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CREATIVITY AND HANDWRITING:
A STUDY OF THE RELATIONSHIP BETWEEN HANDWRITING
AND CREATIVITY IN FIFTH-GRADE CHILDREN

A Dissertation Presented

By

Willa Westbrook Smith

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

February 1986

School of Education

Willa Westbrook Smith

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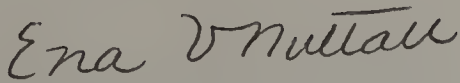
By

Willa Westbrook Smith


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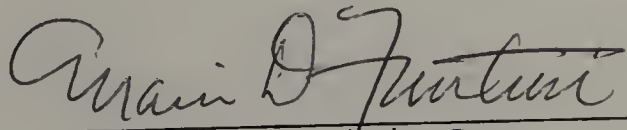
Dr. Doris J. Shallcross, Chairperson of Committee



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Mario D. Fantini, Dean
School of Education

DEDICATION

To the Creative Connection, here and everywhere.

ACKNOWLEDGMENTS

I would like to acknowledge gratefully the help of a number of people who have contributed to this research project. First of all, I want to thank longtime friend Betty Heslen for introducing me to graphology, and Professor Dick Konicek for introducing me to creativity.

I appreciate so much the help and support of my dissertation committee, Dorie Shallcross, Ena Nuttall, and Eleese Brown--their positive regard for me, their openness to the value of graphology, and their constructive questions and practical comments. Many thanks, too, to Ina Tober and Beth Young for their help in clarifying the manuscript when words got in my way and for leading me through the University maze. The generous assistance of the fifth-grade teachers--Bev Burger, Bob Airne, and Gary Belanger--in administering and coding the tests has been invaluable to this study and is greatly appreciated. Appreciation for the excellent work of Margaret Bearse, typist/editor of this dissertation, cannot be conveyed in words. I owe her much for her critical judgment and advice.

Finally, my very creative husband has been sensible, supportive, sympathetic, and steadfast--I cannot count the ways.

Abstract

CREATIVITY AND HANDWRITING:

A STUDY OF THE RELATIONSHIP BETWEEN HANDWRITING
AND CREATIVITY IN FIFTH-GRADE CHILDREN

February 1986

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This exploratory, correlational study examined the relationship between a handwriting analysis test devised by the investigator and other measures of creativity in children. Seventy-one fifth graders, twenty-five boys and forty-six girls, were given the verbal and figural tests of the Torrance Tests of Creative Thinking (TTCT) and the Group Inventory for Finding Talent (GIFT). Their parents filled out the Renzulli-Hartman Creativity check list. Letters from the children to the investigator provided handwriting samples to be correlated with the above criterion measures. Samples were analyzed by a specific procedure yielding a graphological creativity quotient (GCQ) based on the creative personality traits of Spontaneity, Openness, Flexibility, Intuition, Autonomy, Self-Acceptance, Complexity, and Perseverance. Computerized statistical analysis produced bivariate and multiple

regression correlations. The null hypothesis that there is no relationship between children's handwriting scores and their scores on other measures of creativity was accepted, as the .05 level of significance was not quite reached in bivariate correlations (two-tailed) between the GCQ and the total scores for the criterion tests. However, correlation of handwriting scores with scores on the Torrance Tests of Creative Thinking was significant at .27 ($p = .05$). The highest correlation obtained was between the GCQ and the scores on the Torrance verbal test (.30, $p = .01$). One reason for this outcome may have been the above-average socioeconomic level of the non-random sample in which verbal achievement may be highly valued. The lowest correlation, barely positive, was with the scores on the Renzulli-Hartman check list. Parents' bias and inability to compare their child with others may have rendered that criterion measure invalid for this research. Multiple regression analysis showed that, of the eight GCQ components, Perseverance correlated significantly with the total criteria scores ($p = .01$) and Complexity with the Torrance verbal test scores ($p = .05$). Results indicate a need for further research with the GCQ method, which seems to hold promise as a useful tool for assessing the creative personality.

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C H A P T E R I

INTRODUCTION

Statement of the Problem

A frequently stated goal in education is to develop the total individual. The number one recommendation of the White House Conference on Children in 1970 was to provide opportunities for all children to be creative in their lives (C. W. Taylor, 1972-73). Probably many school systems include as part of their definitions of quality education the goal of providing "an opportunity for students to develop to the fullest extent their natural creative abilities and interests" (Longmeadow Public Schools, 1983). Creativity relates positively to achievement, as does intelligence. Highly creative students have been found to achieve at the same level as those of higher intelligence but lower creativity (Roe, 1976).

No one denies the importance of creativity or the desire to encourage creative potential. We must look to the future with its challenges of adapting to change and relieving boredom. But obviously our national climate is still unfavorable toward creative achievement. According to E. P. Torrance (1983), the full development of creative potential is actually being discouraged, except in certain

types of athletics. Although creativity can be taught (Guilford, 1977; Parnes, 1967; Torrance, 1962), it is just one of several talents not being promoted in the schools and therefore wasted (C. W. Taylor, 1972-73).

As an elementary teacher this investigator has seen, as Torrance (1962) has, that when parents and teachers fail to understand creative behavior in children they work toward reducing or suppressing it as a threat to the maintenance of boundaries and control. This lack of understanding is not surprising, considering the complexity of the subject. Researchers have been studying and measuring creativity since the 1950s, when it was feared the United States would be surpassed in scientific efforts by the Soviet Union (Cohen, 1977). They have concerned themselves with the process (Rothenberg, 1979), the product (Besemer & Treffinger, 1981), the climate (Parnes, 1967; Rogers, 1961; Torrance, 1962), and the person (Barron, 1968; MacKinnon, 1975). Still, even the experts cannot agree on what creativity is or how to test for it (Buros, 1978).

Creativity springs from at least eleven sources, including heredity, accident, and group interaction, and has five different levels or dispositions: expressive, technical, inventive, innovative, and emergentive (I. A. Taylor, 1975). Definitions range all the way from novel

problem solving to the "full realization and expression of all an individual's unique potentialities" (MacKinnon, 1975, p. 68). There is the special creative talent of a Beethoven or a Van Gogh that perseveres in the face of psychological disorder. And there is the kind of creative potential we all have for becoming the most we can be, for actualizing and fulfilling ourselves as healthy personalities. Creativity is also immersed in paradox: the process is both explainable and unexplainable, and the product is both familiar and unfamiliar (Rothenberg & Hausman, 1976); the climate calls for a kind of responsible freedom (Christie, 1976); and the person, as explained in Chapter II, can possess many simplified complexities.

In order to measure the complicated phenomenon of creativity, what seems to be needed is an approach based on multiple assessments of abilities, interests, and personality (Rimm & Davis, 1980; Treffinger, 1980). Handwriting analysis (graphology) is one possible assessment of the creative personality, but it has not yet been accepted by educators and psychologists in this country. Fewer than ten of our accredited colleges offer graphology courses, while in Europe these courses are part of the required curricula for psychology and education degrees. However, graphology's usefulness in personnel selection to about 85 percent of all European companies (Levy, 1979)

has caused businesses in this country to become increasingly interested in it as both a nondiscriminatory hiring technique and a guide to employee integrity (Farmer, 1980). The present study is concerned with assessing the creative personality through handwriting analysis.

Purpose of the Study

The purpose of this study was to determine the relationship between handwriting analysis and several other methods of assessing children's creativity. The handwritings of fifth graders were compared to their ratings on creativity tests and inventories.

Since this investigator has found no definitive research on possible relationships between handwriting and creativity (American Handwriting Analysis Foundation [AHAF] Research Committee, 1984), it was assumed that the proposed relationship had no significance. Therefore, the null hypothesis that there is no relationship between children's handwriting and their scores on other measures of creativity was adopted. Specific research questions addressed included the following:

1. Are children's handwriting scores related to their scores on the verbal and figural tests of the Torrance Tests of Creative Thinking?

2. Are children's handwriting scores related to their responses on the Group Inventory for Finding Talent?

3. Are children's handwriting scores related to parents' responses on the Renzulli-Hartman Creativity scale?

4. Are children's handwriting scores related to the composite scores of the preceding three creativity measures?

Meaning of Terms

Definitions of major terms specific to this study are as follows:

Handwriting analysis will be used interchangeably with graphology, the study and assessment of personality through the dynamics of handwriting. Operationally, the term will infer a specific method of holistic graphology (as opposed to trait-stroke or graphoanalysis) based on European theory (Whiting & Sassi, 1983).

Creativity has been given such a variety of definitions that, to be clear, one must state what it is not as well as what it is. In this study, the term will not refer to special talent in art, music, writing, or other fields. It will not mean merely divergent thinking or the ability to use novel approaches to solving problems.

Creativity is used in this research in its broadest sense as the ability to fulfill one's potential, to become all that one is capable of becoming (Maslow, 1968). It presupposes a healthy, integrated personality, and incorporates the following eight traits. The meanings given to the traits are those described in creative studies done mostly at the Institute of Personality Assessment and Research (IPAR), University of California at Berkeley.

Spontaneity is active mental and emotional involvement (Rothenberg, 1979).

Openness is transpersonal awareness of the environment (Rogers, 1961).

Flexibility is the ability to adapt to and learn from experience (Guilford, 1959).

Intuition is breaking away from limitations of logic and the senses (Barron, 1968).

Autonomy is independent judgment and responsibility (Rogers, 1961).

Self-acceptance is positive self-image, ego strength (Maslow, 1968).

Complexity is a many-faceted personality with contradictions (Barron, 1968).

Perseverance is persistence in searching for alternatives (Guilford, 1959).

Significance of the Study

The significance of this study to the fields of both education and graphology lies in the possible initial acceptance of graphology as a method for assessing creativity in children.

Why is it important to assess creativity in children? The best single basis for predicting future performance is past performance, in creativity as well as other areas (Walkup, 1976). So it would follow that the earlier creative processes are used, the more likely they will become part of the life pattern (C. W. Taylor & Ellison, 1975). Processes such as brainstorming, lateral thinking, and imaging can be taught and can increase scores on creative ability measures (Torrance, 1962, 1975, 1983). But if the child is afraid to take risks, remains defensive, or otherwise places limits on his or her own functioning, he or she will not be able to use these tools effectively. Jane Green (1975) described the personality of such a child and labeled him as an underachiever. Although he had many creative tendencies, he could not realize them. Green found that the child's home and school environments were causing him anxiety and doubt.

If we believe that creativity leads to fulfillment, then the earlier we recognize, channel, and promote it,

the better. This researcher sees psychological growth as a kind of alternating current as illustrated in Figure 1.

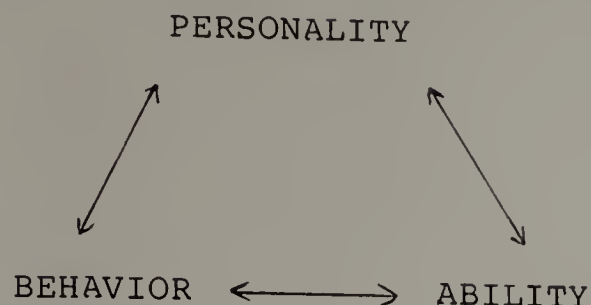


Fig. 1. Diagram of Psychological Growth

The three aspects of growth relate in this way:

1. The personality manifests a certain behavior.
2. If feedback from significant others is encouraging, the behavior is repeated.
3. Since practice makes perfect, the repeated behavior leads to both improvement in ability and changes in personality. For example, self-esteem is necessary for creative and self-actualizing behavior (Maslow, 1968; Wellingham-Jones, 1984), and creative activity improves self-esteem (Davis, 1983; Prince, 1975; Schiwetz, 1979; Shallcross, 1981).

Creativity must be recognized before it can be accepted and encouraged (Torrance, 1966, 1976). Acceptance and encouragement in turn have been shown to be important factors in creative performance. Successful artists in one study (Getzels & Csikszentmihalyi, 1981)

said that as children they were no better than their friends but their drawings were noticed and praised more, so they used their art to gain further approval.

Nuttall's (1970) creative boys reported a higher degree of acceptance by both mothers and fathers; and highly creative architects (MacKinnon, 1962) characterized their parents as giving them extraordinary respect, confidence, and freedom.

Changing the national climate, discouraging as it is to creativity, certainly is a large order. But studies such as the present one can help educators, at least, change their attitudes toward divergent behavior in children through greater awareness of the personalities and needs of those students seen now as threatening and challenging.

Why is graphology important in education? Teachers do not have the opportunity to conduct interviews or administer psychological tests. However, they can readily and unobtrusively peruse written material furnished by their students. The frozen expression of writing allows us to see beyond surface behavior; it does not lie or conceal. In contrast, the limitations of other personality tests have been evident since 1956 when the "organization man" was advised on how to cheat in order to land a job (Whyte, 1956). The control of faking and

social-desirability response sets is a problem in both personality and ability inventories (Anastasi, 1982). The Adjective Check List (Gough, 1952) was faked in a recent study where 100 college students produced three different scores: as uncreative persons, as very creative persons, and as they really were (Ironson & Davis, 1979).

Instructions given with the administration of the Torrance (1966) Tests of Creative Thinking to "be wild" or to "be original" have caused subjects to increase and even double their scores (Davis, 1975).

Handwriting analysis is one of the easiest tests to administer; all that is required of the subject is a page of writing. Consequently, there is no problem with test anxiety or with test-content familiarity when retesting. So it seems an ideal way to measure short-term results of specific training, for example, to increase self-esteem or creative thinking. In research on the effects of hypnotherapy, handwriting tests indicated both immediate and permanent personality changes (Teltscher, 1942/1971).

Educators can use graphological information, along with other assessments, to form needed profiles of not only creative talent but also learning styles, motivation, and patterns for future growth (Solomon, 1978; Teltscher, 1942/1971).

Outline of the Study

In this first chapter, the educational goal of promoting creativity and the discouraging climate toward creative functioning have been discussed. The purpose of the present study has been stated as an attempt to validate a handwriting test for assessing creativity in children. Definitions of major terms used in the study have been presented, as well as the rationales for (1) the assessment of creativity in children and (2) the analysis of handwriting as an educational test.

Chapter II contains a review of pertinent literature on creativity and handwriting analysis. Important factors associated with the creative personality are described in detail, along with the major studies that helped establish them. A pilot study by the investigator to verify those factors in creative adults is summarized, and many creativity tests currently in use are reviewed.

Chapter III describes the design of the study and the procedures used by the researcher. It includes information about the measures, the sample, and the methods of collecting and organizing the data.

Results of the study, presented in Chapter IV, include the analysis of data and discussion of findings. Bivariate and multiple regression correlation results are

explained. Also noted are some of the outstanding creative-personality factors shown by the group of subjects in this study.

Chapter V summarizes the study and looks at the significance of the results. Limitations of the study are registered in this chapter and the measures used are re-examined. Finally, there are recommendations for further research.

C H A P T E R I I
R E V I E W O F T H E L I T E R A T U R E

The literature review, to provide a foundation for the present investigation, encompasses three broad areas. It is therefore divided into three separate sections. The first section contains a review of pertinent literature on the creative personality. The major studies are analyzed and eight personality factors found by these studies to be associated with creative behavior are discussed in detail. Included in this first section is a review of creativity assessments in current use with adults and children. In the second section, graphology is considered as a tool for personality assessment; its history and methods are summarized. The eight creative-personality factors are explained graphologically, and the writing dynamics of children are examined. In the third section, the graphological literature pertaining to creativity is reviewed. Recounted in detail is a pilot study by the researcher on creativity and handwriting that established the graphological creativity quotient used in the present study.

The Creative Personality

Creativity has been studied from the point of view of process, product, climate, and personality. Researchers have found that the process can be experienced whether or not a contribution to others is made. The creative product is said to manifest according to individual aptitude and experience. The climate for creative productivity can be improved through encouragement and deliberate training. The study of creative personality has produced its own body of research, the best of which has come from in-depth observation under controlled conditions, factor analysis, and many other assessments as complicated as the subjects being assessed.

The most influential creative-personality researchers have been J. P. Guilford, Harrison Gough, Anne Roe, Ravenna Helson, Donald MacKinnon, and Frank Barron. Except for those by Guilford, most of the studies took place at the Institute for Personality Assessment and Research (IPAR), University of California at Berkeley.

