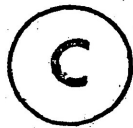


STYLE OF INFORMATION PROCESSING
IN FEMALE AND MALE YOUTHS
RELATED TO CREATIVE SELF-PERCEPTIONS

BY



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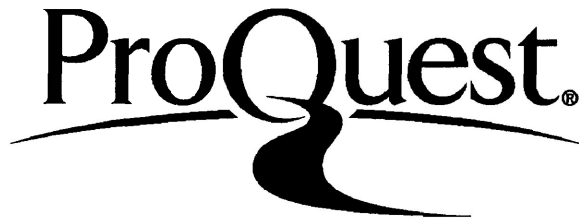
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ABSTRACT

Previous research has suggested that the relationship of hemispheric laterality to creativity should not be studied independent of gender differences. This study investigated the interrelationships between hemisphericity and creativity measures in 93 female and 64 male youths. Right- and Left-dominant, Integrated and Mixed hemisphericity scores were obtained with the test, Your Style of Learning and Thinking (SOLAT). Hemisphericity measures were then related to creativity scores measured by the Khatena-Torrance Creative Perception Inventory (KTCPI), consisting of a creative personality measure, What Kind of Person Are You (WKOPAY?), and a measure to identify creative achievements, Something About Myself (SAM).

Statistically significant differences were found between the hemisphericity levels ($p < .001$), and for the sexes ($p < .05$), on both of the creativity measures.

The following conclusions were formulated by the results of the study: the Lefts obtained the lowest creativity scores, significantly lower than the Right, Integrated and Mixed ($p < .001$); the Mixed style subjects were superior to the Lefts on the creative personality measure (WKOPAY?) ($p < .01$), but not on the creative achievements measure (SAM); the Rights yielded significantly higher creativity scores than the Left and Mixed on both of the creativity measures ($p < .001$); the Integrated did not yield higher scores on the creative personality measure than the Left and Mixed subjects, but did yield significantly higher scores than the Left and Mixed subjects on the creative

achievements measure ($p < .001$); the Right and Integrated yielded similar scores on the creative achievements measure, but not on the creative personality measure; and finally, high creative females (Right and Integrated) resembled high creative males with the similar hemispheric style on their creativity scores, and yielded significantly higher scores than low creative (Left) males ($p < .05$).

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INTRODUCTION

Speculation regarding the creative process has existed for decades. Research on creativity has spawned a number of findings and numerous meta-theoretic statements. Evident, during the past decade, are some changes in the theoretical research approaches applied to the study of creativity. Recently, views of the creative process have emerged which reflect our increasing understanding of the functioning of the human brain.

During the past decade scientists have begun to learn more about the differing functions of the right and left hemispheres of the brain. Much of the impetus in the field has been generated by Sperry (1964, 1967, 1974) and Bogen (1969, 1973) through their work in "split-brain surgery". Specifically, their research has demonstrated the specialized functions of the hemispheres. For example, when the corpus callosum is severed there is no way for information to pass from one side to the other. Each hemisphere can function independently as if it were a complete brain (Sperry, 1964). The left cerebral hemisphere appears to be specialized for thought processes which have been described as verbal, sequential, logical and analytical; whereas the other side, the right cerebral hemisphere is specialized for thought patterns which emphasize perception, synthesis and the holistic arrangement of ideas (Bogen, 1969; Levy-Agresti & Sperry, 1968; Ornstein, 1972; Sperry, 1974).

These research findings on hemispheric functions have enhanced the area of creativity research. While some speculation

has focussed on the idea that creativity is primarily a right hemisphere function (Krueger, 1976; Krippner, Dreistadt & Hubbard, 1972), recent view of the creative process tend to emphasize the importance of both right and left hemispheric functions -- an integrated style (Torrance & Mourad, 1979). A currently popular speculation is that the partition of the creative act can be coordinated with the previously mentioned differences in hemispheric processes: the perceptual insight into a problem is presumed to be due to an increased participation of processes mediated by the right hemisphere, whereas the logical elaboration and verbal communication of this insight is more intimately tied to left hemisphere processes (Bogen & Bogen, 1969; Ornstein, 1972; Garrett, 1976).

In essence, it appears that an integration of the special abilities of both left and right halves is required for the definition of creativity which follows. Creativity, based upon this theoretical position, is not defined exclusively as "original production", but as the "relevant original production of a communicable product" to be utilized or to enhance social well being (Garrett, 1976; McMullen & Stocking, 1978; Parnes, 1976). In this sense, the highly creative individual does not depend more upon either hemispheric style, but integrates the functioning of both. The creative process needs the imaginal idea or product (which has been theorized to originate in the right hemisphere), while also depending upon the functioning of the analytical and logical left to communicate or develop the idea or product to be utilized or to enhance social well being.

Only recently have neuroscientists (Carter & Greenough, 1978; Harris, 1978; Davidson, Schwartz, Pugash & Bloomfield, 1976; McGuinness & Pribram, 1978; Trotman & Hammond, 1979; Witelson, 1976) found any evidence to suggest differences between the brain functions of females and males. It is suggested that female and male brains, in lower animals

and possibly in humans, are anatomically different (Carter & Greenough, 1978). Parts of the brain that control specific behaviors are different in the two sexes. Tests on infra-human species have revealed differences at the level of neural substrata, that arise, in part, from the effect of male and female hormones on the developing brain (McGuinness & Pribram, 1978). Behavioral evidence suggests that performance upon certain tasks and skills varies according to gender (Harris, 1978; Trotman & Hammond, 1979; Witelson, 1976). It has been reported by Witelson (1976) that men show greater lateralization of functions in the right hemisphere. Women show greater lateralization of language skills in the left hemisphere. Trotman and Hammond (1979) suggest a sex-related difference in degree of lateralization of hemispheric functions, with males having a more strict segregation of functions. Hemispheres of women's brains seem less specialized than men's on both verbal and spatial skills (Goleman, 1978).

The research evidence on differing hemispheric functions within the sexes substantiate the findings of differences in the creative style of the sexes. It has been suggested that, whereas men value product creativity, women value product and process creativity (Groth, 1975). Studies on creativity within the sexes reveal that even highly creative women possess a more passive, nonaggressive cognitive style than their male counterparts (Helson, 1967a, 1968; Taylor, 1978; Kogan, 1972). The general finding is that creative women are less self-confident, less self-acceptant and less productive than creative men. These differences have been reported in several studies, and indicate that the relationship of hemispheric laterality to creativity should not be studied independent of gender differences.

In light of the empirical research on female and male hemispheric specialization, there exists the possibility of a difference between the sexes in style of hemispheric

specialization and creative orientation. The present study will investigate the interrelationships between style of information processing (hemisphericity), and two creativity measures in female and male subjects.

HEMISPHERIC LATERALITY AND CREATIVITY

The human brain is composed of two cerebral hemispheres, each of which governs contralateral motor activities. Studies on split-brain subjects, human and infra-human organisms such as monkeys and cats, have provided much insight into the mechanical aspects of cortical laterality (Gazzaniga, 1967; Sperry, 1964, 1967, 1974). Electroencephalograms (EEG) of human subjects studied, support the notion that the brain has independently specialized functions located in distinct hemispheres -- left and right (Bakan, 1969). Though capable of functioning independently (as shown in studies on split-brain subjects), the two hemispheres appear to work cojointly being joined by a massive commissure of nerves known as the corpus callosum (Gazzaniga & LeDoux, 1978; Kinsbourne, 1978; Sperry, 1975). The differences in preference of the two hemispheres for information processing have been referred to as "styles of learning and thinking" (Torrance, Reynolds, Riegel & Ball, 1977), and as "hemisphericity" (Bogen, DeZure, Tenhouten & Marsh, 1972). Briefly defined, hemisphericity is the tendency for an individual to depend more on one than the other hemisphere for information processing (Reynolds & Torrance 1978).

