 Coding _____
 Performance Scale _____
 Full Scale _____

<u>Academics</u>	<u>Name of Test</u>	<u>Date</u>	<u>Age%/Gr%</u>
Mathematics	_____	_____	_____
Word Recognition	_____	_____	_____
Reading Comprehension	_____	_____	_____
Spelling	_____	_____	_____

Comments:

 Please return one week after assessment of creativity
 patterns to: Dee LaFrance, doctoral candidate
 330 Stone Street S.
 Gananoque, Ontario K7G 2A4

I have read and understood the request for my son/daughter to participate in the study of patterns of creative thinking in exceptional children. I have discussed this with my son/daughter and we understand that this information is protected under the Freedom of Information and Protection of Privacy Act, 1989 (Bill 49).

_____ I give permission for my son/daughter to participate.

_____ I do not give permission for my son/daughter to participate.

NAME OF STUDENT: _____

DATE: _____ SCHOOL: _____

SIGNATURE OF PARENT OR GUARDIAN _____

SIGNATURE OF STUDENT: _____

Please return to the teacher by _____ to allow for planning which will not disrupt the school schedule unduly. If you have any questions, please do not hesitate to call Dee LaFrance (613) 382-4209.

Abstract

A comparative analysis of creative thinking patterns in children who are gifted, learning disabled, and gifted with learning disabilities

The aim of the research is to compare the creative thinking patterns of children who are gifted with learning disabilities to children who are gifted without difficulties and to learning disabled children. Conclusions drawn from the data will be helpful in refining criteria for the identification of children who are gifted with learning disabilities (G/LD). In addition, conclusions will enable teachers to foster creativity and thereby self-esteem in three populations of exceptional children as they meet their cognitive, affective, intuitive and sensing needs.

The personnel involved in the study will be children aged 9-13: eight gifted children, eight learning disabled children and eight G/LD children in each of four Boards. Consultants for gifted and special education, a school psychologist and teachers will select the children who will be assessed "blindly". The G/LD children may be found in regular classes doing average work, in gifted classes where accommodation is being made for their learning difficulties or in learning disabilities programs where they may be receiving enrichment in their areas of strength.

The assessment instruments will be the Torrance Tests of Creative Thinking (TTCT, 1990) and an adaptation of the Futures Scenario Writing (FSW). The size of the groups will depend on group dynamics and the convenience to the teachers concerned. An empty classroom would be an ideal setting for administering the revised TTCT (45-60 min.) and also the planning session of the Futures Scenario Writing (45-60 min.) For the second session of the (FSW), some children may choose to use the word processor and a few with severe motor problems may choose to tape-record their Scenarios (1-3 hrs.)

Besides the pencil and paper tasks with the children, selected teachers will be interviewed on tape with regards to their use of creative thinking patterns when differentiating instruction for these groups of children. With parent permission, subtest scores of the Wechsler Intelligence Scale for Children Revised 1974 (including Digit Span) will be requested for each child along with the most recent academic results in language arts and mathematics. When these records are made available to the researcher, the Board personnel will indicate whether the child was exceptional because of very high ability, learning disability, or possibly both.

The data will be treated confidentially and analyzed both qualitatively and quantitatively in order to determine patterns in creative thinking which will assist teachers to identify G/LD children and to develop differentiated curricula for children who are gifted with learning disabilities and for children who are learning disabled.

Dee LaFrance, doctoral candidate, University of Ottawa



UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

FACULTÉ D'ÉDUCATION
FACULTY OF EDUCATION

November 1, 1991

Dear Parent or Guardian,

A research project comparing creative characteristics in children has been approved by the Board of Education. Results from the research will enable teachers to recognize and to use pupils' creative abilities when preparing their lessons for exceptional pupils.