At IPAR, creative subjects were observed, interviewed, and evaluated by staff psychologists while living at the institute for several days. In addition, they were given extensive batteries of up to twenty tests, including the Minnesota Multiphasic Personality Inventory (MMPI)

(Hathaway & McKinley, 1943) and two popular projective techniques--the Thematic Apperception Test (TAT) (Murray, 1943) and the Rorschach (1942) Psychodiagnostic.

Guilford's (1959) Aptitudes Project, as his series of studies was called, yielded the following traits as being related to creativity: four types of fluency of thinking, two kinds of flexibility, as well as originality, ability to improvise, and elaboration. These studies led to his famous Structure-of-Intellect model (Guilford, 1977).

In his work with research scientists and engineers at the University of California, Gough used the projective TAT and tests devised by Guilford. He found the subjects' originality consisted of five factors: (1) intellectual competence, (2) inquiringness, (3) flexibility of thought, (4) preference for aesthetic elegance and harmony, and (5) sense of destiny or belief in their own worth (Hilgard, 1959).

Other research shows creativity to be related to intellect, breadth of interests, independence, and self-assertiveness (Schimeck, 1954) and affected by defensiveness and over-criticalness (Stein & Meer, 1954). Highly creative people have been found to exhibit complexity, reconciliation or opposites, impulsivity, autonomy, self-assertion, and craving for novelty (Schaefer, 1969).

Major Studies of the Creative Personality

The major studies done by Roe, Helson, MacKinnon, and Barron on the creative personality are described separately.

Studies by Anne Roe

Anne Roe (1976) was one of the first psychologists to study the relationship between personality and occupation. Her subjects included painters, biologists, anthropologists, and physical scientists, whom she assessed mainly with projective techniques. As a result of her studies, Roe described some of the more important attributes of creative people: curiosity and openness to experience, independence, autonomy, self-reliance, and dominance. She found them to be high in ego strength, but not to an extreme, and to show discipline and great perseverance. This persistence she termed "notable" and especially important to scientific production. She indicated there must be strong motivation for that degree of persistence but gave no analysis of motives. Roe did, however, note the strength of emotion in her subjects, which Rothenberg (1979) has connected with perseverance. Except for most of the social scientists, her subjects were found to be preoccupied with things and ideas rather than with people

and not to be gregarious or talkative. However, it would seem that introversion/extroversion qualities may determine a person's field of interest rather than creative output.

Studies by Ravenna Helson

Using peer ratings as a criterion of creativity, Ravenna Helson (1976) studied women mathematicians for two reasons. One, the brains of creative women mathematicians might be different from those of other women because, as had been suggested to her, in order to retain originality they may be stifling the life of feeling and concreteness deemed natural to a woman. Two, the study might show these women to have an abundance of essential creative traits because they had overcome the barriers to becoming female mathematicians.

A variety of tests were used to measure intelligence, overall characteristics, interests, aesthetics, mathematical style, and personal and professional history. The data were consistent among the personality inventories, staff observations, and self-descriptions. Results indicated that personality characteristics are powerful determinants of creativity in women mathematicians. The most important were rebellious independence and rejection of outside influence, narcissism, symbolic interests, and

flexibility. These women, despite their complexities, were successfully integrating and simplifying their lives. The women in this study were independent introverts, as opposed to most American women, and so were not suppressing themselves. The personality traits found, although they have been ascribed to creative people regardless of sex, did appear more clearly in these women than in the creative male mathematicians studied earlier by Helson and her associates.

Studies by Donald MacKinnon

Donald MacKinnon (1976a) also used an extensive battery of assessments in the study he directed at IPAR. He tested three samples of architects: forty nominated as outstandingly creative, called Architects I; forty-three Architects II, who had some years of association with the first group; and forty-one Architects III, who had never worked with any of the outstanding creatives. MacKinnon chose to study architects because this profession requires abilities of both artist and scientist--making designs that are both aesthetically pleasing and technically sound. Architects need aptitude in other areas as well, including business, law, and psychology.

Ratings by experts revealed an approximately normal distribution of creativeness in these architects,

overlapping somewhat but representing three different mean levels. The three important areas of research were (1) socialization and interpersonal behavior, (2) complexity of psychological development, and (3) degree of psychological health.

The third group, Architects III, tested highest on socialization, responsibility to a group, and adjustment to society. In contrast, Architects I showed highest scores in independence, autonomy, aggression, and desire to control others. Architects I obtained their notion of the ideal architect from an inner artistic standard of excellence, whereas the ideal for Architects II centered on ability, and for Architects III the ideal was the standard of the profession.

In the areas of psychological complexity and health, Architects I showed the most complexity on eight different scales. Architects II scored only slightly lower and, in addition, gave evidence of more conflict; they had less emotional stability and more anxiety. On several measures of tension, conflict, and anxiety, Architects I were nearly as high as Architects II; but they also had the highest score on ego strength and self-assertiveness, showing they were effectively dealing with their complexities. The goals and ideals of Architects III seemed to be adapted to those of society and their profession, and

therefore they showed greater conformity and less creativeness.

MacKinnon (1976a) applied to his data the typology formulated by the psychoanalyst Otto Rank and was impressed with how well they matched. His Architects III corresponded with Rank's "adapted" type, who as children identify their will with that of their parents, are dependent on and united with the group or society, are normal and average. They experienced the least conflict and also the least creative behavior. Architects II were like Rank's "neurotic" type (MacKinnon prefers to use the term "conflicted") in that they were separate, independent, and different but did not have enough self-acceptance to overcome the guilt of striving for separateness. Some of this conflict was shown in their interpersonal relations: less desire to include others but greater desire to be included; need to be controlled by others but a need also to control others. Architects I epitomized Rank's "artist" type, also with conflicts and complexities but able to achieve a constructive, creative integration through will. They could be open to their experience without being concerned with impressing, or being impressed by, others.

MacKinnon agreed with Rank that self-image is important in determining behavior. His architects' self-descriptions, the adjectives they checked most on the

Gough (1961) Adjective Check List, harmonized with Rank's theory. Of the artist-type Architects I, who in a sense created their own reality, 98 percent checked "imaginative"; 95 percent of neurotic Architects II, confirming the relatedness of neurosis and civilization, chose "civilized"; and 98 percent of Architects II, adapted to society, chose "conscientious."

Studies by Frank Barron

Frank Barron (1968) has written extensively about the IPAR research program and its special interest in the psychology of creativity. He was also directly responsible for an important study concerning a group of 56 writers. The most creative writers were found by Barron and his associates to be more troubled psychologically but to have greater resources to deal with their problems. They were like MacKinnon's Architects I, who were as separate, independent, and different as Architects II but whose self-acceptance helped them overcome their conflicts. The average creative writer was more deviant than the creative architect and, in fact, was in the upper 15 percent of the general population on all measures of psychopathology furnished by the MMPI, including Schizophrenia, Depression, Hysteria, and Psychopathic Deviation. However, the writers were almost as superior to the

general population in Ego Strength, a scale denoting greater personal effectiveness. These findings were reinforced by scores on the California Psychological Inventory (CPI) (Gough, 1957), the profiles of which include predictors of recovery from neurosis: traits such as personal dominance, social presence, intellectual efficiency, and achievement through independence.

Personality Factors Associated with Creativity

Many of the pioneers in creativity assessment used a method called factor analysis. Through factor analysis one can distinguish behavior traits of individuals by noting their differences in performance on specific tasks. A trait or factor is described as "any distinguishable, relatively enduring way in which one individual differs from another" (Guilford, 1959, p. 144). Researchers who use factor analysis cannot find traits they are not looking for. This may be a reason for some differences in the creativity traits mentioned in the studies just discussed. For example, Roe noted dominance as an important factor, whereas Helson spoke of narcissism and MacKinnon and others described self-assertiveness and ego strength. However, there are eight general traits that seem to be shared by all types of creators. They are

spontaneity, openness, flexibility, intuition, autonomy, self-acceptance, complexity, and perseverance. The first four of these factors have been grouped together as personal orientation or style. They show how a creative person functions. The latter four traits have to do with self-image or the arrangement of self as it is projected back, determining why a person is creative. Although these traits will be described separately, it must be stressed that they are closely connected and interdependent.

Personal Orientation Traits

Spontaneity is perhaps the first trait one notices in a creative person. He or she is actively involved both mentally and emotionally, not defensive or anxious. Psychic energy is free to respond quickly. Mental and emotional expression is uninhibited. All the investigators mentioned earlier spoke of the deep emotional involvement of their creative subjects. Rothenberg (1979) said there must be some special meaning associated with the creative process for the creator to risk the anxiety of dealing with unconscious material. Piaget's (1974) view of learning presupposes a spontaneous involvement. The learner must personally rediscover or reconstruct every new truth instead of merely having it imparted.

Openness is conscious awareness of both the environment and of internal needs. It is breaking away from habit and nonthinking conformity. Rogers (1961) called it "extensionality"--looking at the world without distorting it with defensiveness so that one sees only what is presented at the moment and not what has been preconceived. Erich Fromm (1959) defined creativity simply as seeing and responding, that is, having the attitude of full commitment to the here-and-now and being able to respond with complete empathic understanding and relatedness. Wallach and Kogan's (1969) high-creative, high-IQ fifth graders had mature social awareness and empathic responsiveness to others.

Sidney Parnes (1967) offered the kaleidoscope as analogous to the creative process, but it corresponds as well to the creative person. The combinations and patterns we make depend on the number and types of pieces (of colored glass or whatever) in the drum. These pieces are symbols of our awareness and experience. The structure of mirrors inside the barrel--our personality--allows us to relate the pieces in a meaningful way or it prevents us from doing so. Using this analogy, an open and aware person would have more pieces in the drum. "Of crucial consideration here is the interrelatedness of the self and the outside world. Stimuli are absorbed,

integrated, and organized by the creative mind" (Rosner & Abt, 1979, p. 384).

Openness includes curiosity, aesthetic sensitivity, and attraction to the occult and mysterious. It is also a willingness to trust hunches and remain open to surprise and accident, as Edward Steichen did when utilizing an accidental drop of water on his camera lens (Rosner & Abt, 1970).

Flexibility is resilience, the ability to bounce back from mistakes. It also means adapting to and learning from experience. Flexible people can play with possibilities and associations without prejudging and dip into the unconscious without getting stuck there. They even invite errors in order to learn from them; they incorporate mistakes into their work or let them lead the work in new directions (Lowenfeld, 1962; Rothenberg, 1979).

Guilford (1959) found two types of flexible thinking: (1) spontaneous flexibility, a disposition to produce a variety of ideas, and (2) adaptive flexibility, moving to unconventional methods when familiar ones will not work. Rosner and Abt's (1970) creative respondents, when faced with difficulty, would turn the problem completely around. One said, "If none of the possible solutions work, then the only solution has to be the impossible one" (p. 383).

Rollo May (1975) said flexibility is the sine qua non (the primary requisite) for creativity. Rogers (1961) described it as the ability to toy with elements and concepts. This playing around leads to the forming of sometimes wild and improbable ideas out of which something lasting can emerge. Lawrence Kubie (1958) stated that flexibility among the three systems--conscious, unconscious, and the sensitive, fluid, and plastic pre-conscious that lies between them--is what gives us creative potential.

Intuition implies using imagination to process existing knowledge by taking short cuts and breaking away from the limitations of logic and the senses. Perhaps it is because creative people are already capable of openness and flexibility that they can then "go beyond the given world to find the something-more or that something-different that intuition says is there" (Barron, 1968, p. 247). Going beyond consciousness and sense-perception, being responsive to implications and possibilities, the intuitive person can be aware of insights and relationships that transcend ordinary knowledge. This condition of mind has been called satori (Torrance, 1979) and mystical (Brown, 1980) or peak (Maslow, 1968) experience. Some reported statements by Rosner and Abt's (1970)

creative interviewees were "I don't know where the idea came from" and "It just came to mind."

At IPAR the Myers-Briggs Type Indicator (Myers, 1962) was used to show preference in perception of either sensing or intuition. As opposed to 75 percent of the general population's preference for sensing, creative groups preferred intuition in the following percentages: mathematicians, 100 percent; research scientists, 92 percent; writers, 90 percent (Roe, 1976). Of MacKinnon's (1976a) architects, 100 percent of the most creative preferred intuition, as did over 86 percent of Architects II and 61 percent of Architects III, the least creative.

These four factors--spontaneity, openness, flexibility, and intuition--show how creative people interact with their environments. These people are involved, aware, elastic, and imaginative. The group of traits described next have to do with the arrangement of inner self.

Self-Image Traits

Autonomy means independent judgment and responsibility. Rogers (1961) spoke of internal locus of evaluation as perhaps the most fundamental condition of creativity. Other people's evaluations are not discounted by the autonomous person, but neither are they depended on.

One does not blame others but takes full responsibility for one's own actions.

Traits found to be related to creativity in study after study of productive people are autonomy, self-sufficiency, and self-direction. The amount of independence children experience in their relationships with teachers and parents influences their creative ability (MacKinnon, 1962; Rejskind, 1982). Anthony Storr (1972) suggested that MacKinnon's creative architects' autonomy may have included a fear of the influence of others, a resistance to contamination. To Maslow (1968), autonomy also meant relative independence from adverse circumstances, such as hard knocks, stress, and deprivation. He called it psychological freedom.

Self-acceptance can be called ego strength. It is the difference between defense and growth and without it self-actualization is impossible (Maslow, 1968). Self-accepting people are "good enough," "OK"; they look at crises as opportunities to grow. They are confident enough to dare to be different and to take risks.

Ego is the center of one's value system, the manager of one's personality. When ego is strong, the superego as president of the organization gives it authority. When it is weak, it cannot keep in balance the physical, intellectual, and emotional forces within the organization

and the superego must then become a tyrant (Mayer, 1972-73). The ego and superego or ego-ideal of MacKinnon's creative architects came from the same place, within themselves, allowing them to deal with their problems and overcome their conflicts. Subjects with self/ideal congruence are found to be socially poised and confident, whereas those with large ego/ego-ideal discrepancies are prone to anxiety and self-doubt (Gough, Fioravanti, & Lazzari, 1983).

People who accept themselves have greater access to their unconscious and are thus more aware of their inconsistencies and imbalances. Their strong egos give them greater flexibility to withstand the resulting tensions and to integrate the opposing forces. Not only does a strong ego provide an edge in overcoming psychological setbacks, it actually permits the degree of discombobulation that is needed in the process of creation. Because of their ego strength, creative people can visit the subterranean world of their unconscious without becoming stranded there. They insist on a round trip ticket before boarding the boat (Whiteside, 1981).

Self-acceptance is accompanied by a sense of destiny, a belief in one's own worth (Hilgard, 1959). Barron (1968) found in his creative writers a "moral attitude," a commitment to larger aesthetic and philosophical

meanings, a cosmological motivation for creating. This state corresponds to the highest stage in Kohlberg's moral development, that of transcending the societal group for "the universal community of persons" (Kegan, 1982, p. 71).

Complexity includes contradictions and inner conflicts, the opposing forces described above. Paradoxically, it also incorporates an elegant simplicity of style. There are so many facets to a creative person's character, so many "pieces in the drum," that some of them are bound to rub together. To compensate for inner disturbance, one must clarify and simplify thinking patterns.

Rosner and Abt's (1970) contributors spoke of the presence of many thoughts converging on the mind at the same time. They were able to deal with antinomies and apparent paradoxes and produce something greater than the sum of the parts. Barron's (1968) creative writers were at the same time masculine and feminine, extroverted and introverted, conforming and nonconforming. "In the sequence of related acts which result in the creation of something new, there occurs consistently a rhythmic alteration and a genuine resolution or synthesis of certain common antinomies" (Barron, 1963, p. 240).

The creative adolescents tested by George Domino (1970) were "both active and aloof, enthusiastic and

reserved, humorous and serious, sensitive and tactless, rational and unconventional" (p. 50). George Pickering (1976) used Einstein and Freud as examples of creativity overcoming conflict: Einstein's between religious belief and reason; Freud's between strong emotions and self-control. Rothenberg's (1979) study of fifty-seven productive creators documented his theories of janusian and homospatial thinking as essential ingredients in the creative process. Janusian thought (from the many-headed god, Janus) is the simultaneous conception of antithetical ideas; homospatial thinking is the conception of two or more objects occupying the same space. In one sense, time is transcended, in the other, space; but "there is almost invariably a sense of overall balance, proportion, and order" (Rothenberg, 1979, p. 360).