Each hemisphere is characterized by its own particular form of intellect and problem solving capability. During the normal development of right-handed individuals, especially males in our culture, the weight of evidence suggests the left cerebral hemisphere becomes specialized for the logical sequential processing of information, and deals primarily with verbal, analytical, concrete, convergent, deductive,

temporal and digital materials (Bogen, 1969; Gazzaniga, 1970; Ornstein, 1972). The right side (called the minor or mute side) houses nonverbal, abstract, spatial, analogic, motoric (tactual/kinesthetic), emotional, creative, divergent, musical, inductive and some intuitive ability (Bakan, 1971; Ornstein, 1973; Sperry, 1975; Samples, 1976). The specialized functions identified with the right hemisphere are thought to be the basis of the creative impulse (Garrett, 1976). In humans, according to Sperry (1964), one hemisphere is nearly always dominant. Most people, he posits, are right-handed and the left cerebral hemisphere is dominant. However, recent research tends to suggest that, for children approximately five years of age or under, for females, and for left-handed or ambidextrous persons of either sex, the nature of hemispheric specialization is far less clear (Rubenzer, 1979; Rekdal, 1979).

Although there is some documentation to support the notion that the right hemisphere is dominant in creative thinking (Krueger, 1976; Kripper, Dreistadt & Hubbard, 1972; Reynolds & Torrance, 1978), the accumulating evidence suggests that creative thinking or problem solving requires both left and right cerebral functions (Torrance & Mourad, 1979). Depending upon one's creative disposition, style, state or level, the creative individual may or may not depend more on the right hemisphere in creative endeavours.

It is suggested by Garrett (1976) that the functions of the right hemisphere are the basis of the initial creative impulse. The creative process is the transformation of a creative impulse through the use of techniques and sign manipulation into a communicable product (Garrett, 1976). All parts of the brain contribute: the right brain responsible for the manipulation of the tools of the language, appropriate for expression of the vision, whether the language be words,

colours, sounds, movements, or physics. This model describes creativity not only as imagination, but as "expressed and applied imagination" (Osborn, 1953), whereby the creative process can be visualized as involving primary and secondary cognitive processes. The primary creativeness of the inspirational phase of creativity should not be separated from the elaboration and development of the inspiration. Hence, the hemispheres must work together, using their specialities in the formation of a new idea or a work of art. Depending upon one's creative level, style, or type, one hemisphere (the right) or both (an integration) may be utilized during the creative process.

The literature on creativity emphasizes the identification of, and distinction between, different creativity dispositions (Taylor, 1959), or different levels, states, styles and developmental models (Gowan, 1972; Rank, 1945; Werner, 1948, 1957). In the study of such stages one is impressed with the fact that different people, working at different times and places, have come up with theories that fit together well.

Taylor (1959) made a distinction between different creative dispositions. The creative disposition is represented by five (ascending) developmental levels of creativity: expressive creativity, technical creativity, inventive creativity, innovative creativity, and emergentive creativity. The levels suggest that creativity does take on divergent forms. Furthermore, the creative individual may best be analyzed and understood through examination of his/her productive complexity.

Others (Gowan, 1972; Rank, 1945; Werner, 1948, 1957) have made distinctions between types, styles and developmental levels of creativity. Gowan (1972) combined the effective (Eriksonian) stages and the cognitive (Piagetian) stages, into a developmental chart having a periodicity of three, and said that there were higher cognitive stages than those discovered by Piaget, which fit the last three Eriksonian stages.

Gowan represents creativity in his periodic developmental stage theory as proceeding on a dual staircase, with one foot on the affective, and the other on the cognitive risers. Developmental stages occur in periodic three cycle fashion in which the individual's concern with the "world", "I" and "thou", recurs at three levels of maturity. The first stage termed "latency", is characterized by an "it-they" orientation to the world. The second stage, referred to as "identity", is characterized by an "I-me" orientation. Emphasis at this stage is directed toward ego functions. At the third and highest level, the individual has achieved a "thou" orientation, where emphasis is not only directed toward oneself, but others as well. This is referred to as "creativity". Each stage has a special relationship and affinity for another three stages removed from it. Stages, one, four and seven (trust, industry and generativity) are noticeable for a peculiarly thing-oriented, sexually latent aspect of dealing with the world of experience. In stage one, it is the world of percepts; in stage four, the size, shape, form and colour of things, and what one can make of them; in stage seven, the world of significant others (such as children, who are not love objects in a libidinal sense). By contrast with the previous level, the second, fifth and eighth stages (autonomy, identity and ego-integrity) are ego-bound, ego-oriented and ego-circumscribed. They are all about "me" (my identity, my existence and inter-personal relationships, and my salvation). Finally, the third level, stages three and six (initiative and intimacy), deal with the love relationship and its expansion from narcissistic self-love, through Oedipal love of parents, to generalized heterosexual love, to fixation on some individual person.

Prior to Gowan's developmental stage theory was Rank's (1945) postulation on "three personality types". Rank's

personality types include: the average or normal type (adapted man), the conflicted or neurotic type, and the artistic, or man of will and deed (the creative type). Gowan's three stages of development correspond to Rank's personality types. The "world" orientation parallels the adapted man, the "I" or ego orientation, the neurotic type, and the "thou" orientation, with the creative type.

Werner (1948, 1957) formulated a view of development based upon personality orientations. Werner postulated that all human growth follows a path of increased differentiation and hierarchic integration. In the learning and growth process one moves from an undifferentiated state of being to a differentiated one. In the undifferentiated state distinctions are hazed between self and others, inner and outer, rational and nonrational. In the differentiated state distinctions assume a sharper clarity. The separateness of objects, individuals, and ideas at this level though, can lead also to isolation and failure to recognize poorly defined relationships. At the next and highest level of development, one maintains the sense of differentiation and combines it with perceptions of relatedness. This level is entitled, "hierarchic integration".

The polarity of Werner's personality orientations (the undifferentiated and differentiated) are a co-extention of associated developmental functions of the right and left hemispheres. Children (with more diffuse perceptions and global awareness associated with the right hemisphere) learn through school years to differentiate themselves from the world and to distinguish black from white, inner and outer, self and others. Language is the tool for this distinction making. As described by Schachtel (1959), this is the specific

strength of the left hemisphere. However, if language is not to imprison us, for "language may adapt us to the world that is, but it is the enemy of the yet unimagined" (Schachtel, 1959, p. 295), we must recapture our ability to view the world holistically, to see the total Gestalt and unexpected relationships. Further, we must do so without losing our capacity to detach ourselves and act logically upon our initiative and imaginal perceptions. This final integration would require a full use of human capacities -- an integration of right-and-left-hemispheric functions.

McMullen and Stocking (1978) propose a three-dimensional model of the concept of creativity which expands upon the third stage proposed by Gowan and Rank. As well, McMullen and Stocking's model strengthens Werner's postulated "integrated personality orientation". Rather than viewing creativity as a two-dimensional process, between a primary and a secondary phase, intuition and development (Osborn, 1953), McMullen and Stocking propose the importance of the "social linkage". Creativity according to their model, is perceived to incorporate three dimensions: creative ideas as original, visionary, imaginative, etc.; creative ideas as being feasible in terms of expression or formulation in an external media (such as blue prints, tape recordings, mathematical formulae); and creative ideas as achieving "social linkage". The three-dimensional model suggests that the creative person must not only conceive original ideas then externalize them as form and pattern in some transmittable media, but also his/her creative products must take root and spread as pronounced contributions to mankind. The third dimension stresses the same personality orientation as was attributed importance in the models of Gowan, Rank, and Werner -- the integration of polarities and the importance of the "social link" or "the other".

It is the individual utilizing both the right and left hemispheric functions who will fit into the highest level proposed by Gowan, Rank, Werner, and Taylor, **Creativity**

is, however, evident at the other levels, i.e. Ranks' neurotic type, or Werner's undifferentiated personality. Individuals at these levels are characterized by ego-involvements, and are dependent more upon their right hemispheric processes. As Gowan (1972) pointed out:

Creativity is evident at each of these levels, but with different flavors and characteristics. This fact has led many researchers to note that the child's creativity, for example, is not the same as the creative production in young adults. The creativity of the third (initiative) stage is exhibitionistic, dramatic, often repetitive, and generally fragmentary. The creativity of a young adult is characterized by more unity, coherence, daring and brilliance. It is truly novel and often displays a scope of mastery and vigor. Whether the one develops into the other depends of course on environmental conditions. (p. 65).