The information on creative thinking will come from interviewing teachers and, with your signed permission only, from the following:

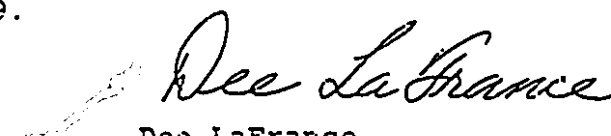
- school records containing information about learning strengths and needs of the pupil
- group activities

With regard to the group activities, the researcher will meet with groups of children for two mornings during school time at the convenience of the teacher. The researcher will not be aware of which children are bright without learning problems, which are average with learning difficulties or very bright with learning difficulties in certain areas.

- The first day, children will be involved in completing figures, in planning and discussing a story.
- The second day, they will write a story using pencil and paper or a computer, or they may choose to dictate their story onto tape. All instruments needed will be provided to the pupil, and the recordings will be destroyed when analysis is completed.

These creative activities should be very enjoyable for the children. Participation is voluntary and you or your son or daughter may withdraw at any time. Results will respect the confidentiality and anonymity of each participant.

If you need further information, please call Dee LaFrance (613) 382-4209.


Dee LaFrance
University of Ottawa

Appendix J WISC-R and WJPEB Results on Individuals Studied

Means and Standard Deviations of WISC-R Subtests

Subtest Scaled	Scores and Standard Deviations for Each Group		
-----	-----		
	Gifted n=23	LD n=25	G/LD n=29
Digit Span	13(3)	8(2)	10(2)
Coding	12(1)	9(3)	10(3)
Arithmetic	14(2)	10(2)	12(2)
Information	14(2)	10(2)	14(2)
Similarities	15(2)	11(2)	16(2)
Vocabulary	15(3)	10(2)	15(3)
Comprehension	15(2)	10(2)	16(2)
Picture Completion	13(2)	11(2)	14(2)
Picture Arrangement	14(3)	11(3)	15(2)
Block Design	16(2)	10(3)	16(3)
Object Assembly	15(3)	11(3)	15(3)

LD = Learning Disabled; G/LD = Gifted with Learning Disabilities.

Table 4. Scatter of Abilities (GT)

Subtests WISC-R Scaled Scores										Gifted Group n=23				
ID	Verbal Subtests						Performance Subtests				Verbal		Perf.	Full
	Info.	Simil.	Vocab.	Compr.	Arith.	Dig.Sp	PC.	PA.	BD.	OA. Mazes	Coding	I.Q.	I.Q.	Scale
01	13	15	16	16	16		17	18	14	18		12	133	141
03	18	17	19	14	15		14	14	18	13		13	142	141
05	16	16	18	13	16		11	15	19	17		15	137	142
13	18	14	15	11	19		13	15	17	15	15	11	135	139
19	13	15	16	19	11	12	13	10	14	18		13	130	131
31	10	13	11	12	10	18	16	14	13	14		12	107	118
33	14	13	12	13	15	10	13	13	14	13		10	120	122
36	10	14	13	13	15	11	14	13	16	12		14	118	125
42	12	11	11	13	12	9	10	11	14	17		13	111	118
48	12	16	14	12	13	12	17	14	18	12		15	120	132
49	12	13	14	13	14	15	10	14	13	12		14	119	121
62	16	13	19	13	13		13	12	14	17		11	130	130
71	17	17	17	18	12		16	19	19	19		12	148	148
78	15	19	15	16	13	6	10	10	17	14	14	11	136	129
80	14	14	15	13	19	15	12	11	18	13	16	11	131	129
82	17	16	18	14	16	15	13	15	19	19	12	12	140	144
84	15	14	16	17	17	13	11	16	13	15	11	13	137	135
86	15	17	17	15	10	18	18	18	19	18	10	12	130	144
89	11	15	13	14	16	12	12	13	16	17	15	12	123	128
92	13	18	15	17	16		14	4	15	15		12	137	128
95	17	17	14	16	13	13	13	13	16	10	5	9	135	128
96	13	18	12	19	14	12	14	15	17	19	13	13	133	141
99	13	16	9	13	11	11	13	14	19	14		13	114	126
Average	14	15	15	15	14	13	13	14	16	15	12	12	129	132
Std Dev.	2	2	3	2	2	3	2	3	2	3	3	1	10	9