Correlates of complexity have included originality, artistic interests, social deviance, independence of judgement, anxiety, and the confrontation with the unconscious that is characteristic of schizophrenics (Barron, 1968). This latter finding seems to bear out the prevailing idea that creative genius is related to insanity. Pickering (1976) said this idea goes all the way back to Plato and Aristotle. But he refuted it with the argument that many creatives behave oddly for two reasons: (1) They may find it dull to be considered

normal, and (2) this behavior may be part of their rejection of society. Anthony Storr (1972) proposed that the idea may have originated with the inability of ordinary people to understand the apparent lack of control shared by the insane and the creative. The playwright Strindberg was an example. Although he had crises where he exhibited symptoms of paranoid schizophrenia, Strindberg was always able to control his inner world. His ability to work was not impaired, "his ego was never completely overthrown" (Storr, 1972, p. 210). In fact, Strindberg (1921) himself, in "The Dream Play," attested to the drive of the creator toward integration when the daughter said: "Conflict between opposites produces energy as fire and water give the power of steam" (p. 101).

Out of complexity comes a preference for harmony and elegance of form and style (Hilgard, 1959). The mind forms and reforms the world in its struggle for harmony and integration (May, 1975). The creative response to disorder is to find an elegant new order, as original people do when shown the Rorschach ink blots--they interpret them by synthesizing the details into one comprehensive image (Barron, 1962).

Perseverance is willingness to delay gratification, to put off the comfort of easy solutions. Creative people persist in finding and testing alternatives until the

right one comes along. They become totally immersed in the project or problem. This takes willpower, self-discipline, and planning ability. Because it involves the will, perseverance depends heavily on autonomy and self-acceptance.

The value of perseverance in problem solving has been seen in many studies. In her work with leading artists and scientists, Anne Roe found they all had one trait in common: a willingness to work hard and for long hours (Guilford, 1959). Getzels and Csikszentmihalyi (1981), in their study of problem finding, discovered that the successful artists took longer to choose their subject matter and start work, although they did not take any longer than the others to make the total drawing. Sternberg and Davidson (1982), whose successful problem solvers were also more persevering, compared problems to some city apartment doors: They have multiple locks requiring multiple keys.

The poet Keats called perseverance "negative capability," a tolerance for uncertainty and doubt (Storr, 1972). McMullan (1976) called it "flexible persistence," reminding us of Rogers' toying with concepts--playing with possibilities but pushing for closure. The creator shifts back and forth. When immediate solutions are not accepted, the likelihood of more alternatives is increased. Without

continuing to turn the drum of Parnes' (1967) kaleidoscope with Edison's "90 percent perspiration," we would not know satori--the Aha! the Eureka! the flash of inspiration that accompanies the successful integration of experience.

These four factors of the inner self, with the four factors of orientation, are some of the dominant characteristics of creative persons. They are the warp and the weft of the creative fabric, interwoven in a multitude of patterns, each unique.

Creativity Assessments Currently Used with Adults

Personality testing in the United States began during World War II with an assessment program carried out by the Office of Strategic Services (OSS) (MacKinnon, 1976b). These assessments differed from previous psychological tests in that they were concerned not with psychopathology but with the positive aspects of personality and the potential for effective functioning. By the 1950s this country was involved earnestly in testing for creativity in response to fears of being surpassed by the Soviet Union in scientific efforts. It was hoped that potentially valuable scientists could be spotted and given the proper encouragement and training (Cohen, 1977).

Besides factor analysis, described in the section on Major Studies of the Creative Personality, early researchers used the Rorschach inkblot test and the MMPI in personality testing. Since these tests were standardized on hospitalized mental patients, they were not deemed valid for assessing normal-functioning people (MacKinnon, 1976b). Consequently, new tests were designed to show specifically the abilities and personality traits associated with growth toward self-actualization. At IPAR, researchers developed the following personality tests: the Barron-Welsh Art Scale (Barron & Welsh, 1952), the Adjective Check List (ACL) (Gough, 1952), the California Psychological Inventory (CPI) (Gough, 1957), the California Q-Sort (Block, 1961/1978), and an Ego Strength scale for the MMPI (Barron, 1968). The following descriptions of these and other tests, unless otherwise specified, are taken from the 1984 Consulting Psychologists Press Catalogue, Palo Alto, California.

The Barron-Welsh Art Scale, an abstract of the Welsh Figure Preference Scale, measures preference for complexity with eighty-six black-and-white figures to which the subjects respond with like or dislike.

The Adjective Check List (ACL) contains 300 adjectives that can be checked to describe oneself. It can be scored on up to thirty-seven scales or syndromes. The ACL

been used in a wide range of research studies. Using fifty-nine adjectives and converting raw scores to standard scores, George Domino devised a key for testing creativity with the ACL (Davis, 1983). However, the ACL has been shown to be susceptible to faking for both high and low scores (Ironson & Davis, 1979).

The California Psychological Inventory (CPI) is a 480-item true/false questionnaire. It now has twenty-four scales, including Poise, Responsibility, Intellectual Efficiency, Achievement Potential, Leadership, and Maturity.

The California Q-Sort consists of a deck of cards with one hundred personality statements. Used in research for twenty years, it is still in demand.

The Ego Strength scale (Es) was devised as an additional indicator on the MMPI to be used both clinically and in research. It can predict response to psychotherapy by measuring traits such as stability, sense of reality, and feelings of personal adequacy (Barron, 1968).

J. P. Guilford and E. P. Torrance are best known for tests not of personality but of creative ability. Guilford built tests that measure each of the twenty-four divergent-thinking abilities in his Structure-of-Intellect model. His research and his model have inspired many other studies and tests. Torrance directed the development of a

series of creativity tests, known collectively as the Minnesota Tests, that were based on the Divergent Production plane of Guilford's model. Now called the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966), they measure fluency, flexibility, originality, and elaboration.

The Creative Behavior Disposition Scale (CBDS) (I. A. Taylor, Sutton, & Haworth, 1976) measures all five creativity dispositions mentioned in Chapter I of this paper. It takes about thirty minutes to place the seventy-five items on a scale of 0-100. Still in the research stage, the scale seems to be a good multi-component test.

The Remote Associates Test (RAT) (Mednick, 1976) focuses on the ability to associate remote elements in relevant ways. Its reliability is adequate (.91-.92) but its validity has been questioned. Not only does it lean heavily on verbal intelligence and convergent thinking (Buros, 1978), but some very creative associations may not be given proper credit (Davis, 1975).

The Wallach and Kogan Tests are scored for fluency and uniqueness. Although the original sample consisted of 151 fifth-grade children, the battery has been used successfully with college students (Davis, 1983). The unique feature of these tests is that they are not timed, a factor that reduces both anxiety and any possible

influence of IQ on the scores. They have good predictive validity but are difficult to score.

The Getzels and Jackson Tests consist of five subtests, most of them verbal. These tests measure flexibility, fluency, and originality and an attempt is made to keep the items open-ended. However, the one subtest that does not involve verbal intelligence requires analytical thinking, a convergent rather than a divergent skill (Davis, 1983).

The Group Inventory for Finding Interests II (GIFFI II) (Davis & Rimm, 1980) includes sixty interest items to be rated from no to definitely. The authors rate reliability high and validity good. The GIFFI II, along with GIFFI I and GIFT (described in the following section), was developed from Davis' How Do You Think inventories, in turn derived from previous research with biological and personality instruments by Calvin Taylor and Charles Schaefer.

Creativity Assessments Currently Used with Children

Not long after programs for the gifted appeared in the schools, it was argued that creativity data should be included in identifying gifted children (C. W. Taylor, 1975; Treffinger, 1980). Consequently, some adult

creativity tests were adapted for children and new ones were invented. Some of the most popular are presented.

The Torrance Tests of Creative Thinking (Torrance, 1966), both verbal and figural, are suitable for all educational levels. Since these were among the tests chosen as concurrent criteria in the present study, they are described in detail in Chapter III in the section on Measures. Thinking Creatively with Sounds and Words is an intriguing Torrance battery where sound effects and onomatopoeia are responded to, but it yields only an Originality score and relies heavily on verbal intelligence. It can be used effectively as an exercise to stimulate creative thinking (Davis, 1983).

The Renzulli-Hartman Creativity scale (Renzulli, Hartman, & Callahan, 1971), the most popular attitude-information instrument, was also chosen as a criterion for the present study. The child is rated on superiority in creativity traits (curiosity, nonconformity, awareness, unusual responses, etc.). However, some warning questions may be asked about ratings: (1) Must the rater have creative characteristics to see them in someone else? (2) Can negative reactions to an individual influence ratings?

The Group Inventory for Finding Creative Talent (GIFT) and the Group Inventory for Finding Interests I

(GIFFI I) are inventories for a range of children from Grades 1-8 (Davis, 1983). The main traits covered are curiosity, independence, flexibility, perseverance, and breadth of interests. Research indicates these inventories are culturally fair with high reliability and good content- and criterion-related validity (Rimm & Davis, 1980). These tests are brief but untimed and easy to administer. Because they are machine scored, they are relatively expensive. A sample of the thirty-three items is "It's all right to sometimes change the rules of the game," testing flexibility. GIFT for upper elementary level was also used in the present study.

The following tests are listed in The Eighth Mental Measurements Yearbook (Buros, 1978):

The Creativity Tests for Children (CTC) are Guilford's adaptation of his adult tests. Low correlations with Torrance's TTCT were reported.

The Creativity Attitude Survey (CAS) and Similes, both by Charles E. Schaefer, are normed for Grades 4-6. The CAS is recommended only to test the effectiveness of school programs. Similes has high reliability and significant correlations with teacher ratings but measures only literary creativeness.

The Test of Creative Potential by Hoepfner and Hemenway is an answer to the Guilford and Torrance tests,

which are time-consuming and difficult to administer and score. However, the scoring service is expensive at eighty cents per test.

Requirements for Tests of Creativity

Investigators do not agree on the best way to test for creativity. MacKinnon (1975) declared creativeness cannot easily be manifested on demand, which is what is required by many tests. Performance on such tests has never been taken as a criterion in the IPAR studies. Blum (1978) said that since testing should simulate the task as closely as possible, the more we depart from a standardized testing procedure, the more successful we can be. Walkup's (1976) answer to this was the interview. He maintained the best way to ascertain people's creativeness was to ask them or to count the number of patents they hold or unique contributions they have made.

Other methods have been devised as well, including the use of Chinese tangrams by George Domino (1980). Domino himself suggested that tangrams and inkblot tests may be more useful in exploring the process of creativity than in measuring it, as their validity leaves much to be desired. Since Guilford's and Torrance's tests have also shown little or no criterion validity (Blum, 1978),

perhaps the same can be said of them. Certainly they are excellent motivators for improving divergent thinking and problem-solving skills.

Torrance (1983) stated that "almost all scientific progress is dependent upon the development and calibration of instruments for measuring the phenomena under study" (p. 5). However, the following lament by test evaluator John W. French is also true: "It will not be possible to evaluate adequately the validity of a test of creativity until the testing profession can agree on what creativity is" (Buros, 1978, p. 247). Existing measures of creativity give relevant and necessary information; they are about as good as they can be, but individually they cannot assess all the dimensions of such a complex phenomenon. What is needed is a kind of profile derived from multiple assessment procedures (Treffinger, 1980).

Domino (1980) suggested minimal requirements for any test of creativity: It should be interesting to take, easy to administer, and amenable to statistical analysis and should not emphasize abilities other than creativity. These conditions can be met by the handwriting analysis method of assessing creativity, a detailed account of which follows.

Handwriting Analysis

History and Methods

Graphology (handwriting analysis) is the study of personality through the arrangement, form, and movement of handwriting. It combines the science of accurately measured factors and the art of interpretation to produce a complete personality profile. Since handwriting originates in the brain, our unconscious use of form and space reveals our attitudes, interests, and energy, our self-image, and our creative potential.

Serious research in the field started only a hundred years ago, but handwriting was observed as far back as Aristotle ("Just as all men do not have the same speech sounds, neither do they all have the same writing") and Confucius ("Beware of a man whose writing sways like a reed in the wind"). After the publication by Camillo Baldi in 1662 of a treatise on handwriting and personality, writings began to be collected systematically. The most influential collector was Abbé Jean Hippolyte Michon, a French priest. He introduced the word "graphologie" and is considered to be the father of modern graphology. He studied handwritings and correlated the strokes to his observations of people's behaviors. Much of his work is still valid, although simplistic by today's standards.

The first scientific graphologist was French psychologist Jean Crepieux-Jamin, who taught in the late 1800s that the whole of writing and personality must be considered rather than each aspect or trait by itself. Among those following were Wilhelm Preyer, who demonstrated that writing originates in the brain, and Alfred Binet, who showed that IQ can be determined from writing, but age and sex cannot.

At the beginning of the twentieth century, the German philosopher Ludwig Klages formulated the basis for the gestalt system used today. Stating his theories of graphology, Klages argued that two forces within us--mind and soul--are dynamically opposed: mind being tendencies toward contraction, regulation, and control; soul being tendencies toward release, expansion, and impulse. The integration of these forces in handwriting--contraction seen in strokes down and toward the self, expansion in upstrokes and those away from the self--shows us the gestalt or essence of the writer. Klages is also credited with coining the term "formniwo," or form level, to mean the degree of aesthetic and intellectual qualities allowing a person to integrate the antinomies of mind and soul.

Most of the validation studies on graphology took place in the 1920s and 1930s. Among outstanding

researchers were Bernard Wittlich in Germany; Max Pulver in Switzerland; Klara Roman in Hungary; and in the United States, Gordon Allport and Philip Vernon at Harvard and Thea Lewinson and Joseph Zubin at the University of Michigan. In spite of many successful validation studies, there were some poorly designed studies that added fuel to a reputation for occultism, so handwriting analysis has been slow to find acceptance in this country.

Graphology has been used in business, psychology, education, criminology, and medicine. In the legal field, besides examining questioned documents, graphologists are beginning to be sought as expert witnesses (Moore & Wood, 1981) and for jury selection (Thorsen, 1984). Personality therapy through handwriting modification is also beginning to prove extremely useful, as results can be achieved in a relatively short period of time (Leibel, 1972; Sainte Colombe, 1972).

There are three general methods of analyzing handwriting: (1) intuitive, (2) trait stroke, and (3) holistic. The intuitive method is used by people who can read handwriting the same way they can interpret body language and facial expressions. Looking at a highly embellished writing (Figure 2), an intuitive analyst would say the writer would probably drive a sports car with "everything on it" rather than a prosaic station wagon and would wear

jewelry and dress in the latest style. Someone who writes in this way is interested in the trappings of life. With intuition and a vivid imagination, one could create quite a picture of this person.

Fig. 2. Sample of Highly Embellished Writing

Intuitive reading has helped give graphology a poor reputation in this country. It was not until 1981 that, as a result of petitions, the subject was removed from the Occult classification at the Library of Congress and placed under Psychology, with three distinct divisions: diagnostic graphology, documentary evidence, and personnel selection.

The second method of analyzing writing, called trait-stroke, was used by the founder of graphology, Abbé Michon, who maintained each type of stroke a person makes

corresponds to a particular trait in his or her personality. In this country, the trait-stroke method was refined and taught by Milton Bunker, founder of the International Graphoanalysis Society. This system of analysis has been criticized as being simplistic and not grounded sufficiently in psychology (Farmer, 1982).

The holistic or gestalt method of analyzing handwriting is the one most widely used in Europe and by many graphologists in the United States. One of several diagrams or worksheets can be used, but the overall procedure is the same: (1) One looks at the sample of writing to get an overall impression and a general idea of the "form level"; (2) then one breaks down the writing into its components, taking measurements with a ruler, protractor, and magnifying glass, noting the many trait-strokes and tendencies, and grouping them according to indicators such as speed, slant, letter connections, size, and so on; and (3) putting it all together, one completes the analysis by synthesizing the details into a final profile. It must be emphasized that it is never the form of simple letters alone, nor any particular characteristic, but the combination and interaction of all parts of the writing pattern that reveal the true nature of the writer (Roman, 1959).