Others have suggested that artistically and scientifically creative adolescents differ from each other (Anastasi & Schaefer, 1969; Helson, 1965, 1966, Roe, 1953). The more artistically creative tend to demonstrate unconventionality, imaginative play, and other fantasy pursuits. Supported by recent research in the neurosciences, West (1976) speculates that minor scientific creativity is likely to be mainly left hemispheric cognitive excitation. Major scientific creativity is likely to involve the excitation and intercommunication of both cerebral hemispheres. West states that:

...some kind of altered state of awareness... may be essential to creativity... Creativity in many extraordinarily gifted individuals depends in part upon temporary dominance of the right cerebral hemisphere (p. 221).

Other differences have been identified when comparing those high on originality with those high on originality and intelligence. The affected, aggressive, demanding and impatient behaviour of the highly original becomes more moderate and controlled

when combined with high intelligence (Barron, 1969). Forisha (1978) concluded that the artistic and/or highly original persons, without the moderating influence of the intellect, swings more toward the pole of passion -- a right hemisphere style -- and away from the pole of reason and logic -- a left hemisphere style.

The accumulating evidence presently suggests the most productive and creative intellectual functioning requires a sharing of the cognitive load -- both left and right hemispheric functions (Torrance & Mourad, 1979). Weinstein (1977) concludes that the two hemispheres cannot be considered as dominant and non-dominant; they are asymmetrical in function, but equivalent in importance. Ornstein (1973) proposes that people generally operate with both hemispheres, alternating them according to the task. Konicek (1975) suggests that many of the most creative individuals are able to use both hemispheres at will. It is suggested that creative geniuses are most adroit at utilizing both left and right hemispheric processing modes (Ghiselin, 1952; Ghilchrist, 1972; Norman, 1977; West, 1976). As Ferguson (1973, p. 107) stated:

The view of creativity - as a non-intellectual activity fails to take into account the dynamic unitary, and coherent nature of the brain. Emotion and intellect, freedom and discipline, reason and intuition, the precise and the gossamer, primary and secondary processes, chaos and order - all those apparent opposites can exist in creative harmony in the human brain.

It is possible that people differ in the ease with which they can make use of the right and left hemispheres. Bogen and Bogen (1969) make such an assumption when they suggest that people at lower levels of creativity are characterized by poor transmission across the corpus callosum. If creativity is indeed marked by cognitive flexibility and efficient use of both hemispheres, one may also assume that the highly creative are able to gain access to the right hemisphere functions with greater ease than those with lesser

creativity.

RESEARCH ON "YOUR STYLE OF LEARNING AND THINKING"

In a recent study, Torrance and Mourad (1979), using the test Your Style of Learning and Thinking (SOLAT) (Torrance, Reynolds and Riegel, 1976), and a variety of measures of creative thinking ability, perception and behavior, found evidence to suggest that both cerebral hemispheres are involved in creative behavior. The study revealed that creative ability in adults of superior intelligence is associated with learning styles which rely heavily on right-hemispheric type processes, or an integration of right-and-left-brain modes. Individuals identified as possessing an Integrated style of information processing exhibited the motivation and personality characteristics associated with creative achievements. Those classified as having a Left hemispheric style of processing information attained lower scores than the other two groups (Right, Integrated) on the measures of creative thinking ability and on the personality measures associated with creative behavior. When comparisons were made with Right and Integrated, very few differences were found. The most significant findings revealed that the Rights were more ego involved, less aware of the others, more intuitive, and higher on the originality measures. Conclusions of the study suggest that superior adults having a style of information processing associated with Right cerebral hemisphere functions and those having an Integrated style of information processing appear to be generally more effective on creativity measures than those with a Left style. These individuals (Right and Integrated) were found to have the motivational and personality characteristics associated with creative achievement.

Administrations of Your Style of Learning and Thinking have revealed that not all subjects fall into one of the three categories -- Right, Left or Integrated. The researchers (Torrance, et al., 1976) have proposed a fourth category --

"Mixed", for individuals who show no clear preference for any of the other styles. Only a few studies have included subjects assigned the Mixed classification. In a recent study, Reynolds and Torrance (1978) included subjects classified as Mixed. This study was designed to investigate perceived changes in styles of learning and thinking (hemisphericity), through direct and indirect training. Their hypothesis was that exposure to a variety of styles and experiences should produce a more integrated style, promoting cerebral complementarity (inter-hemispheric cooperation). On post testing, the researchers were surprised to find a slight increase in the number of subjects falling into the Mixed category. The training programs produced decreases in both the Right and Left categories, increases in Integrated and Mixed. Reynolds and Torrance (1978) stress the need for research to develop an understanding of the meaning of the Mixed classification and its implications. They further elaborated that, "It is not clear whether the Mixed category is a positive or negative state of affairs" (p.251).

RESEARCH ON THE KHATENA-TORRANCE CREATIVE PERCEPTION INVENTORY

Torrance and Khatena (1970 & 1971) developed a test battery entitled Khatena-Torrance Creative Perception Inventory, consisting of the following two biographical measures: What Kind of Person Are You? (WOPAY) (Torrance, 1963) and Something About Myself (SAM) (Khatena, 1970d). The measures were designed on the assumption that perception can be related to creative components of personality, which when operationalized will allow for measurement. Thus, the individual who accurately perceives him/herself as creative, can be expected to behave in creative ways.

What Kind of Person Are You? is based upon the rationale that an individual has a personal self, whose structures have incorporated creative and non-creative ways of behaving (Khatena, 1977). In addition to a creative perception index, the WKOPAY? yields five factors or orientations (Bledsoe & Khatena, 1974b): Acceptance of Authority, Self-Confidence, Inquisitiveness, Awareness of Others and Disciplined Imagination.

"Acceptance of Authority" relates to being obedient, courteous and conforming, and to accepting the judgements of authorities. These represent a cluster of non-creative components. "Self-Confidence" relates to being socially well-adjusted, self-confident, energetic, curious, thorough, and remembering well. "Inquisitiveness" refers to one who always asks questions, is self-assertive, feels strong emotions, and is talkative and obedient. The first three variables are creative, and the last two non-creative components of the factor. The non-creative components of "Awareness of Others" are: courtesy, good social adjustment, being popular or well liked, being considerate of others and preferring to work in a group. The creative components of this factor are: receptivity to ideas of others, courageous in convictions, truthful (even when it gets you in trouble) and non-conforming. "Disciplined Imagination" is wholly composed of descriptive creative variables -- persistent, thorough, industrious, imaginative, adventurous, never-bored, attempting difficult tasks, and preferring complex tasks. Bledsoe and Khatena's (1974b) factor analysis of the above revealed that "Acceptance of Authority" can be referred to as a non-creative orientation, whereas "Disciplined Imagination" proved to be a characteristic of a highly creative orientation. The remaining other factors -- Self-Confidence, Inquisitiveness, and Awareness of Others produced both creative and non-creative elements.

The second measure of the Khatena-Torrance Creative Perception Inventory -- Something About Myself -- is based upon the rationale that creativity is reflected in the personality characteristics of the individual, in the kind of thinking strategies he/she employs, and in the products that emerge as a result of his/her creative strivings (Khatena, 1977). The test, in addition to a creative perception index, yields six factors or creative orientations (Bledsoe & Khatena, 1974a): Environmental Sensitivity, Initiative, Self-Strength, Intellectuality, Individuality and Artistry.

"Environmental Sensitivity" involves openness to ideas of others; relating ideas to what can be seen, touched or heard; interest in beautiful and humorous aspects of experience and sensitivity to meaningful relations. "Initiative" relates to directing, producing, and/or playing leads in dramatic and musical productions; producing new formulae or products; and bringing about changes in procedures or organizations. "Self Strength" relates to self-confidence in matching talents against others; resourcefulness; versatility; willingness to take risks; desire to excel; and organizational ability. "Intellectuality" relates to intellectual curiosity; enjoyment of challenging tasks; imagination; preference for adventure over routine; liking for construction of things and ideas for forming something different; and dislike for doing things in a prescribed routine. "Individuality" relates to preference for working by oneself rather than in a group; seeing oneself as a self-starter and somewhat eccentric; being critical of other's work; thinking for oneself; working for long periods without fatigue. "Artistry" relates to production of objects, models, paintings, carvings; musical composition; receiving awards or prizes, or having exhibits; production of stories, plays, poems and other literary pieces.