Table 5. Scatter of Abilities (LD)

Subtests WISC-R Scaled Scores							L.D. Group n=25								
ID	Verbal Subtests						Performance Subtests					Verbal		Perf.	Full
	Info.	Simil.	Vocab.	Compr.	Arith.	Dig.Sp	PC.	PA.	BD.	OA.	Mazes Coding	1.Q.	1.Q.	Scale	
06	12	14	17	15	11	9	13	18	10	15		13	123	128	128
11	11	13	9	10	10		12	10	10	12		8	103	102	102
14	10	13	10	11	9	7	14	10	12	13		10	103	112	108
15	6	12	8	12	8	7	5	12	7	8		10	95	88	91
18	11	11	11	12	10	7	14	12	11	9		10	106	108	107
23	10	15	12	13	13	6	12	14	13	14		12	115	121	121
27	13	12	10	11	14	7	10	7	9	14		6	112	93	103
32	9	9	13	6	10	6	10	11	9	9		9	96	96	96
38	12	14	13	11	12	8	9	5	10	6		9	114	85	100
39	10	9	14	11	12	11	14	10	14	12		14	107	120	114
40	10	9	8	9	12	6	14	12	14	13	13	8	97	115	105
43	12	9	7	7	10	7	12	11	9	8		13	94	104	98
44	8	10	7	11	9	4	11	15	12	9		11	94	111	101
46	11	7	8	8	9	7	10	9	11	10		9	91	98	93
47	8	11	11	13	11	12	15	11	9	10		8	105	104	104
64	7	10	10	10	9	5	11	8	4	8		6	95	82	87
69	10	14	12	12	13	8	11	11	11	15		10	113	111	113
73	6	11	8	10	6	6	8	11	12	12	11	7	88	100	92
75	9	8	8	9	8	5	10	12	5	8	6	11	90	93	91
77	9	13	12	9	13	8	10	13	11	10	11	8	107	102	105
81	7	14	11	12	6	7	10	13	10	10	12	1	100	91	95
83	11	11	11	11	10	11	13	11	15	14		13	105	123	114
91	9	9	6	12	7	6	12	9	9	13	12	4	91	95	92
93	8	9	9	9	9	11	9	6	9	8	14	9	92	87	89
97	12	8	11	5	8	10	11	2	9	6		3	92	74	82
Average	10	11	10	10	10	8	11	11	10	11	11	9	101	102	101
Std.Dev.	2	2	2	2	2	2	2	3	3	3	2	3	9	14	11

Table 6. Scatter²¹⁰ of Abilities (G/LD)

Subtests WISC-R Scaled Scores							Gifted /L.D. n=29								
ID	Verbal Subtests						Performance Subtests						Verbal I.Q.	Perf. I.Q.	Full Scale
	Info.	Simil.	Vocab.	Compr.	Arith.	Dig.Sp	PC.	PA.	BD.	OA.	Mazes	Coding			
02	16	15	14	17	17	13	15	14	11	14		11	137	121	133
04	17	19	17	19	12	7	7	11	17	11		13	143	112	132
06	14	12	14	14	13	9	16	14	18	18		8	120	133	130
09	14	15	19	18	12	6	11	15	13	12		7	136	111	126
10	15	16	18	16	9	10	15	15	12	13		16	130	130	133
16	16	15	19	19	12		14	13	18	14		10	140	129	138
17	18	19	19	19	15	13	11	14	14	15		12	152	123	142
20	15	14	12	15	14		15	14	19	16		12	124	136	134
21	14	15	17	15	12	9	15	17	19	19	16	10	128	142	140
22	14	18	19	13	10	11	12	13	14	10		6			
24	13	16	13	14	14	13	16	12	11	12		4	124	106	118
33	11	15	10	16	14	7	12	12	19	17		9	119	128	126
37	14	17	12	14	11	9	12	12	15	11		9	122	112	120
41	15	19	12	19	15	11	17	16	19	13		9	139	133	141
50	11	12	9	11	8	9	14	12	14	14		13	101	124	112
54	14	16	15	18	11		13	19	12	13		15	130	131	134
55	12	16	14	13	11		13	19	17	19		14	119	145	136
66	10	16	16	15	11	10	14	16	18	18	10	11	122	138	133
70	13	13	13	15	10	8	15	17	16	16		13	118	138	130
72	12	15	15	18	10		14	15	15	17		10	124	130	130
74	13	19	17	15	10	9	13	15	15	13	9	12	130	126	131
76	14	17	16	14	12	13	12	18	18	17	12	8	128	132	134
79	12	14	12	14	14	10	12	16	19	13	15	15	119	135	130
85	13	14	18	15	9	13	15	18	15	19	11	12	123	141	136
87	9	19	14	14	11	11	15	14	19	16	19	7	120	130	128
88	13	16	13	14	8	14	17	16	17	16	13	9	117	135	128
90	15	15	19	16	10	12	15	16	16	13	10	10	131	119	130
94	16	19	18	17	8	13	15	14	13	16	13	5	136	118	130
98	13	15	15	14	13	9	15	17	18	17	16	12	124	141	137
Average	14	16	15	16	12	10	14	15	16	15	13	10	127	128	131
Std Dev.	2	2	3	2	2	2	2	2	3	3	3	3	10	10	7