The diagram used by this investigator is a circular one called the Personal Worth Chart (Figure 3). A modification of the Roman-Staempfli psychogram (Roman, 1968), it is divided into eight sections or syndromes, each containing five factors. The upper half represents the conscious part of the personality (traits that can be consciously changed or controlled); the lower half represents the unconscious (motivations and subconscious drives). The right side reflects extroversion (social needs); the left, introversion (inhibitions). Of the forty indicators, ten can be directly measured and the rest require numerical judgments, on a scale of 0-10, based on the strength and frequency of the writing characteristics. Understanding the psychological significance of the various indicators gives the analyst a basis for evaluating and interpreting the scores.

Handwriting analysis has been found to be a valid and practical method of personality assessment, equal to or better than any other assessment procedure or projective technique, including the Rorschach (Teltscher, 1942/1971) and the Thematic Apperception Test (Lomonaco, Harrison, & Klein, 1973). Interrater reliability among the different techniques of analyzing handwriting has also been studied (Whiting, 1980). This investigator took part in one recent study that proved statistically significant

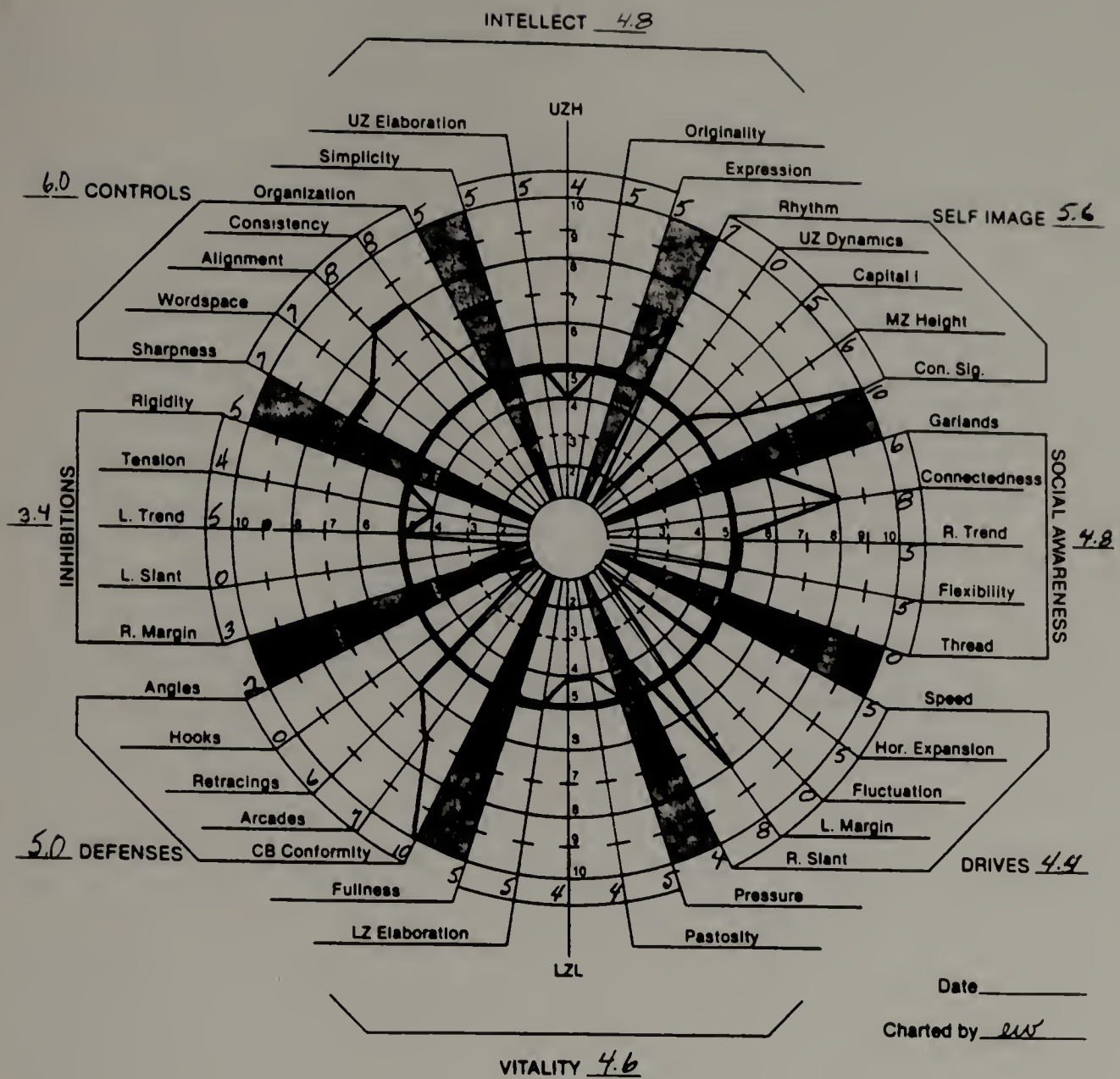


Fig. 3. Personal Worth Chart:
Measurements for Copybook Writing

Source: E. Whiting and P. Sassi, Personal Worth, Intermediate Course in Handwriting Analysis (San Diego, Calif.: Handwriting Consultants, 1983), p. 7.

reliability based on the two major approaches, trait-stroke and holistic (Pritchard, 1985).

Creative Personality Factors as Seen in Handwriting

The eight major creative personality factors described earlier in this chapter can be interpreted graphologically. The following interpretations, unless specifically stated, are from Whiting and Sassi's (1983) Personal Worth course.

Spontaneity, or active mental and emotional involvement and expression, is determined by three scores from the Personal Worth Chart: Expression, Speed, and Right Slant. Expression is the ability to express oneself without inhibitions, an inner freedom controlled by intellect. Speed is the inner tempo, the spontaneity of reaction and adjustment. Right Slant is the automatic emotional reactions and release.

Openness, one's transpersonal awareness, is determined by scoring the entire Social Awareness Syndrome-- a combination of five separate scores from the Personal Worth Chart: Garlands, Connectedness, Flexibility, Right Trend, and Thread. This syndrome is a measure of how a person reaches out from self to others and to life. It reveals not only social methods on the conscious level but also inner unconscious motivations. This section lies on

the right or extroverted side of the chart and is split between conscious and unconscious by Right Trend. Garlands is the degree of empathy for others. Connectedness is contact with reality, cause and effect perspective. Flexibility is resilience and ability to blend thinking, feeling, and action. Right Trend is reaching out toward others and the future. Thread is tact and diplomacy, changing direction easily.

Intuition, using imagination to break away from the limitations of logic and the senses, is determined by the score for Simplicity and a score of 10-minus-Connectedness. The latter gives a score for disconnected writing. In one study the correlation between intuition and breaks in handwriting was significant at the .02 level of confidence (two-tail) (Hayes, 1979). Simplicity is the ability to eliminate nonessentials. The 10-minus-Connectedness is going beyond cause and effect perspective.

Flexibility, the ability to adapt to and learn from experience, is a repeat of the single score for Flexibility from the Social Awareness Syndrome. This investigator feels there is no risk in repeating this score, as flexibility is such an important part of creativity.

Autonomy, independent judgment and responsibility, consists of the mean of Rhythm and Originality. Rhythm is balance of tension and release--harmony. Originality is

individuality or nonconformity. Originality in writing does not in itself denote creativity (Mendel, 1947). If the Rhythm score is low, showing disharmony, then Originality will also be regarded as low and be judged as eccentricity rather than creativeness.

Self-Acceptance, ego strength or positive self-image, is determined by the overall impression of the writing. On the Personal Worth Chart, it is the mean score of ten indicators, giving a composite known as High Form Level (HFL). The indicators of HFL are shown in Figure 4. HFL writing is usually pleasing to look at and departs considerably from what graphologists call "copybook," the style one learns in school. The HFL score measures how well the intellect is integrated into the social environment, what this investigator calls "productive capability" (W. W. Smith, 1983). Low Form Level (LFL) script, on the other hand, is usually inharmonious and can be difficult to read. It contains features that reveal negative personality traits such as defensiveness, rigidity, and anxiety. According to Ania Teillard (1975), psychoanalyst and pupil of Klages, the best way to understand his formniwo (form level) is by comparison through use of a scale of values. She said:

The inferior level is expressed by emptiness, the lack of expression, movements mechanized and devoid of life and originality; by

<u>Indicator</u>	<u>How it is seen</u>	<u>What it measures</u>
Controls:		
*Organization	overall use of space	self-direction; planning; adjusting to change
Intellect:		
*Simplicity	economy of stroke	clear thinking; directness; resistance to distractions
*Originality	variation from "copy-book" forms	innovation; unconventionality
*Expression	movement; form; color	spontaneity; freedom of thought and action
Self-Image:		
*Rhythm	cadence of upstrokes and downstrokes; balance of movement	harmony; integration of mental/physical/emotional
UZ Dynamics	left-to-right movements and connections in upper zone	drive; assertion of will
Social Awareness:		
Garlands	bowl-shaped strokes	empathy; receptivity
Connectedness	connected letters and punctuation	logical association; perspective
Flexibility	smoothness; fluidity	resilience; ability to accommodate and learn from experience
Drives:		
Speed	tendency to the right; simplified forms; ascending lines	inner tempo; spontaneity of reaction and adjustment

Fig. 4. Graphological Indicators of High Form Level

*Also determinants of IQ.

monotonous writing, colorless, lacking individuality; or by an exaggerated writing trail, but one stripped of life.

The superior level we feel in the rhythm, the good distribution of white and black spaces, the happy proportion of the letters. It can stand up to certain harsh elements (see Beethoven's writing), even to regularity (if it's not too rigid). (p. 9)

Clinical psychologist/graphologist Ulrich Sonnemann (1950) defined form level as "the relative degree of originality of form in combination with its relative degree of aesthetic balance" (p. 25). He maintained that laymen's judgments of form quality have had high correlations with those of other laymen and with the judgments of graphologists. Figure 5 shows examples of High Form Level and Low Form Level writings.

Complexity, the result of a multi-faceted personality that often includes contradictions, must consist of both Simplicity and Originality, both explained earlier. Alfred O. Mendel (1947), describing how comprehensive thinkers such as Einstein and Pasteur disposed of the i-dot problem by integrating the dot with the preceding or following letter, said: "Almost always the more simplified a person's script, the more complex his personality" (p. 284).

Perseverance, persistence in searching for alternatives, is seen as a combination of willpower (Upper Zone Dynamics) and mental planning (Organization). Upper Zone Dynamics are drive and assertion of will, manifestations

I often think (in hindsight) that these two contradictory impressions following each other very quickly, influenced my later career as an author/illustrator of books for children who are about to enter school. With my books I attempt

Male, 54, right-handed. High Form Level. Energy productive.

When you get home from work, I thought to "Erik the Red" after I had been calling and calling all. He ripped down a school image and now is building a 40. The State is after him because they built for fire safety reasons. Valeno is after Marilyn because

Female, 26, right-handed. Low Form Level. Energy is weakened by frustration, emotional instability, fluctuating self-image.

Fig. 5. Examples of High and Low Form Level Writings

of psychic or universal energy--intensity of life (Teillard, 1975)--necessary to remaining involved with a task while tolerating uncertainty and putting off closure. Organization allows one to deal with complexities and cope with unusual circumstances while waiting for the right solution.

Analyzing the Writing of Children

People express their personalities through handwriting, as through other gestures. Even the scribbles of a two-year-old reveal personality dynamics (Solomon, 1978). Like the character of their owner, the scribbles may not be complete forms, but they can provide a trained graphologist with clues to the child's self-image, organization, motivation, and needs.

The overall sign of a healthy child is firmness in the writing and an even stroke. This is the dynamic, elastic stroke Roda Wieser spoke of in her concept of "ground rhythm," a prerequisite for High Form Level. She described ground rhythm as "inner strength or weakness which expresses itself in all behavior, including the writing movement" (Karohts, 1964, p. 40).

Psychologists agree that behavior patterns are crystallized by age five. An analysis of children's

writing, with rounded forms showing impressionability, must take into account a rapid rate of change; but it can indicate their pattern for future growth. "Even the handwriting of young children reveals their basic character structure and important aspects of their emotional makeup, potentials, and learning capacities" (Teltscher, 1942/1971, p. x).

Although this investigator has seen many personality differences in first and second graders copying from the same writing model, some philosophers, psychologists, and graphologists caution that children's writing does not fully reveal character until the ages of eight to ten. One reason is that by that age the writing becomes an unconscious habit, with more concentration given to the thought than to the physical act (Olyanova, 1936/1969). Another reason is that consciousness, and therefore personality, has not been basically formed until then (R. Smith, 1982).

Assessing Creativity Through Handwriting Analysis

Graphological Literature on Creativity

Although there has been no definitive graphological research on the subject of creativity (AHAF Research

Committee, 1984), many graphologists have referred to it and some of its important aspects. For instance, Mendel's (1947) example of writings simplified by i-dot connections has been mentioned previously. This and other short cuts are ways of breaking with the copybook style. It is like breaking away in problem solving from an unproductive mental "set." Jane Green (1975) also rated simplification of writing form as one of two major factors in creativity. She said, "It is generally the sign of a complicated personality who has the facility to create unusual things or situations" (p. 134). The other factors she valued are originality, flexibility, spontaneity, expressiveness, freedom from anxiety, and rhythm. Green commented that "a rhythmic, synergized movement suggests a progressive, adaptable attitude" (p. 132).

Betty Link (1972) examined creative potential for business in three areas: originating ideas, producing useful objects, and artistic expression. The writing of an idea-person is judged on simplicity, flexibility, individualized forms, expressive freedom, and fullness of form. Technical creativity is scored for initiative, resourcefulness, individualized forms, rational objectivity, and intelligence. Aesthetic creativity includes individualized forms (with both simplification and elaborations), rhythm, and regularity. One can see that

in each of these groupings the breaking away from copybook forms is a major factor in the writing of creative people.

As mentioned earlier, complex personalities can have many kinds of contradictions. In his study of handwritings of successful people, Herry O. Teltscher (1942/1971) observed a variety of contradictory traits; for example, Einstein's excellent logical capabilities versus flashes of spontaneous insight, Toscanini's dynamic and emotional temperament versus his great discipline and control, and Freud's stubborn determination as opposed to his creative imagination. Edward O'Neill (1980) called some contradictions "ambivalence," a disagreement between conscious and unconscious attitudes. If ambivalence is reasonably controlled, it can broaden emotional amplitude and make a person more adaptable and versatile. Sonnemann (1950), describing the handwriting of a man whom he decided would best understand the needs of both parents and children and thus would best meet the qualifications for a chief buyer of toys, used the oximoron "restrained imaginativeness" to show the synthesis of contradictions in this man's High Form Level writing.

Graphologically, form level signifies a positive or negative self-image, the higher score showing the greater ego strength or productive capability. This investigator interprets High Form Level as being similar to Barron's

(1968) view of ego strength. Barron refers to the Ego Strength (Es) scale of the MMPI, with its contributing characteristics of physical health, sense of reality, feelings of personal adequacy, freedom from moral or ethical prejudice, and spontaneity. He adds intelligence to this list. Since High Form Level in handwriting also involves intelligence, positive self-image, social awareness, flexibility, and spontaneity (see Figure 3, p. 49), it is reasonable to assume the two terms are comparable.

The Upper Zone in writing includes all the looped letters, such as b, h, l, capitals, and extensions of strokes that reach above the height of the middle zone letters, for example, a, m, n, o. It is known in graphology as the measure of exploration, mental and philosophical. Some authors have termed the Upper Zone the area of intellect, pride, and the ideal (Mendel, 1947), and of imagination and inquiry (Roman, 1952). Link (1972) listed it as one graphic feature in technical creativity (inventiveness).

On the other hand, one must be cautious about interpreting high scores. For example, high scoring subjects on the Self-Acceptance scale of the CPI appear to be more self-satisfied (a negative trait) than self-accepting (Barron, 1968). Whiting and Sassi (1983) did not include UZ height as part of the IQ or HFL scores on the Personal

Worth Chart because they believed a high score in this area points away from reality to illusions and delusions. Also, Huntington Hartford (1973) found that greater-than-average upward extensions may be traced to aspirations but are "rarely the instinctual and compulsive search of the purely creative person" (p. 175). In a pilot study by this investigator on productive creativity and handwriting, described in detail in the following section, Upper Zone height was indeed seen to bear no relation to creativity (W. W. Smith, 1983).

Pilot Study on Creativity and Handwriting

Because graphologists are among those concerned with creativity and because of the lack of definitive creativity research by graphologists, this researcher undertook a graphological investigation of productive creativity and handwriting. The purpose was to focus on the structure of the creative personality through handwriting analysis.