Relative to the six creative orientations (of SAM), generally adolescent boys and girls, college men and women, perceived themselves as having orientations of Environmental Sensitivity, Intellectuality, Individuality, Self-Strength, Artistry, and Initiative -- in that order of priority (Khatena, 1975). In another study, the teacher was identified to perceive his students to be creative in the same order of creativity orientations as the students perceived themselves in Khatena's (1975) study (Johnson, 1976).

Torrance and Mourad (1979) found that on the overall measure of creative achievement and behavior derived from Something About Myself, the Lefts are significantly lower than both the Rights and Integrateds. The Lefts are lower than the Rights on Environmental Sensitivity; the Rights are higher than the Lefts on Intellectuality; the Lefts are lower than both the Rights and Integrateds on Individuality.

In another study, Torrance, Reynolds, Riegel and Ball (1978) reported that upon administration of the SOLAT and WKOPAY, the factor scores of the latter test yielded significant differences among the three classifications -- Right, Left and Integrated. For example, on factors Acceptance of Authority and Self-Confidence, the Lefts were significantly higher than the other two groups. On Awareness of Others, the Integrateds were higher than the Lefts. Similarly, the administration of the SAM produced significant differences, with those individuals reporting a Right and Integrated style of learning and thinking yielding a higher score than those reporting a Left style (Torrance et al., 1978).

SEX DIFFERENCES AND HEMISPHERIC LATERALITY

We are only beginning to understand the importance of sex differences in relation to hemispheric laterality. Within the realm of psychological research, significant sex differences are a common outcome, and are an expected finding for most

researchers. It is a general conclusion that women excel at certain tasks, while men transcend in others. Women often exhibit one perceptual and cognitive pattern, men a strikingly different one (Goleman, 1978).

The research evidence on lateralization between the sexes substantiates this position. For example, on spatial tasks -- the rod-and-frame and embedded-figures tests -- females are cited as being more field dependent, and more global in thought (or, cognitively undifferentiated). Males are more field independent, analytical (or, cognitively differentiated) (Gross, 1959; Harris, 1978; Witkin, Dyk, Faterson, Goodenough & Karp, 1962). The general conclusion is males are superior in performance of visuo-spatial tasks and show greater lateralization of functions to the right hemisphere, and females show greater superiority in tests of verbal skills with lateralization to the left hemisphere (Harris, 1978; Witelson, 1976).

Witelson (1976) concluded that the psychological functions in women are not localized into one particular hemisphere of the brain, to the same degree as in men. In effect, mental abilities in women are spread over both hemispheres -- they are less specialized than men. McGlone (1977) is of a similar opinion. McGlone examined 85-right-handed adults admitted to a neurological ward for damage to the right or left side of the brain. She administered each patient a battery of psychological tests -- some testing verbal skills, while others assessed nonverbal spatial abilities. She hypothesized that if a mental function is located in a particular half of the brain, there should be impairment in the function if that hemisphere is damaged. McGlone found that women showed less severe losses in both verbal and spatial ability, whether the damage was in the right or left hemisphere. This led her to conclude that a woman's verbal and spatial

abilities are more likely duplicated on both sides of the brain, while a right-handed man is more likely to have his speech centre on the left, spatial skills on the right.

Davidson and his colleagues (1976) identified a hemispheric sex difference that involves hemispheric arousal and specialization. They studied the degree of electrical activity in each half of the brain during a series of mental tasks, for which the subjects had to generate a response rather than simply perceive something. Sex differences did not appear on every task. However, women on the whole seemed better able to activate those zones that were needed for the task at hand. Davidson et al. concluded that women seem better able to focus attention on one particular task -- whether it is driving a strange route or carrying on a conversation -- and do it more efficiently. Men seem better at tasks that require utilization of two different cognitive approaches at the same time.

McGuinness and Pribram (1978) maintain that differing ratios of sex hormones acting on particular brain structures underlie sex differences. Neuroscientists in this area of research suggest that the "preoptic-suprachiasmatic" area (POA-SC) (a tiny region near the base of the brain) may be functionally (and perhaps structurally) different in males and females (Carter & Greenough, 1978). Sex disparities in the POA-SC area (and probably other brain regions) may be part of the mechanisms through which male or female brains control essential reproductive events, including sexual behavior. McGuinness and Pribram (1978) favour the view that males function better on tasks in which the two hemispheres are not in competition. Females are better able to shift from one hemisphere to another -- a conclusion in keeping with Davidson, et al. (1976).

SEX DIFFERENCES AND CREATIVITY

Much of the literature on creative persons has dealt primarily with creative men. As criticized by Bruch and Morse (1978, p. 526):

a recent theoretical framework for the development of the creative individual (Gowan, 1972) is based essentially upon the creative man's progression according to developmental theories of Piaget and Erikson.

Relatively little attention has been devoted to research concerned with developmental stages of creativity in women. Simpson (1979, p. 377) suggests that:

By understanding the levels to which a fully liberated person might escalate, we are much better able to diagnose barriers which prevent gifted women from reaching them.

In a critical overview of developmental theory as applied to mature women, Simpson (1979) presented three conclusions: that women tend to spend more time in certain developmental stages; many women are spending more time in fulfilling the lower needs; and that their progression through these stages may be quite uneven.

Various reasons have been espoused for the state of affairs of women as related to the developmental stages and creativity. Simpson (1979), in discussing why women stay in a particular developmental stage longer than men, reviews several positions. First, he reasons that women spend more time in a particular developmental stage than men because of "safety and security needs". The assumption being that at lower stages, females can be dependent, can be taken care of, and do not have to take a lot of risks, while still feeling they are fulfilling a vital function. As another explanation, he offers Gowan's "developmental dysplasia theory". "Developmental dysplasia arises from a failure to escalate" (Gowan, 1974, p. 49). It involves some aspect of a developmental lag, arrest, or slowdown, which means that

some part of the development of the individual is behind schedule, i.e., cognitive development may be "stuck" in formal operations, while affective levels reach the parental stage. As yet another explanation, Simpson proposes the possibility that "intimacy" rather than "initiative" related roles are still the most culturally acceptable roles for women, i.e., the affective areas, including love, affiliation, reproduction and care.

Most of the early research on sex differences in terms of creativity were carried out by Ravenna Helson (1965, 1966a, 1966b, 1967a, 1968). Of particular interest are two studies (1967b, 1968), exploring sex differences in creative style. From these studies she concludes that there is support for a hypothesis of two types of consciousness: patriarchal, which is represented as assertive, objective, analytical and purposive; matriarchal, which is viewed as a "brooding" over emotional content until organic growth "comes forth". She further describes creative women as having low control, little flexibility and little confidence in dealing with the outside world (in comparison to creative men). She suggests that such differences in cognitive style, in interaction with environmental influence, may be responsible for the less creative productivity by women than men. Similarly, Halpin, Halpin and Torrance (1973) found that the relationship between creative abilities and creative personality is not as high for females as it is for males.

Using the multi-dimensional Creative Behavior Disposition Scale (CBDS) (Taylor & Fish, 1979; Taylor, Sutton & Haworth, 1974), Taylor (1978) found that on ten measures of creativity, men scored higher in most areas than women. Moreover, men scored significantly higher on "innovative

creativity", whereas women were found to score higher on "technical creativity".