Table 4a. Scatter of Abilities (GT)

Woodcock Johnson Psycho- Educational Battery (WJPE) GT Group Percentiles n=7

ID	Broad Cognitive	Verbal	Reasoning	Perceptual Speed	Memory
51	99%	87%	99%	87%	99%
53	99%	97%	97%	64%	99%
58	97%	86%	98%	97%	94%
59	99%	95%	95%	98%	98%
61	99%	82%	99%	92%	99%
65	99%	91%	99%	97%	98%
68	99%	71%	99%	57%	99%
Average	99%	87%	98%	85%	98%
Std Dev.	1%	8%	1%	16%	2%

Table 5a. Scatter of Abilities (LD)

Woodcock Johnson Psycho- Educational Battery (WJPS) LD Group n = 5

ID	Broad Cognitive	Verbal	Reasoning	Perceptual Speed	Memory
52	34%	73%	55%	5%	34%
56	36%	47%	74%	4%	16%
57	21%	60%	28%	1%	20%
60	14%	29%	7%	4%	45%
67	10%	28%	5%	28%	43%
Average	23%	47%	34%	8%	32%
Std Dev.	10%	17%	27%	10%	12%

Appendix K Calculation of 'below their own average' with regards to the WISC-R subtests

Kaufman (1979) suggested a method for examining discrepancies between an individual's own scaled scores on the WISC-R. He based his formulae on those developed by Davis (1959) and Sattler (1974). This "relative strength" measure allows for an understanding of the 'peaks and valleys' of an individual child's profile. Since all strengths and weaknesses are relative to the child's own ability, this measurement improves upon the practice of using a group mean of 10 and a standard deviation of three which artificially elevates the performance of high-I.Q. children. "Each scaled score is systematically compared to the child's own midpoint, with statistically significant differences used to determine meaningful fluctuations..." (Kaufman, 1979, p. 56).

For example, one might use Bannatyne's recategorization of the subtests of the WISC-R (1974) which were as follows:

1. Acquired knowledge = Information + Arithmetic + Vocabulary
2. Spatial = Picture completion + Block design + Object Assembly
3. Conceptual = Comprehension + Similarities + Vocabulary
4. Sequencing = Digit Span + Arithmetic + Coding

In order to determine discrepancies in a student's own scores, first the child's Verbal scaled score average and Performance scaled score average are calculated. Then, for