The goals were

1. to determine whether certain personality traits thought to be associated with creativity were present in the handwriting of a number of productively creative persons;
2. to determine whether these creative people manifested contradictions within their personalities;

3. to investigate a possible relation between self-concept and creativity; and

4. to investigate a possible relation of height of Upper Zone letters to creativity.

Handwriting samples were collected from seventeen well-known, productively creative adults. A criterion of their creativity was the fact that they had produced stories, plays, poems, visual art, cartoons, or concepts that have been published or prized or both. Fourteen of the subjects also replied to a questionnaire pertaining to birth order, self-concept as a child, schooling, and early experiences; and they checked a list of thirty-two adjectives to describe themselves.

A full graphological assessment was made of each respondent, for which the Personal Worth Chart was used as an aid. All forty graphic indicators were scored on a scale of 0-10 to yield a personal profile for each subject. From the assessment scores, IQ was measured, then High Form Level (HFL) and Low Form Level (LFL), both explained earlier. Finally, the eight creativity traits described previously were scored by the researcher, using their graphological interpretations. Figure 6 shows the traits and scoring procedure. The eight scores were totaled for each subject, then multiplied by three to obtain a graphological creativity quotient (GCQ). The researcher chose

Trait	Meaning	Scoring
Spontaneity	active mental and emotional involvement and expression	Expression Speed Right Slant mean
Openness	transpersonal awareness of the environment	Social Awareness syndrome (5 scores), find mean
Intuition	breaking away from limitations of logic to process knowledge	Simplicity 10 minus Connectedness mean
Flexibility	ability to adapt to and learn from experience	Flexibility score
Autonomy	independent judgment and responsibility	Rhythm Originality mean
Self-Acceptance	positive self-image, ego strength	High Form Level (10 scores), find mean
Complexity	many-faceted personality with contradictions	Simplicity Originality mean
Perseverance	persistence in searching for alternatives	Upper Zone Dynamics Organization mean

Add the eight scores and multiply by 3 to find the graphological creativity quotient (GCQ). (Copybook GCQ = 117.)

Fig. 6. Traits and Scoring Procedures for the Graphological Creativity Quotient

to multiply by three because the result, an average score of over 100, can tolerate the elimination of fractions of points.

Of the seventeen respondents, eleven were male and seven were female. The age range was forty to sixty-three, with the average being fifty-two. As children, 85 percent attended public schools--57 percent in the city as opposed to suburban or rural areas. Forty-one percent were considered by both themselves and others as typical children, 12 percent were considered atypical, and the rest were equally divided. From answers to questions about childhood traumas, illnesses, and influences, one might conclude that these creative individuals had more or less normal childhoods, without prodigious behavior on their part or special treatment by others. MacKinnon (1976a) reported, too, that his creative architects' family life on the whole was quite happy. Although most questionnaire data proved insignificant, the percentages of first-born or only-child (57 percent) and left-handedness (18 percent) seemed higher than the norm. However, these data were outside the scope of the study and are regarded only as possible avenues for future research. The Adjective Check List data merely determined that the degree of self-knowledge of the subjects was high.

Feelings as to preference for working alone or with others were divided among the respondents to the questionnaire. The consensus seemed to be that it depended on what they were doing. Barron's (1968) creative writers were found, on the Myers-Briggs Jungian Type Indicator, to be distinctly more introverted than extroverted. The respondents in this pilot study, most of whom were also writers, showed as a group less than one full point difference between graphological scores on the left or introversion side of the Personal Worth Chart in the Controls, Inhibitions, and Defenses syndromes (4.9) and those on the right side in the Self-Image, Social Awareness, and Drives syndromes (5.7) showing extroversion. However, no significance can be attached to this information at this time.

IQ, as determined from scores on the Personal Worth Chart, ranged from 120-152, with an average IQ of 136. Graphologically determined IQ scores have been shown in empirical studies to be within five points of the Stanford-Binet tests (Whiting & Sassi, 1983). IQ was included only as an indication of the general intellectual level of the subjects in the study. Wallach and Kogan's (1969) landmark study of children implied that intelligence is not a factor in creativity. However, it seems that at least an above-average level may be necessary to

be productively creative in our society. Studies have shown that there is a low positive correlation of intelligence and creativity, around .40, but that beyond an IQ of 120, around the 95th percentile, the relationship is negligible and personality factors become more important (Barron, 1968; Meer & Stein, 1955).

The results of this study indicated the eight personality traits found to be typical of the creative individual were present in all seventeen of the respondents in varying but above-average amounts. These traits were interpreted graphologically to produce a graphological creativity quotient (GCQ). The GCQ range of the respondents was 129-179, with a mean of 148. The GCQ for copybook or school copy writing is 117. Without further research, it can only be concluded that these people are merely more creative than those who do not deviate from the standard form.

The GCQ method can be used by other handwriting analysts familiar with the circle profile and probably can be adapted for use with any graphological system. It is proposed, however, as simply one method of assessing creativeness. Certainly more than one procedure is necessary (Davis, 1975; C. W. Taylor, 1964; Treffinger, 1980).

Contradictions were found in most of the subjects of the study, their average score for Complexity being 7.1--

the highest of all the eight traits. Some of the contradictions were empathic/distancing, spontaneous/compulsive, conforming/rebelling, aggressive/soft, fluctuating/consistent, impulsive/introspective.

The relationship between self-concept and creativity, established by the personality research previously discussed, was verified graphologically. Self-acceptance--ego strength--can be seen by finding the degree of High Form Level in the script. The HFL of the respondents ranged from 6.0-7.7 (against an average of 5.0). The LFL, or anxiety and defensiveness range, was 3.7-5.0, with a mean difference between the two of 2.3 points. The relation between HFL and LFL indicates how well a person is functioning in his or her environment. Since it is unusual for this difference to be more than two points (Whiting & Sassi, 1983), these creators are well above average in their scope of interests and activity. They are unconventional and not hesitant about trying new ventures. They are above average in intelligence and social awareness and will seldom allow negative attitudes to impede their progress and growth.

High Form Level people, those with a high level of ego strength, would seem to have an edge on the irrational "further reaches of creativity" (Torrance, 1980), the flashes of insight of the Japanese satori (Torrance, 1979),

and the ecstasy of peak experience (Maslow, 1968). When confronted with novelty, they would get excited rather than suspicious; when looking at new solutions to problems, they would overlook defects instead of focusing on them (Torrance, 1980).

As stated earlier, height of Upper Zone letters was seen to bear no relation to the writing of these creators.

The present research was planned as a logical outgrowth of the pilot study, with the following purpose: To validate the GCQ with relation to other creativity measures by investigating the assessment of children's creativity through their handwritings.

Assessing Children's Creativity

It has been shown that certain personality factors can be used as valid creativity measures. It has also been shown that creativity can be assessed graphologically. Still, three questions present themselves:

1. Should children's creativity be measured by the same factors used for adults?
2. Can children's handwriting reveal those factors?
3. In the investigation of children's creativity, what is the significance of the "fourth grade slump"?

To address the first question, while creativity and maturity are not the same thing, Maslow (1968) said, "The highest maturity is discovered to include a childlike quality, and we discover healthy children to have some of the qualities of mature self-actualization" (p. 207). Getzels and Jackson (1962) also learned that highly creative students' personality structures, although less sharply delineated, are congruent with those of mature creative people.

A number of investigators have attempted to use Cattell's 16 Personality Factor Questionnaire for assessing the overall personality of children aged twelve, eight, five, and four (Cattell & Butcher, 1970). They found little difference except in the relative importance of a few factors such as Suspecting versus Accepting and Shrewdness versus Naiveté. On the other hand, two new factors appeared, especially for younger children: Excitability and Conflict with the Superego, two traits that are not entirely absent in adults. It would seem these differences would not be important in a test of creativity, however. This investigator has found, in reviewing the creativity tests presented earlier in this chapter, that the main difference between tests for adults and for children is not in factors or skills analyzed but

in adjustment to the children's interests and their relative lack of verbal skills.

The second question asked earlier has not yet been addressed in the literature. Although graphologists have mentioned creativity revealed in children's handwriting (Mendel, 1947; Olyanova, 1936/1969; Solomon, 1978; Teltscher, 1942/1971), this researcher knows of only one who has associated multiple traits with the creative personality. Jane Green (1975) found in the handwriting of a bright but underachieving eight-year-old the qualities of self-esteem, sensitivity, fluidity, ambivalence, independence, inventiveness, and imagination. Green stated: "The creativity of this child is signified by his non-copybook approach, particularly in the signature. Inventiveness and originality are essential ingredients in his personality" (p. 226).

A slump in creative behavior has been observed to occur around the beginning of the fourth grade. An interesting study was done in this regard by Frank E. Williams (1976). He reported that Paul Torrance was the first to note this slump. Torrance found the decrease between third and fourth grades to be significant at the .01 level of confidence. However, by the fifth grade, creative behavior again showed an upswing, with mean scores on Torrance's battery only a half-point lower than

the third grade mean. The slump seems to be culturally produced, for not only is it absent in some cultures, but also the greatest slump occurs in the dominant advantaged culture of the United States. Williams did not test creativity as such but self-concept, a trait known to be related to creative behavior. His findings showed a decided slump (at the .05 level) in school-related self-concept and motivation. However, he did not see a decrease in personal self-concept. He concluded that school pressures may be the cause of a downswing in creative behavior.

Children seem to have coping skills to deal with their environments unless they are stressed by academic goals they cannot control. Treffinger's (1980) idea of the necessity for a multi-dimensional approach to the assessment of creative potential supports the results of Williams' study. These results also show the fourth-grade slump to be real, although merely the result of a temporary decrease in self-esteem. One might question whether such a decrease in one personality factor would have a significant effect on the graphological creativity quotient. In any case, the use of fourth-grade children as subjects in the present investigation might have introduced an unnecessary variable and so was avoided.

Summary

This chapter has presented a review of the literature pertinent to the creative personality, the study of handwriting analysis, and the assessment of creativity in adults and children. The pilot study leading to the graphological creativity quotient (GCQ) was summarized and some potential problems in assessing creativity in children were aired. The next chapter details the design of the present study, including descriptions of the concurrent criteria, the sample used, and the methods of data collection.

C H A P T E R I I I
R E S E A R C H D E S I G N A N D P R O C E D U R E S

This validation study was of a correlational nature. Its purpose was to validate a handwriting test as a method of assessing creativity in children. The null hypothesis adopted was that there is no relationship between children's handwriting and their scores on other measures of creativity. The research design employed to investigate this hypothesis required (1) selection of appropriate measures to serve as concurrent criteria, (2) selection of a sample, and (3) determination of techniques for obtaining and organizing the data.

Measures

To assess the degree of creativity in the children's handwriting, the graphological creativity quotient (GCQ) technique described in Chapter II was used. This technique is based on the holistic approach to the dynamics of arrangement, form, and movement in writing.

As concurrent criteria, the following creativity measures were chosen:

1. the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966), verbal and figural, Forms A;

2. the Group Inventory for Finding Talent (GIFT) (Rimm, 1980), Upper Elementary Level; and
3. the Renzulli-Hartman Creativity scale (Renzulli, Hartman, & Callahan, 1971).

Torrance Tests of Creative Thinking

Based on Guilford's (1977) Structure-of-Intellect model, the TTCT measure the divergent production abilities of fluency, flexibility, originality, and elaboration. Although divergent thinking has been seen as only one factor in creativity (Guilford, 1976), there is a strong correlation between the two, leading many researchers to conclude that divergent production tests are valid predictors of creativity (Zegas, 1976).

The TTCT evidence no racial or socioeconomic bias (Torrance, 1975) and are by far the most widely used tests of creative ability (Torrance, 1980). But they are also the most criticized. Besides being susceptible to faking (Davis, 1975) as pointed out earlier, they are timed. Detractors have claimed that creativity cannot be turned on quickly, so perhaps high scorers are merely fast and not the most creative. Also, many people have not felt comfortable with the scoring, not only because it is tedious, time consuming, and therefore expensive (Cohen,

1977), but also because of the open-endedness of the tasks. Torrance and his colleagues have countered with many validity studies and longitudinal research (Torrance, 1983), workshops and workbooks on streamlined scoring techniques (Ball & Torrance, 1980), and specific test instructions.

The verbal test, *Thinking Creatively with Words*, consists of seven subtests. The first three (Asking, Guessing Causes, Guessing Consequences) measure ability to formulate questions, sense problems, and infer consequences. Other subtests involve describing ways a stuffed elephant can be improved (Product Improvement), listing uses for and making up unusual questions about cardboard boxes (Unusual Uses, Unusual Questions), and imagining what would happen if clouds had strings attached to them (Just Suppose).

Because *Thinking Creatively with Words* relies on facility with words or verbal intelligence, the figural test was also included in this battery. Research shows that the performance of many children can be hampered by difficulties in committing ideas to writing (C. W. Taylor, 1964). *Thinking Creatively with Pictures* has three subtests. The first, Picture Construction, assesses productive and original thinking and elaboration ability. Picture Completion measures a tendency toward structuring

and integrating. The child must control the tension caused by the incomplete drawings and delay gratification long enough to get away from common responses. In the Parallel Lines subtest, the same stimulus must be perceived in many different ways.

In order to increase understanding of the qualities being tested by the TTCT, many validation studies have been conducted with children. Scores on the tests have been compared with personality characteristics found through interviews, Rorschach ink blots, drawing tests, and other measures. Some coefficients of correlation reported in the Torrance Tests of Creative Thinking, Norms-Technical Manual (Torrance, 1966) are .40-.77 with Industrial Arts performance and .25 with a rating of Inventive level. Also, longitudinal studies correlating the TTCT with "real life" creative achievements have produced coefficients of .51 and .63, considered unusually high for tests of creativity (Torrance, 1983). High scores on the TTCT have correlated significantly in different studies (Torrance, 1966) with personality traits examined in the present study: readiness to respond emotionally to the environment (Spontaneity), curiosity (Openness), imagination (Intuition), lack of rigidity (Flexibility), independence (Autonomy), strength of self-image (Self-Acceptance), presence of conflicts in ego

development (Complexity), and resistance to premature closure (Perseverance).

Torrance (1966) reported that interscorer reliability coefficients for the TCTT are generally in excess of .90, provided the scorers have read the manuals carefully and use common sense in identifying and judging responses. Test-retest reliability varies considerably; some studies reported high coefficients of correlation (.97 and .80), some lower (.34 to .79). Torrance explained this discrepancy as a result of motivational conditions surrounding the testing situations.

Group Inventory for Finding Talent

It has been said that the best way to test for creativity is to ask the person (Walkup, 1976). Therefore, the Group Inventory for Finding Talent (GIFT) was chosen to complement the TTCT. It is an inventory of attitudes and values associated with creativity. These attitudes include curiosity, independence, flexibility, perseverance, and breadth of interests. The Upper Elementary form, for grades five and six, was used in the present study. It differs from the Primary and Elementary forms mainly in vocabulary and size of print. There are thirty-three yes-or-no items, with no time limit for completion.

Construct validity for GIFT has been researched with creativity instruments such as the TTCT, Domino's Creativity scale of the Adjective Check List, and Gary Davis' How Do You Think inventory. Although this is a relatively recent test, it is normed with a population of over eight thousand children and validated in more than eighteen separate studies with diverse cultural and socio-economic groups (Rimm & Davis, 1980). Validity coefficients range from about .25 to .45, considered good for a test of creativity (Davis, 1983). Split-half reliability is high (.88 for the Upper Elementary form). Test-retest reliability was found to be much higher than the reliability of teacher nominations (.56 as compared to .18).

Renzulli-Hartman Creativity Scale

The most popular attitude/behavior inventory used by school systems to screen for gifted programs was felt to be important to include in a validation study of creativity. This is the Creativity scale, part of the Scale for Rating Behavioral Characteristics of Superior Students (SRBCSS) offered by Renzulli, Hartman, and Callahan (1971) to be used in conjunction with other talent-identification procedures. Children are rated on ten behavioral traits, including curiosity, nonconformity,

awareness, and unusual responses (e.g., "Is nonconforming; accepts disorder; is not interested in details, is individualistic; does not fear being different"). The traits are rated in varying degrees: (1) seldom or never, (2) occasionally, (3) considerably, or (4) almost always. Ratings are weighted and totalled to give a profile score.