An assumption supported by research findings (Barron, 1969; Blaubergs, 1978; Bruch & Morse, 1978; Elman, 1976; Heintz, 1977) is that creativity is representative of normal, healthy, effective functioning. Overlapping these studies is the view-point that a healthy personality is androgynous -- encapsulating both female and male personality attributes. Elman (1976) on investigating clinicians' perceptions of mentally healthy and creative adults found that mentally healthy adults were seen as significantly more androgynous. Phenomenological data within the study revealed essentially androgynous descriptions of the healthy and the creative. However, when asked to describe a healthy or a creative person, the majority of clinicians (both males and females) chose to describe a man. From her research, Heintz (1977) suggests that more differences exist between high and low creative individuals than high creative females and males. These studies have also indicated that differences in the creative production of males and females are likely due to socialization experiences. Heintz (1977) concluded that greater flexibility in sex roles is correlated with a more highly integrated personality, which may be related to creativity.

Most of the studies in this area have approached the topic by employing the male as a starting point for the investigation of the female. Very few studies have included comparisons to the general female population, and between groups of gifted females (Blaubergs, 1978). Bruch and Morse (1978) have formulated a model for the study of creative women. The Bruch-Morse Model is not one-sided, for males who are creative, are seen as having feminine characteristics such as being aesthetically sensitive and

being aware of their inner feelings and external reality. For females, the model focusses on retaining stereotypically feminine personality characteristics. Within this recent model, they propose 20 components that are not identified in terms of a feminine-masculine dichotomy. Under each of the components they have identified a midpoint between two extremes -- conceptualized as most facilitative for creative productivity in women, i.e., independence, assertiveness, rather than passivity or aggressiveness. The pattern to emerge from the model is one of combining positive aspects of both the traditionally feminine and masculine personalities, while rejecting the negative aspects of both. The creative-productive woman appears to retain those aspects of the creative personality which are "feminine" and which enhance productivity, yet assumes a degree of assertiveness and independence of judgement which traditionally have been viewed as "masculine". A woman's degree of self-acceptance and ego strength help determine her potential for independence, assertiveness, and concern for others (Morse, 1978).

At present, the assumption in the field of creativity and sex differences is that it will be the female or male, possessing androgynous characteristics, who will function at a high level of creativity (Blaubergs, 1978; Bruch & Morse, 1978; Elman, 1976; Heintz, 1977). Bardwick (1971, p. 203) summarizes the literature on women and creativity by stating that:

a high degree of bisexuality exists in those who are truly creative. The creative person resists pressure to be limited and conform to the sex-role stereotypes.

This theoretical position fits well into the proposed framework on hemispheric laterality. It was suggested that the integrated style parallels a high level of creativity. Thus, it will be the male or female who will be found to function at an integrated style of hemispheric specialization -- who possess androgynous characteristics -- who will exhibit a similar creative personality style and similar creative achievements and behaviors. Females and males of the other two hemispheric styles (either right or left) will not produce as homogenous results.

CONCLUSION

The literature available on creativity as related to hemispheric laterality in females and males is neither extensive nor conclusive. However, the literature review of the areas of interest does indicate that the relationship of hemispheric laterality to creativity should not be studied independent of gender differences. It is the purpose of this thesis to contribute additional information to this area by examining the relationships between self-perceived creative personality style and creative achievements and behaviors, and style of hemispheric processing in females and males.

HYPOTHESES

The past investigations related to hemispheric laterality and creativity suggest a need for further research on the interrelationships, specifically in light of the proposed sex differences. The present study was designed to identify female and male subjects according to style of hemispheric processing -- Right, Left, Integrated or Mixed. It was theorized that there are different styles, levels or dispositions of creativity, and depending upon one's creative orientation, different hemispheric processes are involved. The purpose of the present study was to determine

whether the style of hemispheric specialization could be associated with differential creative personality styles, achievements and behaviors, in females and males. The independent measures in the study were sex and hemispheric specialization. The dependent variables were creative personality style, and creative achievements and behaviors.

The following hypotheses were investigated in the present study:

(1) Subjects of either sex, identified as Left hemispheric style will attain lower scores on the two creativity measures than the Right, Integrated and Mixed. Subhypotheses are that they will attain their highest scores on Acceptance of Authority and Self-Confidence, their lowest on Discipline Imagination.

(2) Subjects of either sex, identified as Mixed style will attain higher scores than the Lefts on the two creativity measures. It is subhypothesized that when compared to the Lefts, the Mixed will obtain higher scores on the factor orientations associated with creativity.

(3) Subjects of either sex, identified as Right hemispheric style will attain higher scores than the Left and Mixed subjects on the two creativity measures. Subhypotheses are that they will obtain their highest scores on Disciplined Imagination, their lowest scores on Acceptance of Authority.

(4) Subjects of either sex, identified as Integrated in hemispheric style will attain higher scores than the Left and Mixed subjects on the two creativity measures. However, the Right and Integrated will yield relatively similar scores on the overall measures of creativity. Subhypotheses are that the Integrated will obtain their highest scores in Awareness of Others, and obtain higher scores than the Left and Mixed on the creative factor orientations. A further

subhypothesis is that females and males at this hemispheric level will yield comparatively homogeneous scores.

(5) Finally, the Left, Right and Mixed style females will produce lower scores on the two creativity measures than the males of a similar hemispheric style. It is further sub-hypothesized that females will obtain lower scores than males on most of the creative factor orientations.

METHOD

SUBJECTS

Subjects were 93 female and 64 male senior high school students (157 young adults), selected from three local high schools. Their ages ranged between 16 and 19, with a mean age of 17.4 years.

TEST INSTRUMENTS:

METHOD FOR MEASURING HEMISPHERICITY

The instrument to identify the subjects hemisphericity or style of information processing was Your Style of Learning and Thinking (SOLAT) (Torrance, Riegel, Reynolds & Ball, 1978), Form B (see Appendix A). The test is a 40-item self-report, multiple choice questionnaire, designed to classify respondents according to Right, Left, Integrated or Mixed style of information processing. The instrument has been organized on a thorough analysis of the research regarding the specialized cerebral functions of the right and left hemispheres. For each test item the respondent is provided with three choices: one of a right hemisphere mode of processing information, one of a left hemisphere mode, and the other, an integrated style of processing information.

The mean test-retest coefficient of correlation is reported at about .85 (Torrance et al., 1978). The reliability coefficients of correlation, after an intervention period of 6 weeks were: Right $r=.84$; Left, $r=.86$; and Integrated, $r=.82$. The test reliability (homogeneity) of the three scales using Grobach's Alpha was computed with the following results: Right scale alpha=.68, Left scale alpha=.66, and Integrated scale alpha=.69. As Torrance et al. (1978, p.6) pointed out,

...while these reliability estimates are somewhat below recommended values for individual comparisons, they are within the acceptable range for making group comparisons, indicating "Your Style of Learning and Thinking", Form B, probably has sufficient reliability to allow valid comparisons to be made between groups of subjects classified on the basis of scores derived from it.

MEASURES FOR ASSESSING CREATIVE SELF-PERCEPTION

To measure creative self-perception the sample was administered the Khatena-Torrance Creative Perception Inventory (KTCPI) (KHATENA & Torrance, 1976) (see Appendix B), consisting of the following battery:

"What Kind of Person Are You? (WKOPAY?) (Torrance, 1963), a test designed to provide a measure of creative personality style and consists of 50 objectively scored, forced choice items.

Factor scores derived from this instrument include: Acceptance of Authority, Self-Confidence, Inquisitiveness, Awareness of Others, and Disciplined Imagination.

"Something About Myself" (SAM) (Khatena, 1970d), is a 50-item checklist designed to measure creative achievements and behaviors. The test is based on the rationale that a creative person reflects this potential in three categories of functioning: personality traits, use of creative thinking strategies, and creative productions. The factor scores derived from this instrument are: Environmental Sensitivity, Initiative, Self-Strength, Intellectuality, Individuality and Artistry.

Both measures present words or statements to which subjects are required to respond with the expectation that they will reflect the extent to which they tend to function in creative ways (Khatena, 1977).

Khatena and Torrance (1976) report test-retest reliability coefficients for the What Kind of Person Are You? at the following time intervals: same day, one month and six weeks with $r_s = .91, .97, .80$ ($p < .01$), respectively. Test-retest reliability co-efficients for the Something About Myself, are reported for the following time intervals: one day, one week and four weeks, with $r_s = .98, .97, .94$ ($p < .01$), respectively (Torrance & Khatena, 1976). A considerable amount of validity and reliability evidence is summarized in the norms-technical manual (Khatena & Torrance, 1976).