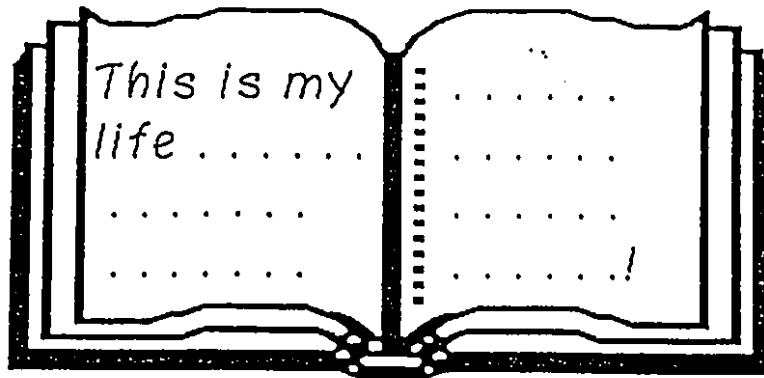
each of the subtests included in the factor of interest, the corresponding mean is subtracted from the child's subtest scores. The differences are then summed to form the child's relative factor strength. For example, for the sequencing factor, the relative strength factor is given by (Arithmetic - Verbal average) + (Digit span - Verbal average) + (Coding - Performance average). A large positive relative factor strength indicates that the child excels in this factor relative to his or her overall abilities. Conversely, a large negative value indicates a relative weakness in the factor.

Bannatyne, A. (1974). Diagnosis: A note on recategorization of the WISC scaled scores. Journal of Learning Disabilities, 7, 272 - 274.

Davis, F. B. (1959). Interpretation of differences among averages and individual test scores. Journal of Educational Psychology, 50, 162 - 170.

Kaufman, A. S. (1979). Intelligent testing with the WISC-R. New York, NY: John Wiley.

Sattler, J. M. (1974). Assessment of children's intelligence. Philadelphia, PA: Saunders



When you dream about your future, what do you see yourself doing? What do you hope to achieve? What do you want to do for yourself, your family, your country, your world?

Your dreams and hopes for the future shape your life in many ways. The dreams and plans you create are what encourage you to act.

So, imagine that it is a time in the future. How old are you? Where do you live? What kind of work are you doing? What have you done today? What do you still want to do?

Use your ideas about your future to tell us of your dreams and hopes. Tell your story of your future in any way you want.

:

STREAMLINED SCORING SHEET 216
TORRANCE TESTS OF CREATIVE THINKING, FIGURAL FORMS A and B

Name: _____ Test Date: _____ Form: _____

Grade: _____ Age: _____ Sex: _____ School: _____

	Raw Score	Standard Score	National Percentile
1. Fluency: Act. 2 _____ + Act. 3 _____	= _____	_____	_____
2. Originality: Act. 1 _____ + Act. 2 _____ + Bonus _____ + Act. 3 _____ + Bonus _____	= _____	_____	_____
3. Abstractness of Titles: Act. 1 _____ + Act. 2 _____	= _____	_____	_____
4. Elaboration: (Circle appropriate number 1-6 for A or B)			
A { Act. 1: 1(0-5) 2(6-12) 3(13-19) 4(20-26) 5(27-33) 6(34+)			
{ Act. 2: 1(0-8) 2(9-17) 3(18-28) 4(29-39) 5(40-50) 6(51+)			
{ Act. 3: 1(0-7) 2(8-16) 3(17-27) 4(28-37) 5(38-47) 6(48+)			
B { Act. 1: 1(0-5) 2(6-13) 3(14-21) 4(22-29) 5(30-37) 6(38+)			
{ Act. 2: 1(0-9) 2(10-19) 3(20-29) 4(30-39) 5(40-49) 6(50+)			
{ Act. 3: 1(0-14) 2(15-24) 3(25-34) 4(35-44) 5(45-54) 6(55+)			
5. Resistance to Premature Closure: Act. 2 _____	= _____	_____	_____
Average Standard Score	= _____	_____	_____

Ability	Interpretation									
1. Fluency										
2. Originality										
3. Abstractness of Titles										
4. Elaboration										
5. Resistance to Premature Closure										
Standard Score	40	60	80	100	120	140	160	180		
Percentile		2	16	50	84	98	99+			