In research done by Renzulli and his associates, the Creativity scale compared favorably with the verbal sub-scores of the TTCT (from .24 to .48) but did not correlate significantly with the Torrance figural tests. High reliability coefficients were found: Stability, .79 ($p < .01$); and interjudge, .91 ($p < .01$).

Although the Creativity scale was formulated for use by teachers and counselors to guide them in rating gifted and talented children, it was used in the present study as a rating by parents for two reasons. It was felt that (1) parents know their children better than the teacher and (2) it would be an imposition to ask teachers to fill out forms for a whole class.

Sample

Subjects were all grade five students, twenty-five boys and forty-six girls, in the largest of three elementary schools in an upper-middle-income, predominately

white suburban community in Western Massachusetts. The school enrollment was about 430 in kindergarten through grade five. Population of the community was about 16,500.

This atypical and nonrandom sample included three classes for a total of seventy-one children. Both boys and girls were assessed, since cultural or sexual differences were not an issue but only personality factors that appear in the writing of both men and women (W. W. Smith, 1983). The age range of the subjects was ten years, five months to twelve years, three months, with a mean of exactly eleven years. Selection of fifth graders provided a group of children as young as possible, while avoiding the fourth grade slump in creativity (explained in Chapter II) and assuring the writing styles would be mainly unconscious habit.

After permission was granted by both the Principal and the Superintendent of Schools (see Letter to Principal, Appendix A), the cooperation of the three teachers was obtained. A letter was then sent to parents (Appendix B) explaining the study, asking for their cooperation and participation, and including a Subject Release Form (Appendix C) for permission to test their children.

Before the children took the letters home to parents, this investigator talked with them about the study in order to increase motivation to participate and to give

them a personal choice in the matter. Although some follow-up was necessary, all Subject Release Forms were returned. One girl at first chose not to be tested but changed her mind before the testing began. Participation by the children was 100 percent.

Data Collection

The classroom teachers coded their class lists in order to replace children's names on tests with code numbers. This was done to reduce any possible biasing by the investigator, who knew some of the children three years previously. The TTCT and GIFT were administered during school time by the teachers to ensure less test anxiety and more convenience to the teachers' schedules. A relaxed atmosphere was sought, but seating was arranged as with other testing situations so that students' responses would not be influenced by others. The teachers administered the Torrance verbal and figural tests separately and then the GIFT inventory, all according to manual directions, planning together so that each class gave the same test at the same time. The latter was done so the children would be free to discuss their responses afterward with friends without contaminating test results.

Less than 10 percent of the children missed and had to make up one or more of the tests.

At the end of the testing the children were requested to write a letter to the investigator stating their reactions to the creativity tests. It was felt this type of content would be pertinent, therefore providing the necessary motivation to produce a substantial amount of spontaneous writing. Each student was given two sheets of unlined paper, 8½ by 11 in., and asked to place one sheet on top of the other when writing. The second sheet was to give more freedom of space to those who needed more than one page to express themselves. Also, the second sheet facilitated judgment of pen pressure (necessary to arriving at the GCQ), as it pads the hard desk and allows the pen point to more readily dent the back of the writing paper. New pencils were provided for the tests, and new ballpoint pens with the protective point-surface removed were given to the children for writing the letters.

The Renzulli-Hartman check lists were taken home by the children (see Appendix D for letter accompanying check list) and returned to the classroom teachers for coding. Again, follow-up by the investigator was necessary to ensure 100 percent return. Later it was found that one check list had been returned without being filled out.

Therefore, the data on the check lists were obtained from only seventy children.

All creativity measures were scored blindly by this investigator, except the GIFT inventory, which was returned to the author for machine scoring. The handwriting samples were analyzed first so that there would be no possibility of contamination of judgment by scores obtained on the other measures. The Torrance tests were scored section by section so that the investigator could familiarize herself thoroughly with the scoring directions. For example, all Picture Construction tests were rated before beginning the scoring of Picture Completion.

Scores for the GCQ were prepared with the technique discussed in Chapter II: The writing indicators for eight personality traits were judged and assigned numerical values; the scores were added and multiplied by three. The TTCT raw scores were converted to T scores according to tables based on fifth grade data (Torrance, 1966). The machine-scored GIFT yielded both percentile and Normal Curve Equivalent (NCE) scores. The NCE scores are recommended for statistical analysis (Rimm, 1980) and were used in this study. Scores on the Renzulli-Hartman scale were raw scores, weighted and totalled as specified (Renzulli, Hartman, & Callahan, 1971).

Summary

This chapter was concerned with gathering and organizing data in preparation for computerized statistical analysis. The measures were described in detail, the size and composition of the sample were given, and techniques of data collection were presented, including scoring procedures. In Chapter IV, results of the data analysis will be related and discussed.

C H A P T E R I V

RESULTS

This chapter contains a restatement of the purpose of the study, along with specific results of the data analysis as they relate to that purpose. Bivariate and multiple regression correlations are presented. Also, observations and speculations are offered concerning some of the graphological creativity quotient (GCQ) personality traits.

Restatement of Purpose

The purpose of this correlational study was to investigate the relationship between scores derived from the handwriting of fifth graders and their scores on other measures of creativity; namely, (1) the verbal and figural tests of the TTCT, (2) the GIFT inventory, and (3) the Renzulli-Hartman Creativity scale. The null or nondirectional hypothesis adopted for this exploratory research was that there is no relationship between children's handwriting scores and their scores on other measures of creativity. Specific research questions were the following:

1. Are children's handwriting scores related to their scores on the verbal and figural tests of the Torrance Tests of Creative Thinking?

2. Are children's handwriting scores related to their responses on the Group Inventory for Finding Talent?

3. Are children's handwriting scores related to parents' responses on the Renzulli-Hartman Creativity scale?

4. Are children's handwriting scores related to the composite scores of the preceding three creativity measures?

Analysis of Data

Statistical analysis of the data was done on the CYBER main frame computer at the University of Massachusetts. The Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975), Version 9.0 (NOS), was used for the analysis. The .05 level of significance was chosen as a standard for rejection of the null hypothesis.

The computer procedure known as the Pearson Correlation was applied to the data to show the strength of relationship among the variables. The Pearson product-moment technique is the one most often used by researchers and is the most precise for determining relationship (Best, 1977). A two-tailed test was applied because a null hypothesis does not predict direction. The Pearson

procedure produces bivariate correlations, allowing handwriting scores for the seventy-one subjects to be correlated with their scores on the other creativity measures. Scores on all components of the GCQ and the total GCQ, as well as the scores on the individual criterion tests, the total score for the two Torrance tests, and the combined criterion scores were correlated as pairs.

If a correlation was significant, another procedure called New Regression was applied to the data. This procedure gives a multiple regression correlation between a dependent variable and more than one independent variable. The multiple correlation coefficient indicates a two-variable relationship where all other independent variables are weighted evenly. This coefficient shows the relative impact of each independent variable on the dependent variable, over and above the effects of the remaining independent variables (Kerlinger & Pedhazur, 1973).

The results of the analysis of the data and discussion of the findings will be presented in three parts. In the first part the results of the bivariate correlations will be presented and related to each research question. The GCQ components as independent variables in the multiple regression correlations will be the focus of the second part. In the third part, the researcher points out strong

and weak characteristics of this group of subjects and presents some possible developmental aspects of creativity. Speculations are offered but are intended as nothing more than an attempt to understand the outcome of this particular data analysis and they cannot be generalized to individuals beyond the present sample.

Bivariate Correlations

In Table 1 is a summary of the Pearson correlations between the scores on the criterion tests and the handwriting scores (GCQs). This table shows the coefficient of correlation between the GCQs and the scores on the Torrance verbal test to be the highest at .30, significant at the .01 level of confidence. Although the correlation between the GCQs and the scores on the Torrance figural test (.12) was only negligible, the verbal test scores correlated high enough to bring the correlation with the total TTCT scores (.27) to a significant level ($p = .05$). The correlation between the GCQs and the scores on GIFT was minimal (.17), while the scores on the Renzulli-Hartman scale correlated the least, a barely positive .07. Relationship between the GCQs and the combined criterion test scores (.22), although positive, did not quite reach the critical .23 correlation coefficient.

TABLE 1

BIVARIATE CORRELATIONS BETWEEN CRITERION SCORES AND GRAPHOLOGICAL CREATIVITY QUOTIENTS (GCQs)

Criterion	GCQs
TTCT total scores	.27*
Verbal scores	.30**
Figural scores	.12
GIFT scores	.17
Renzulli-Hartman scale scores	.07
Combined criterion scores	.22

NOTE: Critical $r = .23$.

* $p = .05$. ** $p = .01$.

Results of the bivariate correlations as they relate to the research questions indicate the following:

1. Children's handwriting scores (GCQs) are related to their scores on the Torrance Tests of Creative Thinking (TTCT).

2. Children's handwriting scores (GCQs) are not related to their scores on the Group Inventory for Finding Talent (GIFT).

3. Children's handwriting scores (GCQs) are not related to parents' responses on the Renzulli-Hartman Creativity scale.

4. Children's handwriting scores (GCQs) are not related to the composite scores from the three creativity measures.

It is interesting to note some relationships not reported in Table 1. A few of the personality trait scores comprising the GCQs were found to correlate significantly on their own with scores on the criterion measures: the scores for Flexibility and Complexity with the Torrance verbal test scores (.23 and .25); the scores for Flexibility with the total TTCT scores (.25); and the scores for Perseverance with the GIFT scores (.27) and with the combined criterion scores (.31). These traits will be treated in detail in the section on the graphological creativity quotient components at the end of this chapter.

Also, some significant relationships were found among the various criterion tests used in this study. Bivariate correlations among the test scores were all positive, as they were between the GCQs and the criterion test scores. Significance was seen between the scores on the two Torrance tests (.28), between the scores on GIFT and the Renzulli-Hartman scale (.27), and between the scores on GIFT and the Torrance figural test (.34).

Multiple Regression Correlations

Because there was a highly significant correlation between the Torrance verbal test scores and the children's handwriting scores (GCQs), the New Regression procedure was applied to these data. As a matter of interest, this procedure was also applied to the combined criterion scores, as these scores correlated very near significance with the GCQs. The New Regression procedure reported the relative effect of each GCQ component, as an independent variable, on the relationship of the GCQs to the Torrance verbal test scores and to the combined criterion scores. A summary of these correlations is presented in Table 2.

TABLE 2

MULTIPLE REGRESSION CORRELATIONS OF GCQ COMPONENTS
WITH THE TORRANCE VERBAL TEST SCORES AND
THE COMBINED CRITERION SCORES

GCQ Component	Torrance Verbal Test Scores	Combined Criterion Scores
Spontaneity	.17	-.03
Openness	.07	-.05
Flexibility	.23	.18
Intuition	.21	.07
Autonomy	.16	.17
Self-Acceptance	.14	.14
Complexity	.25*	.08
Perseverance	.12	.31**

*p = .05.

**p = .01.

Table 2 shows that the component Complexity had the highest multiple correlation at .25 ($p = .05$) with the Torrance verbal test scores (which yielded the highest bivariate correlation with the GCQs). Flexibility at .23 was next and Intuition at .21 was a close third in influencing the relationship between the GCQs and the Torrance verbal test scores. The component Perseverance yielded a highly significant multiple correlation of .31 ($p = .01$) and contributed the most to the relationship between the GCQs and the combined criterion scores. Flexibility at .18 and Autonomy at .17 were next in order of contribution. These personality traits will be discussed in the next section.

Graphological Creativity Quotient Components

The means and standard deviations for each GCQ component, or personality trait, are listed in Table 2, ranked from highest mean to lowest. The copybook (school model) means are also presented as a standard for comparison. Table 3 shows higher-than-standard means for the group of subjects in this study in Complexity, Self-Acceptance, Openness, Perseverance, and Intuition. Autonomy, Flexibility, and Spontaneity are the same as or one-tenth of a point below the standard.

TABLE 3
 MEANS AND STANDARD DEVIATIONS FOR
 THE GCQ COMPONENTS

GCQ Component	Copybook Mean	Present Subjects Mean	Subjects S.D.
Autonomy	6.0	5.9	1.26
Complexity	5.0	5.7	.84
Self-Acceptance	5.1	5.5	.57
Openness	4.8	5.4	.65
Perseverance	5.0	5.2	.83
Flexibility	5.0	4.9	1.19
Spontaneity	4.5	4.5	1.05
Intuition	3.5	4.4	1.03

As stated in Chapter II, the GCQ is based on scores obtained on certain personality dimensions. A higher score reveals a more positive deviation from the copybook style of writing, that is, the style taught in school. The range of GCQs in this investigation was from 82 to 151, with a mean of 123. The GCQ for the mechanical-looking copybook style is 117. Because the mean GCQ for the subjects in the present study is higher, it can be assumed that their deviations from the standard model indicate an above-average amount of creative potential. This seems to bear out the generally acknowledged relationship between

intellectual competence and creativity, as the academic achievement of students in the community sampled has traditionally been above the national norm and the mean IQ of this sample, computed graphologically, is 119.

Both the bivariate and multiple regression analyses show that in this group of subjects some personality traits were more important than others in their influence on creative behavior. Perseverance was outstanding in correlating with the combined creativity scales. Referring to the definition of this trait in Chapter I, it can be seen that Perseverance means persistence in searching for alternatives. Perhaps Edison's famous dictum that creativity is 90 percent perspiration and only 10 percent inspiration can be interpreted to mean that in the creative personality perseverance has to come first and that without it the other personality traits we ascribe to creative behavior are impotent. The significant contribution of the trait of Complexity to the relationship between the GCQs and the Torrance verbal test scores and its relatively high mean when compared with the school model standard may be explained by the above-average intelligence of the subjects. A complex personality was defined as having many sides, possibly including contradictions. Flexibility and Autonomy also were influential in this study. However, they were below the copybook

standard. Flexibility was defined as the ability to adapt to and learn from experience; and Autonomy, as independent judgment and responsibility. Perhaps these youthful subjects have not had enough life experience to develop either of those traits beyond the standard.

When analyzing creative characteristics in children, one must consider possible developmental differences. In judging the writing of these ten-to-twelve-year-olds, this investigator was aware of the potential unfairness of applying adult standards to still-developing individuals. Therefore, allowances were made in evaluating some handwriting behaviors that may have indicated emerging but not yet well-established traits. For example, in scoring Disconnectedness (of importance to scoring Intuition), if there were breaks for apostrophes or x crossings, but not for i dots or t crossings, a point was still added. Also counted was any indication of decreasing letter size within a word (used in judging Flexibility, Openness, and Self-Acceptance), even though it may not have been consistently repeated. Decreasing letter size indicates empathic tactfulness, not acknowledged as a strong point in preadolescents.

Although Intuition was important in the relationship between the GCQ scores and the Torrance verbal test scores, its relatively low mean in this age group was not

surprising, as some people say intuition is schooled out of children and others maintain it comes only with much knowledge and experience. On the other hand, the low level of Spontaneity was surprising, for one would think of most eleven-year-olds as being emotionally involved with their environment rather than controlled and reserved. A graphological indicator of this control and reserve, and consequently lowered spontaneity, was the prevalence (54 percent of subjects) of upright slant (80 degrees or more), whereas the copybook or learned slant is rightward (about 70 degrees).

This investigator thought the upright slant might be merely an effort to control the writing space, as these children are not accustomed to writing on unlined paper. Therefore, a comparison was made between slants in the unlined writing samples and those in the Torrance verbal test booklets, where lines were provided. No discrepancy was found--the slants were consistent. However, the lack of lines seems to have caused more fluctuation in alignment (evenness of line of writing) in the samples than in the test booklets. This fluctuation was allowed for when Organization was scored.

Thinking low spontaneity may have been due also to a poorly established writing style, as these fifth graders had begun their school experiences by learning to print

and then switching to cursive writing in second grade, the investigator again compared the samples with the writing in the verbal test booklets. All but two of the seventy-one students used cursive writing in their letters to the investigator; and, of those sixty-nine, only 25 percent regressed even in part to a printing style under the time pressure of the verbal test. Therefore, the lack of intuition and spontaneity in these youngsters must be attributed to other causes.

In the multiple regression analyses, the trait of Openness was among the least important in the relationship of the GCQs to the combined criterion scores (-.05) and to the Torrance verbal test scores (.07). Thus, it is possible that Openness, defined as transpersonal awareness of the environment, may not be a strong factor in the creative personality. Certainly the trait is above the standard level in this group of fifth graders (mean score of 5.4 as compared with copybook mean of 4.8). But it seems to have been of little importance to their creative production.