PROCEDURE

The administrations of the test instruments took place in groups of 5 to 20 subjects. The subjects were tested either in their classrooms or in a counselling room. On the first day of testing the subjects were administered the measure for hemisphericity, Your Style of Learning and Thinking. Subjects were allowed 20 minutes to complete the test, which appeared to be ample time. A subject was assigned a scale classification (Right, Left or Integrated) if he/she received a standard score of 120 (one standard deviation above the means on national norms -- mean=100 and standard deviation=20) or higher on that scale. A subject identified as Right was one who utilized more of those styles associated with right hemisphere functions. Similarly, Left category subjects utilized more of those styles most closely associated with left cerebral functions,

while Integrated subjects utilized more styles showing primarily complementary information processing. All subjects who were identified to have no dominant pattern according to this criterion were assigned a Mixed classification (showing no preference for any of the other styles).

Anywhere from two to four days following the administration of Your Style of Learning and Thinking, the subjects were administered the Khatena-Torrance Creative Perception Inventory. The subjects were allowed 20 minutes to complete the test battery (What Kind of Person Are You? and Something About Myself). The two measures comprising the inventory were scored according to directions (Khatena & Torrance, 1976), providing for each test and each subject a total scale score, and five factor orientation scores for the What Kind of Person Are You?, and six factor orientation scores for the Something About Myself.

For all three instruments, the standard instructions specified in the test manual were read aloud to the subjects in the prescribed manner. Testing conditions were generally ideal.

A week following the last test administration, the subjects were debriefed in groups. At this time, the subjects were also provided with their individual results. The debriefing consisted of a lecture incorporating the background aims of the study, i.e., what the experimenter was interested in investigating. The lecture concluded with a question and answer session.

RESULTS

The distribution of the laterality scores for the females and males are presented in Table 1. Of the 157 subjects tested with the SOLAT, 20 (9 females and 11 males) were classified as Right-dominant, 26 (13 females and 13 males) as Left-dominant, 21 (15 females and 6 males) as Integrated, and 90 (56 females and 34 males) as Mixed. The proportionately large number of subjects falling into the Mixed category was unexpected. It was assumed that a greater number of subjects would be distributed over the other three levels.

Table 1 also presents the distribution in percentages for the subjects at each of the hemisphericity levels. Of particular interest are the differing distributions of the females and males. The table indicates that more females fell into the Integrated (16%) and Mixed (60%) styles (a total of 76%), than males (10% and 53%, respectively, with a total of 63%). The males tended to exhibit greater preference for either a Right or Left hemispheric style, with a combined total of 37% of the males exhibiting a Left and Right style, to 24% of the females exhibiting similar preferences. A chi-square analysis, of the varying percentages of males and females at the combined totals of the Right and Left styles, compared to the combined totals of the sexes at Integrated and Mixed, approached significance, $\chi^2(1)=3.65$, $p<.10$.

The mean creative self-perception scores for hemisphericity levels are presented in Table 2. The 2 X 4 analysis of variance (using the Regression approach) of the hemisphericity levels and sex for the two creativity measures are presented in Tables 3 and 4. The tables indicate that there is a significant effect for hemisphericity, for both of the creativity

Table 1

Distribution of Hemisphericity Scores
for Females and Males

	Right		Left		Integrated		Mixed	
	F	M	F	M	F	M	F	M
N (157)	9	11	13	13	15	6	56	34
% (F=59/M=41)	10	17	14	20	16	10	60	53

Table 2

Mean Creative Perception Scores
for Hemisphericity Levels

	Right	Left	Integrated	Mixed
KTCPI	5.42	4.27	5.04	4.75
WKOPAY?	5.74	4.34	4.96	4.91
SAM	5.10	4.21	5.11	4.59

Table 3

2 X 4 Analysis of Variance of
the four Hemisphericity Levels
for the Females and Males
on the WKOPAY?

Source	SS	df	MS	F
Main Effects	28.268	4	7.065	7.977
Sex	4.414	1	4.414	4.983*
SOLAT	22.810	3	7.603	8.585**
2-Way Interactions				
Sex X SOLAT	0.547	3	0.182	0.206
Explained	33.186	7	4.741	5.353
Residual	131.961	149	0.886	
TOTAL	165.147	156	1.065	

*p<.05

**
p<.001

Table 4

2 X 4 Analysis of Variance of
the four Hemisphericity Levels
for the Females and Males
on the SAM

Source	SS	df	MS	F
Main Effects	17.156	4	4.289	5.192
Sex	3.753	1	3.753	4.543*
SOLAT	14.856	3	4.952	5.995**
2-Way Interactions				
Sex X SOLAT	1.383	3	0.461	0.558
Explained	18.082	7	2.583	3.127
Residual	123.082	149	0.826	
TOTAL	141.165	156	0.905	

*p<.05

**
p<.001

measures: WKOPAY?, $F(3,149)=8.58$, $p<.001$; SAM, $F(3,149)=6.00$, $p .001$. Also, indicated in the tables are significant sex differences for both the WKOPAY?, $F(1,149)=4.98$, $p<.05$, and SAM, $F(1,49)=4.54$, $p<.05$, with the males yielding higher scores for both measures. As indicated in Tables 3 and 4 there were no significant interactions between hemisphericity and sex.

A correlational analysis, using the Pearson product-moment correlation (r) was carried out to determine the relationship between the hemisphericity levels and the creativity measures. The converted standard scores were used, instead of the scale classifications, to make the laterality scores more comparable. Table 5 illustrates the overall relationship of each of the hemispheric levels with the two creativity measures. The data were further analyzed to present the relationship between the creativity measures for the females and males, indicated in Table 6. In general, Table 5 indicates that the scores on the WKOPAY? are positively related to Right cerebral functioning, while the scores on the SAM are positively related to an Integration of hemispheric functions. Both creativity measures were negatively related with Left cerebral functioning. As well, the males attained higher correlations on the creativity measures than the females, particularly at the Right hemisphere, as indicated in Table 6.

The remainder of the findings are presented according to the order of the specific proposed hypotheses. The main hypotheses were analyzed using the a priori contrast method of analysis, while the subhypotheses were analyzed using the Newman-Keuls, post-hoc comparison method.

Table 5

Product-Moment Coefficient of Correlation
between Hemisphericity Standard Scores
and Creativity Measures

	Right	Left	Integrated
WKOPAY?	.33*	-.30**	-.04
SAM	.12	-.35**	.17*

*p<.01

**
p<.001

Table 6

Product-Moment Coefficient of Correlation
between Hemisphericity Standard Scores
for Females and Males, and Creativity Measures

	Right		Left		Integrated	
	F	M	F	M	F	M
WKOPAY?	.22**	.44***	-.32***	-.37***	.04	-.06
SAM	.07	.17	-.28***	-.49***	.15	.28**

*p<.05

**p<.01

***p<.001

CREATIVE ORIENTATIONS AND A LEFT HEMISPHERIC STYLE

This hypothesis stated that subjects of either sex identified as Left hemispheric style will attain lower scores on the two creativity measures than the Right, Integrated and Mixed subjects. The results of an a priori contrast, investigating the differences between the three other hemispheric style and the Lefts produced a significant difference on both measures: WKOPAY?, $t(153)=3.88$, $p<.001$, and the SAM, $t(153)=3.15$, $p<.001$.

The subhypotheses were analyzed using Newman-Keuls. The results of these analyses identified the Lefts, contrary to expectations, not to be significantly higher than the other three groups on Acceptance of Authority, $t(153)=1.88$, $p=.06$, but as predicted, to obtain significantly higher scores on Self-Confidence, $t(153)=2.04$, $p<.05$. Also, as predicted, the Lefts were lower than the other three groups on Disciplined Imagination, $t(153)=3.48$, $p<.001$.