Checklist of Creative Strengths:

- _____ 1. Emotional Expressiveness (in drawings, titles)
- _____ 2. Storytelling Articulatness (context, environment)
- _____ 3. Movement or action (running, dancing, flying, falling, etc.)
- _____ 4. Expressiveness of Titles
- _____ 5. Synthesis of Incomplete Figures (combination of 2 or more)
- _____ 6. Synthesis of Lines (combination of 2 or more sets, Activity 3, Form A) or
Synthesis of Circles (combination of 2 or more, Activity 3, Form B)
- _____ 7. Unusual Visualization (above, below, at angle, etc.)
- _____ 8. Internal Visualization (inside, cross section, etc.)
- _____ 9. Extending or Breaking Boundaries
- _____ 10. Humor (in titles, captions, drawings, etc.)
- _____ 11. Richness of Imagery (variety, vividness, strength, etc.)
- _____ 12. Colorfulness of Imagery (excitingness, earthiness, etc.)
- _____ 13. Fantasy (figures in myths, fables, fairy tales, science fiction, etc.)

Creativity Index: Average Standard Score _____ + Bonus _____ = _____ Standard Score _____ National Percentile

Comments: _____

Appendix N
Classroom Extensions:
Comparison of Three Groups on Creative Thinking Strengths

WISC-R (1974)

Use Bannatyne triads (1974) and Kaufman method (1979) to examine "relative strength" of WISC-R subtests (Appendix K). Note that the average range may be a "relative weakness" for a gifted/LD student (-).

Factors	TTCT	Figural	Form B	Gifted	Gifted/LD	LD
Fluency				+	-	-
Originality				+	+	+
Abstractness of Titles				+	-	-
Elaboration				+	-	-
Resistance to Premature Closure				-	-	+

TTCT Creative Strengths

		GT--LD		GT--G/LD		LD--G/LD	
HUMOUR		/ -		- /		- /	
H	Humour						
THINKING							
SA	Storytelling Articulateness	x	-	/	-	-	/
S/IF	Synthesis Incomplete Figures	-	-	-	x	-	x
S/C	Synthesis Circles	x	-	-	/	-	x
ET	Expressiveness of Titles	/	-	/	-	=	
FEELING							
EE	Emotional Expressiveness	/	-	-	/	-	x
INTUITIVE							
EB	Extending Boundaries	=		=		=	
FA	Fantasy	-	/	-	/	/	-
UV	Unusual Visualization	/	-	x	-	/	-
PHYSICAL SENSING							
RI	Richness of Imagery	x	-	=		-	x
CI	Colorfulness of Imagery	=		=		=	
IV	Internal Visualization	-	/	x	-	x	-
MA	Movement/Action	x	-	x	-	-	/
<u>FUTURE SCENARIO WRITING (FSW)</u>		GT--LD		GT--G/LD		LD--G/LD	
HUMOUR							
H	Humour	x	-	x	-	-	x
THINKING							
CF	Cognitive Factual	x	-	/	-	-	/
CP	Cognitive Problem Solving	x	-	x	-	-	x
CE	Cognitive Elaboration	x	-	-	/	-	x
FEELING							
AEP	Affective Emotions Positive	x	-	x	-	x	-
AEN	Affective Emotions Negative	/	-	x	-	x	-
AIn	Affective Internal Control	=		-	x	-	x
AX	Affective External Control	=		/	-	=	
INTUITIVE							
IPV	Intuitive point of View	x	-	x	-	/	-
IF	Intuitive Fantasy	x	-	x	-	-	x

PHYSICAL SENSING

GT--LD GT--G/LD LD--G/LD

SM	Sensing Movement	x -	/ -	- x
SV	Sensing Visually	x -	x -	- x
SA	Sensing Auditorially	x -	x -	- x

GT = gifted; LD = learning disabled; G/LD = gifted/LD
 x = a difference of three or more persons (stronger than...)
 / = a difference of less than three persons (somewhat
 stronger than...)
 = = negligible difference