Summary

In this chapter we have seen the results of this research, positive but with mixed significance, and looked

into some of the possible reasons for this outcome. One thing should be mentioned: Although the components of the GCQ have been separated for examination, they must be seen as interrelated and interdependent within the gestalt of the personality. At this time no definite conclusion can be made regarding the relative distribution of the creative personality traits listed in Table 3. It can be said only that they are present in the writing of these ten-, eleven-, and twelve-year-olds and that the subjects ranking high on the criterion measures also tended to show higher levels of most of these traits in their writing.

C H A P T E R V
SUMMARY AND CONCLUSIONS

In this final chapter, the study is summarized and the significance of its results to the fields of education and graphology is discussed. Limitations of the study are considered, and both dependent and independent variables are re-evaluated. The last section contains the investigator's recommendations for future research.

Summary of the Study

The purpose of this study was to examine the validity of a specific handwriting test as a method of assessing creativity in children. The handwritings of fifth graders were compared to their ratings on creativity tests and inventories. Because this was exploratory research, the investigator did not choose a direction for the hypothesis tested. The null hypothesis adopted was that there is no relationship between children's handwriting scores and their scores on other measures of creativity. The .05 level of significance was chosen as a standard for rejection.

Seventy-one fifth grade children, twenty-five boys and forty-six girls comprising three classes in an

upper-middle-income suburban school, participated in the study. The children were given two batteries (verbal and figural) of the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966) and the Group Inventory for Finding Talent (GIFT) (Rimm, 1980). Their parents responded to the Renzulli-Hartman Creativity scale (Renzulli, Hartman, & Callahan, 1971). After being tested, the children wrote letters to the investigator, thus providing samples of their handwriting.

All measures were scored blindly by the investigator except the machine-scored GIFT. The writing samples yielded graphological creativity quotients (GCQs) according to a technique devised previously by the investigator, using numerical values assigned to eight creative personality traits. Those traits were Spontaneity, Openness, Flexibility, Intuition, Autonomy, Self-Acceptance, Complexity, and Perseverance.

Statistical analysis consisted of bivariate and multiple regression correlations between the GCQs and the criterion variables. Bivariate correlations by the Pearson product-moment technique (two-tailed) indicated significant relationships between the GCQs and (1) the Torrance verbal test scores and (2) the total scores on the Torrance tests (verbal and figural), with coefficients of .30 ($p = .01$) and .27 ($p = .05$), respectively.

Correlations with the Torrance figural test, GIFT, and the Renzulli-Hartman check list were positive but below the .05 level of confidence. Multiple regression correlations showed the varying influences of the GCQ components, with the traits of Complexity and Perseverance being the most influential in the relationship of the GCQs to the Torrance verbal test scores and to the combined criterion scores, respectively.

The null hypothesis that there is no significant relationship between children's handwriting scores and their scores on other measures of creativity was accepted. The investigator believes that either chance or sampling error probably accounted for any apparent relationship between the GCQs and the composite scores from the criterion creativity measures chosen for this study. However, an important finding was the significant correlation between the children's handwriting scores and their scores on the Torrance tests. Many researchers recognize the divergent production abilities of fluency, flexibility, originality, and elaboration as valid predictors of creativity (Zegas, 1976). Scores on the TTCT have correlated highly in other studies (Torrance, 1966) with the same personality traits examined in this study. In the present study, children with higher levels of those personality traits were capable of higher levels

fact was more meaningful to this investigator than their responses on the two inventories of attitudes and interests or their parents' responses on a creativity checklist.

Significance of the Findings

This study is of possible value to the fields of education and graphology for two reasons. One, it has proposed a practical method of assessing creativity in children, perhaps leading to easier identification of this characteristic and eventually to greater creative achievement in the schools. Two, the results may lead to greater recognition and acceptance of graphology, the study of handwriting analysis, by educators.

Used with other creativity assessments, the graphological method investigated in this study can provide educators with an index of creative talent, a creativity quotient (CQ). This numerical score can then be compared and contrasted with others to form a complete profile of educational potential, such as the Baldwin Identification Matrix (Baldwin & Wooster, 1977) does for giftedness. Educators generally recognize that the IQ rating is incomplete as a description of intellect. Parnes (1972) has predicted that by the year 2000 the CQ will be part of every intellectual profile. Seeing creativity as part of

an educational description, as a quality possessed in some measure by us all, "everybody's business" (Shallcross, 1981), educators may begin to change their attitude toward divergent and sometimes challenging behavior in children and learn to notice and appreciate creative abilities. Teachers then may come to expect and encourage creative responses by their students and, realizing R. K. Merton's self-fulfilling prophecy (Rosenthal, 1976), increase creative achievement. In addition, curriculum designers may provide for more teaching of creative expression and problem solving, and those concerned with motivation and learning styles may focus more fully on the needs of the creative individual, discovered by Torrance (1966), for experimentation, manipulation, inquiry, and discovery.

Validation studies such as this may lead to an appreciation for graphology as a means of assessing the creative personality. This in turn may open the door to the recognition of its usefulness in evaluating other psychological factors and eventually to its being considered by educators along with personality rating scales, inventories, and projective tests. Like scales and inventories, graphology provides quantitative data for ease of comparison and objective study. Like projective tests, it probes the deeper layers of personality that subjects may not know about or care to reveal.

Limitations of the Study

The present descriptive research was concerned with correlating handwriting analysis with other methods of testing creative behavior. Although some significant relationships were identified and measured, certain limitations of the study must be accounted for. Of necessity the problems and behaviors presented in a creativity measure do not allow for right-or-wrong, objective, factual answers. Responses on the Torrance tests may have been affected by administrator directions or a number of other variables. Responses by the children on the GIFT inventory and by their parents on the creativity checklist may well have been influenced by personal biases and impulse. Also, graphological evaluation is prone to subjective fluctuation, even though it is based on measurements and yields numerical scores.

Judgments had to be made as to creative strength of responses on the TTCT and as to strength of personality trait indicators in the handwriting samples. For judgments to be consistent on those two measures, all scoring was done by the investigator. Although the investigator has had ten years of study and experience in handwriting analysis, it is acknowledged that errors in judgment are possible even when care is taken. The writing samples

varied in length, too. Whereas the ideal sample would be at least a full page (about 20 lines), some of the samples in this study were only nine or ten lines of writing.

To eliminate personal bias, not only were all measures coded to remove individual names, but the handwritings were analyzed before other test results were known. To reduce human error, all numerical calculations and quantitative scores entered into the computer were checked and rechecked.

An attempt was made, too, to reduce or neutralize as much as possible those variables that were impossible to control directly. For example, possible contamination of test results was reduced by having each test administered at the same time in all three classrooms. The children were then free to discuss test items and responses afterward. But this presented a problem of possible inconsistency in test administration. It can only be assumed the teachers administered the tests according to manual instructions and requests made by the investigator. It also was assumed that parents' responses on the Renzulli-Hartman checklist were truthful and thoughtful. However, using parents as objective observers may have introduced enough error to make that instrument invalid. Some of the variables influencing performance were eliminated by providing new pencils for the TTCT and identical pens and

paper for the handwriting samples. But performance-motivation, fatigue, anxiety, and other external factors such as time of day and classroom atmosphere may have had some uncontrollable effects on the results.

The non-randomness of this sample precludes generalization beyond it. As mentioned earlier, the socioeconomic level was atypical and the intelligence was higher than the norm. Conclusions cannot be inferred for other age groups or socioeconomic levels.

Variables Re-examined

The state of the art of both dependent and independent variables in this study, that is of both the graphological and criterion creativity measures, is such that definitive validation is extremely difficult. Not only do investigators disagree as to what creativity is and how to test for it, but according to evaluator Philip M. Clark, even with extensive normative data, "relatively low criterion validity plagues all measures of creativity" (Buros, 1978, p. 245).

As stated in Chapter IV, some relationships were found among the criterion tests used: between the two Torrance tests (.28), between GIFT and the Renzulli-Hartman scale (.27), and between GIFT and the Torrance

figural test (.34). However, this tells us little about the effectiveness of these tests. Their authors have been cautious in their claims. Torrance (1966) said a composite score from his TTCT, although he did not recommend using it, "does seem to give a rather stable index of the total amount of creative energy a person has available or is willing to use" (p. 72). The GIFT inventory and the Renzulli-Hartman checklist were both designed as guides in screening for gifted education programs, but to be used only with other identification procedures. As GIFT's author said, "Creativity is a subtle characteristic which is difficult to identify" (Rimm, 1980, p. 1).

The validity of graphology has been well established (see Chapter II). But the graphological creativity quotient suffers from all the afflictions of the other creativity measures. In addition, the GCQ method was used previously on merely a very small sample of very creative people. Although it is based on carefully researched personality traits, the GCQ's validity is highly questionable. Its reliability has yet to be evaluated.

Comments by the children in their letters to the investigator provided clues to their motivation and performance on the Torrance and GIFT tests. On the

Torrance tests, 75 percent of the subjects preferred drawing to writing, with comments such as "your hand gets sweaty when I am writing" and "writing pains my hands." Their overall performance was better on the verbal test, however; 66 percent had higher verbal T scores than figural, with a mean score six points higher. Torrance (1966) referred to a study that showed a relationship between higher socioeconomic status and higher scores on the verbal than on the figural tests. Mentioning the great influence of cultural factors on performance, he said, "In the United States, it is generally recognized that middle and upper class families place relatively greater emphasis on verbal skill than do lower class families" (p. 76). If one applies the alternating current theory proposed in Chapter I, where approved behavior is repeated and improved, then creative ideas expressed verbally would be more valued in this sample than would those expressed by drawing.

Comments by the children concerning the GIFT self-inventory indicated that they liked thinking about themselves, but some felt the questions were arbitrary and confusing and they "had a terrible time" answering them. One girl explained her description of the "half and half" questions by saying she answered no to "the one about do you and your mother and father play together." "But

sometimes we do," she added. (The items are actually statements, this one being "My mom or dad like to play with me.") Not only did some of the items seem strange, but many children felt they were too personal and "only the family's business." This need for privacy may be connected to the low level of spontaneity discussed in Chapter IV. One might wonder, too, how well eleven-year-olds can analyze their own behaviors. They may not have trouble answering yes or no to "Making up stories is a waste of time," but might be influenced in their reactions to "I like to take walks alone" by societal restrictions, and might not be able to judge themselves for "I ask a lot of questions."

The results of the Renzulli-Hartman checklist correlation seems to show that parents were the worst source of information about the creativity of these subjects. It was reasoned when choosing this measure, although it is meant to be used by teachers as a screening device, that parents know their children better than the teachers. But teachers usually have the experience of knowing many other children and so may be able to make more useful comparisons. It was assumed that parents' ratings would be truthful. However, parents' lack of comparative information and fluctuations in familial bias

were not taken into account and could have influenced results tremendously.

Recommendations for Future Research

The present correlational investigation was exploratory in nature, the first formal union of creativity and graphology. Its results may provide direction for future research, both dealing with that union and radiating from it.

Futher research with the GCQ, with and without modifications, would seem to be indicated in order to validate the procedure. The present study can be replicated in its entirety or repeated as modified by any of the following suggested changes:

1. To control further the variables involved, all tests can be administered by the same person instead of by individual classroom teachers and children can be rated on the Renzulli-Hartman checklist by their teachers instead of parents.

2. Other measures of creativity could be used as criteria, such as individual interviews, peer ratings, and creative language and art projects. Validity of results are of course dependent on the validity of the concurrent criteria.

3. Other age groups and socioeconomic levels can be included as subjects, so that results would have a broader influence.

In addition, interjudge reliability of the GCQ scoring procedure can and should be investigated. Graphological reliability studies have had mixed results, however, depending perhaps on the expertise of the graphologists involved (Pritchard, 1985).

Further graphological research on creativity may focus on several areas of concentration. Handwriting tests can be devised to measure individually the divergent thinking abilities of fluency, flexibility, originality, and elaboration assessed by the TTCT. Also, graphologists can measure personality factors contributing to I. A. Taylor's (1975) different levels or kinds of creativity (expressive, technical, inventive, innovative, and emergentive). Finally, additional talents seen by Calvin Taylor (1975) as part of our total potential, such as planning, forecasting, and decision making, could be described and measured graphologically.

Graphologists as well as psychologists must concern themselves less with pathology and more with the positive aspects of personality. Graphology can be of value in assessing short-term personality changes resulting from deliberate educational training programs to develop the

talents listed earlier. Studies on improving self-concept and confidence and reducing defensiveness and other internal blocks to self-actualization may benefit from the below-the-surface probing and nonthreatening procedure of handwriting tests.

The effect of studies such as these on the clinical practice of graphology and of its outgrowth, handwriting therapy, in increasing potential for optimum functioning and creative health can be far-reaching. Moreover, validation studies must continue if graphological testing is to be recognized and accepted in this country. But, like psychology, graphology is validated best through its usefulness. The following statement is still important today: "The practical significance of graphology must continue to depend largely on its ability to survive critical scrutiny in clinical settings as well as laboratory ones" (Wells, 1946, p. 313).

Summary

The present study has shown positive correlations between handwriting analysis and other methods of testing for creativity, with some results significant at the .05 level of confidence. The handwritings of seventy-one fifth graders were measured by a graphological process

yielding a creative personality quotient. These scores were compared with scores on the TTCT, GIFT, and the Renzulli-Hartman Creativity scale. Results have been discussed and implications applied to the present sample only. Significance of this study is dependent on further research and the possible acceptance of graphology by educators as a useful addition to present assessment techniques.

BIBLIOGRAPHY

- Adams, J. L. Conceptual blockbusting. New York: W. W. Norton, 1974.
- American Handwriting Analysis Foundation Research Committee. Search from National Library of Medicine (National Institute of Health) studies on agraphia, handwriting, and graphology, 1984.
- Anastasi, A. Psychological testing (5th ed.). New York: Macmillan, 1982.
- Arieti, S. Creativity, the magic synthesis. New York: Basic Books, 1976.
- Baldwin, A. Y., & Wooster, J. Baldwin Identification Matrix Inservice Kit for the Identification of Gifted and Talented Students. Buffalo, NY: DOK Publishers, 1977.
- Ball, O. E., & Torrance, E. P. Effectiveness of new materials developed for training the streamlined scoring of the TTCT, figural A and B forms. Journal of Creative Behavior, 1980, 14, 199-203.
- Barron, F. The psychology of imagination. In S. J. Parnes & H. F. Harding (Eds.), A source book for creative thinking. New York: Charles Scribner's Sons, 1962.
- Barron, F. Diffusion, integration, and enduring attention in the creative process. In R. W. White (Ed.), The study of lives. New York: Atherton Press, 1963.
- Barron, F. Creativity and personal freedom. Princeton, NJ: Van Nostrand, 1968.
- Barron, F., & Welsh, G. S. Artistic perception as a factor in personality style: Its measurement by a figure-preference test. Journal of Psychology, 1952, 33, 199-203.
- Besemer, S. P., & Treffinger, D. J. Analysis of creative products: Review and synthesis. Journal of Creative Behavior, 1981, 15, 158-178.

- Best, J. W. Research in education (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall, 1972.
- Block, J. The Q-sort method in personality assessment. Palo Alto, CA: Consulting Psychologists Press, 1978. (Originally published, 1961.)
- Blum, J. M. Pseudoscience and mental ability. New York: Monthly Review Press, 1978.
- Brown, B. Supermind--the ultimate energy. New York: Harper & Row, 1980.
- Buros, O. K. (Ed.). The eighth mental measurements year-book (Vol. 1). Highland Park, NJ: Gryphon Press, 1978.
- Cattell, R. B., & Butcher, H. J. Measuring the main dimensions of personality. In B. Semeonoff (Ed.), Personality assessment (2nd ed.). Middlesex, England: Penguin Books, 1970.
- Cohen, D. Creativity: What is it? New York: M. Evans, 1977.
- Christie, T. Environmental factors in creativity. In A. Biondi & S. J. Parnes (Eds.), Assessing creative growth: Measured changes--Book Two. Great Neck, NY: Creative Synergetic Assoc., 1976.
- Davis, G. A. In frumious pursuit of the creative person. Journal of Creative Behavior, 1975, 9, 75-87.
- Davis, G. A. Creativity is forever. Dubuque, IA: Kendall/Hunt, 1983.
- Domino, G. Identification of potentially creative persons from the Adjective Check List. Journal of Consulting and Clinical Psychology, 1970, 35, 48-51.
- Domino, G. Chinese tangrams as a technique to assess creativity. Journal of Creative Behavior, 1980, 14, 204-213.
- Farmer, J. The potential of handwriting analysis as a screening tool. Security Management, March 1980, pp. 84-90.