CREATIVE ORIENTATIONS AND A MIXED STYLE

Primarily this hypothesis stated that the Mixed would yield higher scores than the Left on the two creativity measures. An a priori contrast, testing the specific hypothesis of interest, identified that the Mixed were significantly higher than the Left on the WKOPAY?, $t(153)=2.38$, $p<.01$, but not on the SAM $t(153)=1.83$.

The post-hoc comparisons for the Mixed and Left, on the creative factor orientations, are presented in Table 7, The table indicates that on closer examination of the creative factor scores, there are very few significant differences identified between the Mixed and Left subjects. Only two significant differences were identified: Intellectuality, $t(153)=2.40$, $p<.01$.

Table 7

Newman-Keuls Comparison on the Differences
between the Left and Mixed Mean Scores
for the Creative Factor Orientations

Creative Factor Orientations	Left	Mixed	t
<u>WKOPAY?</u>			
Self Confidence	5.14	4.84	-1.55
Inquisitiveness	3.76	3.88	0.34
Awareness of Others	5.66	5.78	1.14
Disciplined Imagination	4.48	4.84	1.90
<u>SAM</u>			
Environmental Sensitivity	5.57	5.57	0.00
Initiative	2.04	2.63	1.12
Self- Strength	4.58	4.74	0.55
Intellectuality	3.93	4.47	2.40*
Individuality	4.11	4.55	1.54
Artistry	3.19	3.96	2.83*

*p<.01

and Artistry, $t(153)=3.19$, $p<.01$, with the Mixed subjects yielding the higher scores.

CREATIVE ORIENTATIONS AND A RIGHT HEMISPHERIC STYLE

The predictions regarding the Rights were supported by the results. Using the a priori comparison method, the Right subjects were identified to obtain higher scores than the Left and Mixed on both creativity measures: WKOPAY?, $t(153)=4.94$, $p<.001$, and SAM, $t(153)=3.13$, $p<.001$.

An analysis of the subhypotheses identified the Rights to score higher than the other three groups on Disciplined Imagination, $t(153)=3.35$, $p<.001$, and to further obtain the lowest score on Acceptance of Authority, $t(153)=2.74$, $p<.001$.

CREATIVE ORIENTATIONS AND AN INTEGRATED STYLE

The fourth hypothesis stated that Integrated subjects of either sex would attain higher scores than the Left and Mixed. This hypothesis was not totally supported by the results. An a priori contrast revealed the Integrated not to yield significantly higher scores than the Left and Mixed on the WKOPAY, $t(153)=1.31$, $p>.10$. However, the Integrated were identified to yield significantly higher scores than the Left and Mixed on the SAM, $t(153)=3.15$, $p<.001$.

Furthermore, this hypothesis predicted that the Integrated and Right would yield similar scores on the creativity measures. This was not totally supported by the results. The scores yielded by the Integrated and the Right

were similar on the SAM, $t(153)=0.04$, but on the WKOPAY?, the Rights obtained significantly higher scores than the Integrateds, $t(153)=2.93$, $p<.001$. This latter finding led to a further analysis. The analysis was carried out to further examine why the Rights obtained higher scores on the WKOPAY? Therefore, a post-hoc analysis was carried out between the factor orientation scores of the Integrated and Right. This analysis revealed significant differences on Self-Confidence $t(153)=2.77$, $p<.01$; and Inquisitiveness, $t(153)=1.91$, $p<.05$, with the Integrated yielding the higher scores. On the other factor orientations of the WKOPAY?, the Integrated and Right yielded similar scores.

It was further predicted that the Integrated would yield the highest score on Awareness of Others. This prediction was not supported by the results, $t(153)=1.43$, $p=0.2$. With regard to the other creative factors, and the differences between the Integrateds, and the Left and Mixed subjects, the Integrateds yielded significantly higher scores on five of the creative factor orientations. The means and results of the Newman-Keuls comparison are presented in Table 8, and indicate that when compared to the Left and Mixed, the Integrated yield significantly higher scores on all but Awareness of Others, Self-Strength, Individuality and Artistry.

Finally, it was predicted that the females and males at the Integrated hemispheric level would yield similar scores on the two creativity measures. This prediction was supported by the results of an analysis of the simple main effects for the WKOPAY, $t(149)=0.01$, and the SAM, $t(149)=1.53$.

Table 8

Newman-Keuls Comparisons on the Differences
between the Integrated, and Left and Mixed mean scores
for the Creative Factor Orientations

Creative Factor Orientations	Integrated	Left	Mixed	t
<u>WKOPAY</u>				
Self-Confidence	4.85	5.13	4.84	-0.638
Inquisitiveness	4.90	3.76	3.88	2.61**
Awareness of Others	5.90	5.66	5.78	1.46*
Disciplined Imagination	5.10	4.48	4.84	2.07*
<u>SAM</u>				
Environmental Sensitivity	6.17	5.57	5.57	2.33*
Initiative	3.84	2.04	2.63	2.60**
Self- Strength	4.82	4.58	4.74	0.52
Intellectuality	4.97	3.93	4.47	3.17**
Individuality	4.67	4.11	4.55	1.63
Artistry	4.11	3.19	3.96	1.53

*p<.05

**p<.01

CREATIVE ORIENTATIONS AND HEMISPHERIC STYLES IN FEMALES AND MALES

The last hypothesis stated that there would be differences in the creativity scores between the females and males at each of the Right, Left and Mixed styles. When a comparison of the simple main effects was carried out between the females' and males' scores at each of the hemisphericity levels, only one significant difference was identified. This difference was between the Mixed females and males on the WKOPAY?, $t(149)=2.97$, $p<.001$, with the males yielding the higher score.

To further investigate the differences between the females and males at each of the hemispheric levels, a 2 X 4 analysis of variance was carried out for each of the non-creative and creative factor orientations. The means and results of these analyses are presented in Table 9, the table indicates that the females are higher on three of the factor orientations: Acceptance of Authority, Environmental Sensitivity and Artistry. Males are higher on Self-Strength and Individuality. No sex differences were identified on six of the factor orientations.

Table 10 illustrates the scores for females and males on the two creativity measures. As indicated earlier, the analysis of the sex differences at each of the hemispheric levels revealed only one significant sex difference (at the Mixed level). Therefore, females and males at the other three hemispheric levels produced relatively similar creativity scores. A further analysis between the sexes was carried out to examine the extent of the sex difference between the levels. Specifically what was investigated was the relationship between high creative females and low creative males. Therefore, although not hypothesized, an

Table 9

Means and Results of a 2 X 4 Analysis of Variance
of the KTCPI Factors for the Females and Males

KTCPI Factors	Females	Males	F
WKOPAY?			
Acceptance of Authority	3.49	2.95	5.44*
Self- Confidence	4.75	4.86	0.57
Inquisitiveness	4.17	3.76	1.49
Awareness of Others	5.80	5.70	0.45
Disciplined Imagination	4.82	5.04	2.18
SAM			
Environmental Sensitivity	5.87	5.51	4.48*
Initiative	2.52	2.97	2.22
Self- Strength	4.51	5.16	10.28***
Intellectuality	4.49	4.55	0.28
Individuality	4.33	4.80	5.78**
Artistry	4.04	3.44	4.80*

*p<.05

**p<.01

***p<.001

Table 10

Mean Creative Perception Scores
for Hemisphericity Levels for Females and Males

	Right		Left		Integrated		Mixed	
	F	M	F	M	F	M	F	M
WKOPAY?	5.52	5.59	4.16	4.44	4.75	5.17	4.61	5.20
SAM	4.84	5.36	4.13	4.29	4.91	5.58	4.52	4.66

analysis was carried out between the creativity scores of the Right and Integrated females, compared with Left males. This analysis revealed significant differences on both of the creativity measures: WKOPAY?, $t(149)=2.98$, $p<.01$; SAM, $t(149)=2.29$, $p<.05$, with the Right and Integrated females yielding the higher creativity scores.

DISCUSSION

This study explored the hypothesis that styles of information processing can be associated with different creative personality styles, behaviors and achievements. Further, the differences between females and males on their styles of information processing, and creativity measures were examined. The results obtained, generally supported most of the hypotheses of the study. Possible explanations for the absence of empirical support for certain hypotheses and other unexpected findings will follow.