- Fromm, E. The creative attitude. In H. H. Anderson (Ed.), Creativity and its cultivation. New York: Harper & Brothers, 1959.
- Getzels, J. W., & Csikszentmihalyi, M. Creativity: Looking for the right questions. Leading Edge Bulletin, 1981, 2(3), 1-2.
- Getzels, J. W., & Jackson, P. W. Creativity and intelligence: Explorations with gifted students. New York: Wiley, 1962.
- Gough, H. G. Adjective Check List. Palo Alto, CA: Consulting Psychologists Press, 1952.
- Gough, H. G. California Psychological Inventory manual. Palo Alto, CA: Consulting Psychologists Press, 1957.
- Gough, H. G., Fioravanti, M., & Lazzari, R. Some implications of self versus ideal-self congruance on the Revised Adjective Check List. Journal of Personal and Social Psychology, 1983, 44, 1214-1220.
- Green, J. N. You and your private I. St. Paul, MN: Llewellyn, 1975.
- Guilford, J. P. Traits of creativity. In H. H. Anderson (Ed.), Creativity and its cultivation. New York: Harper & Brothers, 1959.
- Guilford, J. P. Aptitude for creative thinking: One or many? Journal of Creative Behavior, 1976, 10, 165-169.
- Guilford, J. P. Way beyond the IQ. Buffalo, NY: Creative Education Foundation, 1977.
- Hartford, H. You are what you write. New York: Macmillan, 1973.
- Hathaway, S. R., & McKinley, J. C. Manual for the MMPI. Minneapolis: University of Minnesota Press, 1943.
- Hayes, H. A graphological indicator of intuition. Journal of the Council of Graphological Societies, 1979, 4, 6-8.
- Helson, R. Women and creativity. In A. Rothenberg & C. R. Hausman (Eds.), The creativity question. Durham, NC: Duke University Press, 1976.

- Hilgard, E. R. Creativity and problem solving. In H. H. Anderson (Ed.), Creativity and its cultivation. New York: Harper & Brothers, 1959.
- Ironson, G. H., & Davis, G. A. Faking high or low creativity scores on the Adjective Check List. Journal of Creative Behavior, 1979, 13, 139-145.
- Karohs, E. Roda Wieser: Ground rhythm in handwriting. Self-published paper, 1964.
- Kegan, R. The evolving self. Cambridge, MA: Harvard University Press, 1982.
- Kerlinger, F. N., & Pedhazur, E. J. Multiple regression in behavioral research. New York: Holt, Rinehart, & Winston, 1973.
- Leibel, C. P. Change your handwriting, change your life. New York: Stein & Day, 1972.
- Levy, R. Handwriting and hiring. Dun's Review, March 1979, pp. 72-79.
- Link, B. K. Graphology, a tool for personnel selection. Minneapolis, MN: Paul S. Amidon & Assoc., 1972.
- Link, B. K. AHAF Research Committee report, 1983.
- Lomonaco, T., Harrison, R., & Klein, F. Accuracy of matching TAT and graphological personality profiles. Perceptual and Motor Skills, 1973, 36, 703-706.
- Longmeadow Public Schools. Definition of quality education. Statement prepared by high school staff and adopted by School Committee, June 13, 1983.
- Lowenfeld, V. Creativity: Education's stepchild. In S. J. Parnes & H. F. Harding (Eds.), A source book for creative thinking. New York: Charles Scribner's Sons, 1962.
- MacKinnon, D. W. The nature and nurture of creative talent. American Psychologist, 1962, 17, 484-494.
- MacKinnon, D. W. IPAR's contribution to the conceptualization and study of creativity. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.

- MacKinnon, D. W. Architects, personality types, and creativity. In A. Rothenberg & C. R. Hausman (Eds.), The creativity question. Durham, NC: Duke University Press, 1976. (a).
- MacKinnon, D. W. Assessing creative persons. In A. Biondi & S. J. Parnes (Eds.), Assessing creative growth: The tests--Book One. Great Neck, NY: Creative Synergetic Assoc., 1976. (b)
- Maslow, A. H. Toward a psychology of being. New York: Van Nostrand Reinhold, 1968.
- May, R. The courage to create. New York: W. W. Norton, 1975.
- Mayer, D. Ego as manager of the personality. Annals of the American Association of Handwriting Analysts, 1972-73, 3, 52-57.
- McMullan, W. E. Creative individuals: Paradoxical personages. Journal of Creative Behavior, 1976, 10, 265-275.
- Mednick, S. A. The associative basis of the creative process. In A. Rothenberg & C. R. Hausman (Eds.), The creativity question. Durham, NC: Duke University Press, 1976.
- Meer, B., & Stein, M. L. Measures of intelligence and creativity. Journal of Psychology, 1955, 34, 117-126.
- Mendel, A. O. Personality in handwriting. New York: Stephen Daye Press, 1947.
- Moore, M., & Wood, J. Handwriting analysis and the expert witness. Case & Comment, 1981, 86(6), 3-6.
- Murray, H. A. TAT manual. Cambridge, MA: Harvard University Printing Office, 1943.
- Myers, I. Manual: The Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press, 1962.
- Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K. S., & Bent, D. H. Statistical package for the social sciences (2nd ed.). New York: McGraw-Hill, 1975.

- Nuttall, E. V. Creativity in boys: A study of the influence of social background, educational achievement, and parental attitudes on the creative behavior of ten-year-old boys. Unpublished doctoral dissertation, Boston University, 1970.
- Olyanova, N. Handwriting tells. New York: Bobbs-Merrill, 1969. (Originally published, 1936.)
- O'Neill, E. The phenomenon of ambivalence. Self-published paper, 1980.
- Parnes, S. J. Creative behavior guidebook. New York: Charles Scribners' Sons, 1967.
- Parnes, S. J. Creativity: Unlocking human potential. Buffalo, NY: DOK Publishers, 1972.
- Parnes, S. J., & Harding, H. F. (Eds.). A source book of creative thinking. New York: Charles Scribner's Sons, 1962.
- Piaget, J. To understand is to invent. New York: Grossman, 1974.
- Pickering, G. Creative malady. New York: Dell, 1976.
- Prince, G. M. Creativity, self, and power. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.
- Pritchard, A. Reliability of graphological judgments based on different techniques of handwriting analysis. Unpublished master's thesis, University of Oklahoma, 1985.
- Rejskind, F. G. Autonomy and creativity in children. Journal of Creative Behavior, 1982, 16, 58-67.
- Renzulli, T., Hartman, R., & Callahan, C. Teacher identification of superior students. Exceptional Children, 1971, 38, 243-248.
- Rimm, S. GIFT: Group Inventory for Finding Creative Talent--manual for administration. Watertown, WI: Educational Assessment Service, 1980.

- Rimm, S., & Davis, G. A. Five years of international research with GIFT, an instrument for the identification of creativity. Journal of Creative Behavior, 1980, 14, 35-46.
- Roe, A. Psychological approaches to creativity in science. In A. Rothenberg & C. R. Hausman (Eds.), The creativity question. Durham, NC: Duke University Press, 1976.
- Rogers, C. R. On becoming a person. Boston: Houghton Mifflin, 1961.
- Roman, K. Handwriting: A key to personality. New York: Pantheon Books, 1952.
- Roman, K. G. Graphology using the psychogram (digest of workshop sponsored by the American Handwriting Analysis Foundation). Santa Clara, CA: Cole, 1959.
- Roman, K. G. Encyclopedia of the written word. New York: Frederick Ungar, 1968.
- Rorschach, H. Psychodiagnostics. Bern, Switzerland: Huber, 1942. (Grune & Stratton, NY, distributors.)
- Rosenthal, R. Experimenter effects in behavioral research. New York: Irvington, 1976.
- Rosner, S., & Abt, L. The creative experience. New York: Dell, 1970.
- Rothenberg, A. The emerging goddess. Chicago: University of Chicago Press, 1979.
- Rothenberg, A., & Hausman, C. R. (Eds.). The creativity question. Durham, NC: Duke University Press, 1976.
- Sainte Colombe, P. de. Grapho-therapeutics: The pen and pencil therapy. New York: Popular Library, 1972. (Originally published, 1966.)
- Schimeck, J. G. Creative originality: Its evaluation by the use of free-expression tests. Unpublished doctoral dissertation, University of California, 1955.
- Schaefer, C. E. The self-concept of creative adolescents. Journal of Psychology, 1969, 72, 233-242.

- Schiwetz, G. A. A study of creative expression activities and their influence on self-esteem. Unpublished doctoral dissertation, University of Houston, 1979.
- Shallcross, D. J. Teaching creative behavior. Englewood Cliffs, NJ: Prentice-Hall, 1981.
- Smith, R. Writing man: Handwriting and consciousness. Unpublished manuscript, 1982.
- Smith, W. W. Productive creativity and handwriting. Independent pilot study, 1983.
- Solomon, S. Knowing your child through his handwriting and drawings. New York: Crown, 1978.
- Sonneman, U. Handwriting analysis as a psychodiagnostic tool. New York: Grune & Stratton, 1950.
- Stein, M. L., & Meer, B. Perceptual organization in a study of creativity. Journal of Psychology, 1954, 37, 39-43.
- Sternberg, R. J., & Davidson, J. E. The mind of the puzzler. Psychology Today, June 1982, pp. 37-44.
- Storr, A. The dynamics of creation. New York: Atheneum, 1972.
- Strindberg, A. The dream play. In E. Bjorkman (Ed. and Trans.), Plays by August Strindberg. New York: Charles Scribner's Sons, 1921.
- Taylor, C. W. Creativity: Progress and potential. New York: McGraw-Hill, 1964.
- Taylor, C. W. Igniting creative potential (Bella Vista School Project Implode, 1971). Reprinted as "Multi-talent Potential" in Annals of the American Association of Handwriting Analysts, 1972-73, 3, 60-67.
- Taylor, C. W. Multiple talent teaching approach. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.
- Taylor, C. W., & Ellison, R. L. Moving toward working models in creativity: Utah creativity experiences and insights. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.

- Taylor, I. A. An emerging view of creative actions. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.
- Taylor, I. A., Sutton, D., & Haworth, S. The measurement of creative transactualization: A scale to measure behavioral dispositions to creativity. In A. Biondi & S. J. Parnes (Eds.), Assessing creative growth: Measured changes--Book Two. Great Neck, NY: Creative Synergetic Assoc., 1976.
- Teillard, A. L'Ame et l'Ecriture: Graphology based on analytical psychology. Translated by Edward B. O'Neill. Self-published, 1975.
- Teltscher, H. O. Handwriting--revelation of self. New York: Hawthorn Books, 1971. (Originally published, 1942.)
- Thorsen, R. Jury selection. Talk given at American Handwriting Analysis Foundation Conference, Spokane, WA, July 1984.
- Torrance, E. P. Guiding creative talent. Englewood Cliffs, NJ: Prentice-Hall, 1962.
- Torrance, E. P. Torrance Tests of Creative Thinking, norms-technical manual (Research edition). Princeton, NJ: Personnel Press, 1966.
- Torrance, E. P. Creativity research in education: Still alive. In I. A. Taylor & J. W. Getzels (Eds.), Perspectives in creativity. Chicago: Aldine, 1975.
- Torrance, E. P. Education and creativity. In A. Rothenberg & C. R. Hausman (Eds.), The creativity question. Durham, NC: Duke University Press, 1976.
- Torrance, E. P. The search for satori and creativity. Great Neck, NY: Creative Synergetic Assoc., 1979.
- Torrance, E. P. Assessing the further reaches of creative potential. Journal of Creative Behavior, 1980, 14, 1-19.
- Torrance, E. P. The role of creativity in the education of the gifted: A position paper. Prepared for Gifted Certification Seminar, Gainesville, GA, October, 1983.

- Torrance, E. P., & Ball, O. E. Torrance Tests of Creative Thinking, streamlined (revised) manual, figural A & B. Bensenville, IL: Scholastic Testing Service, 1984.
- Treffinger, D. J. The progress and peril of identifying creative talent among gifted and talented students. Journal of Creative Behavior, 1980, 14, 20-34.
- Walkup, L. E. Detecting creativity: Some practical approaches. In A. Biondi & S. J. Parnes, Assessing creative growth: The tests--Book One. Great Neck, NY: Creative Synergetic Assoc., 1976.
- Wallach, M. A., & Kogan, N. Modes of thinking in young children: A study of the creativity-intelligence distinction. New York: Holt, Rinehart & Winston, 1969.
- Wellingham-Jones, P. Adolescence and self-esteem. Red Bluff, CA: Walker Lithograph, 1984.
- Wells, F. L. Personal history, handwriting, and specific behavior. Journal of Personality, 1946, 14, 313.
- Whiteside, M. Rare beasts in the sheepfold. Journal of Creative Behavior, 1981, 15, 189-198.
- Whiting, E. (Ed.). Five analysts from five schools analyze writings from the same subject. Journal of the Council of Graphological Societies, 1980, 5, 6-15.
- Whiting, E., & Sassi, P. Personal Worth, intermediate course in handwriting analysis. San Diego, CA: Handwriting Consultants, 1983.
- Whyte, W. H., Jr. The organization man. New York: Simon & Schuster, 1956.
- Zegas, J. A validation study of tests from the divergent production plane of the Guilford Structure-of-Intellect Model. Journal of Creative Behavior, 1976, 10, 170-177.

APPENDIX A

LETTER TO PARENTS

Dear Fifth-Grade Parents:

Many of you already know me as one of the second-grade teachers at Center School. For the last seven years, I have also been a certified graphologist (handwriting analyst), and now I am a doctoral candidate in Education at the University of Massachusetts. For my dissertation research, I have developed a study of children's creativity and handwriting. This study will test the relationship between the handwriting of fifth graders and their ratings on a variety of creativity measures.

I hope to be able to have the fifth graders at Center School as my subjects, not only because of the age of the children but because I know the teachers and can rely on their cooperation. However, I will need your help, too. You will be asked to fill out a short (one page) creative-behavior check list. This will be sent home with your child and returned to the teacher. The children will be given two tests of creative thinking (one with words and one using drawings) and a short true-or-false inventory of attitudes. These tests will be fun to take and will in no way influence their grades in any subject. Then, the children will write me a letter describing their reactions to the tests. The letter will be used as a sample of their handwriting to be analyzed for traits of creativity and correlated with the results of the tests.

As the tests will take no more than about 1½ hours altogether, the teachers have consented to administer them during regular class time. Thus, there will be no extra time involved for the children. All tests will be coded by the teachers before I score them, so that none of the children's names can be associated with their ratings. This will ensure total confidentiality and impartiality.

When my study is finished, I will be very happy to share the results with you. If you have any questions, please call me at Center School (567-3387) or at home (566-3027). I look forward to working on this project and appreciate your willingness to be a part of it. Thank you for your cooperation.

Sincerely,

Willa Smith

APPENDIX B
SUBJECT CONSENT FORM

Dear Parents:

Please sign and return this as soon as possible to your child's teacher. Thank you.

Sincerely,

Willa Smith

Date _____

I agree to participate in this research on children's creativity and handwriting, as set forth in the accompanying letter from Willa Smith, doctoral student.

I understand that no individual's name will be associated with his/her results or any of the creativity measures or with the handwriting samples. I further understand and agree that composite results of this study may be published.

I also grant permission for my child _____ to participate to the extent outlined in the letter.

Signature of parent/guardian

APPENDIX C

LETTER ACCOMPANYING RENZULLI-HARTMAN CHECK LIST

Dear Parents:

Enclosed is the Renzulli-Hartman check list. If possible, it would be helpful if both of you fill this out together, so you can discuss actual behaviors and come to joint conclusions as to how your child rates on these characteristics. Also, please remember that all responses will be kept totally confidential. I will assume that your responses are truthful and as accurate as you can make them.

I would like to have your check list returned in the envelope provided as soon as possible. Thank you very much for agreeing to participate in this study.

Sincerely,

Willa Smith