CREATIVITY AND A LEFT HEMISPHERIC STYLE
OF INFORMATION PROCESSING

As predicted, the results confirmed that subjects of either sex, classified as having a Left hemispheric style of information processing produced significantly lower scores than the other three groups on the two creativity measures. Other predictions were supported. On the creative personality measure (WKOPAY?), Left-dominant subjects were highest on Self-Confidence, a factor encapsulating both non-creative and creative elements. Moreover, the Left-dominant subjects yielded the lowest scores on Disciplined Imagination. However, contrary to what was expected (from the research evidence of Torrance et al. 1978), the Lefts did not yield higher scores than the other three groups on Acceptance of Authority. The negative results obtained with the Lefts on Acceptance of Authority can be explained upon consideration of the differences between Torrance's et al. (1978) sample and the present sample. Torrance et al. based their findings on college students enrolled in a creative thinking class. The present sample was comprised of adolescents from the general population, who, in light of their

stage of development, would be expected to be less acceptant of authority. As proposed by the Erikson-Piaget-Gowan development model, the second stage, usually identified with "youth-adolescence", is as Gowan (1972) elaborates, a "time of searching introspection...of defiance of authority, rather than obedience to it" (p. 63). This position receives support upon examination of the mean scores yielded by the two samples. The total mean score for the present subjects on Acceptance of Authority was 3.15, which is considerably lower than the total mean score of 4.27, reported by Khatena and Torrance (1976) for their college-adult populations. Therefore, adolescents, regardless of hemispheric style or creativity score, perceive and reflect a similar orientation toward authority.

In general, the results indicated that a Left style of information processing is negatively related to either of the creativity measures. These findings are in agreement with those of other researchers, who have also reported that Lefts score significantly lower in creativity measures than Right, Integrated and Mixed subjects (Torrance & Mourad, 1978; Torrance & Reynolds, 1978; Torrance et al., 1978; Reynolds & Torrance, 1978).

CREATIVITY AND A MIXED STYLE OF INFORMATION PROCESSING

Reynolds and Torrance (1978) have strongly urged continued research which will include the data obtained from Mixed subjects. Most researchers in the past, utilizing the SOLAT, have eliminated the Mixed category for reasons of possible difficulties in explaining or decoding the results. The present study revealed that 56%, a significant proportion of the subject pool, fall into the Mixed

category. The greater ratio of Mixed subjects was not evident in Reynolds and Torrance's (1978) study, where the subject sample used was atypical. Gifted and graduate students were examined, both groups that are distinctively superior in ability, motivation and educational achievements. Therefore, the conflicting findings revealed in the present study suggests the possibility that most subjects from typical populations of the age group representative of the present study, have not sufficiently developed or organized their styles of information processing.

Contrary to expectations, the Mixed did not yield higher scores than the Left on both of the creativity measures. When compared with the Left-dominant subjects, the Mixed subjects of either sex yielded significantly higher scores on the creative personality measure (WKOPAY?), but not on the creative achievements measure (SAM). An analysis of the differences between the Mixed and Left on the factor orientations revealed only two significant differences: Intellectuality and Artistry.

Therefore, with respect to creative expression, one may conclude that subjects of the Mixed category share characteristics of the creative and non-creative person. The Mixed subjects exhibited the potential for creativity, reflected in their creative personality styles, but had not achieved the level of the Integrateds in the expression of this potential in significant creative behaviors and achievements.

CREATIVITY AND A RIGHT OR INTEGRATED STYLE OF INFORMATION PROCESSING

Evidence presented earlier suggested that a positive

relationship exists between creativity and Right-dominant and Integrated cerebral functioning. Such a relationship was in fact found, although not in the manner expected.

A correlational analysis revealed the creative personality measure (WKOPAY?) to be positively related to a Right hemispheric style, while the creative achievements measure (SAM) was positively related to an Integration of hemispheric processes. As hypothesized, the Rights were higher than the Left and Mixed on both the creativity measures. However, contrary to expectations, the Integrated were not found to yield significantly higher scores than the Left and Mixed on the creative personality measure (WKOPAY?), but did yield higher scores on the creative achievements measure (SAM).

When a comparison was made between the Integrated and Left-and-Mixed, on the factor orientations associated with creativity, the Integrated yielded higher scores on five of the factors. Contrary to an hypothesis, and Torrance's et al. (1978) findings, the Integrated were not significantly higher than the other three groups on Awareness of Others. However, as suggested earlier, this may be a factor associated with the differences between the two samples. For example, Khatena and Torrance (1976) report a mean of 4.93 on Awareness of Others for their college-adult populations. In the present study, the mean was found to be 5.73. Therefore, the adolescents in the present study yielded higher scores than expected on that factor. Late adolescence is a developmental period during which significant others (e.g., same-and-opposite-sexed peers), take on an added importance (Gowan, 1972). This was identified to be the

case for high-and-low creative adolescents.

The prediction that the Integrated and Right would yield similar scores on the creativity measures was not confirmed in the present study. Upon comparison, the creative perception indices scores for the Right and Integrated subjects were identified to be similar on the creative achievements measure (SAM). On the creative personality measure (WKOPAY?), the Rights obtained significantly higher scores. This finding was intriguing and warranted some further investigation. Subsequent analysis of the factor orientations derived from the WKOPAY? revealed that the Integrated were higher than the Right on two factors: Self-Confidence and Inquisitiveness. (The Rights obtaining the lowest score on Self-Confidence.) Both of these factors have been identified by Bledsoe and Khatena (1974b) as containing creative and non-creative elements. Interestingly, no differences emerged on the other three factor orientations. Therefore, it may be safely assumed that the Integrated's score, on the creative personality measure, was lowered by their being higher than the Right on Self-Confidence and Inquisitiveness.

One explanation for the differences evidenced between the Right and Integrated may be obtained from the research evidence on hemispheric specialization. Investigators have identified Right hemispheric functioning to be related with artistic aspects, spatial abilities, emotional expressions, creative and inductive thinking, and internal focus (Kane & Kane, 1979). Integration of hemispheric functions has been identified with an interaction of the inductive and the deductive, the intuitive and the logical,

the emotional and the rational, the creative and the analytic, and internal and external focus (Kane & Kane, 1979). From the above research evidence, it would be expected that the Integrated individuals would exhibit higher scores than the Right on those orientations that incorporate both creative and non-creative ways of behaving.

A second explanation may be derived from the developmental stage theories of Rank (1945, 1947) and Gowan (1972). Rank made the distinction between the "neurotic" and "creative" types. Associated with the former are actions contrary to acceptable social standards, and feelings of insecurity. The "creative" type is viewed as being free of conflict, capable of efficiency, and expressing their own will and self-hood with confidence. According to Gowan, individuals at lower levels of creative development are characterized as having less self-confidence. They have not fully developed the "feeling of control" and sense of self in relation to the world of significant others, as have the individuals at the higher levels. Individuals at lower levels of creativity are described by Gowan as either "cool" (Latency Stages), or "introspective" (Identity Stages). At the former stage, the individuals are thoroughly absorbed in experiencing, having little time to assess their feelings, or to search for their identity. At the latter stage, individuals tend to be immersed with themselves. Since, in the present study, the Integrated and the Right were not found to exhibit similar creative orientations in terms of their perceptions of their psychological selves, it is suggested that they are functioning at differing levels of creativity.

Therefore, the differences that emerged between the Right and Integrated were reflective of differing types, and differing developmental levels of creativity. More specifically, the Integrated although not as high as the Rights on the overall creative personality measure, did reflect creative orientations, and furthermore exhibited the creative achievements (reflected in their positive correlation on the SAM), that placed them at a "higher" level of creative functioning. The Integrated not only exhibited the personality traits associated with creativity, but exhibited their potential in their creative thinking operations, products, and greater involvement in creative productions.

CREATIVITY AND A RIGHT OR INTEGRATED STYLE OF INFORMATION PROCESSING IN FEMALES AND MALES

As predicted females were found to score lower than males on the overall creativity measures. Further support for the hypothesis regarding the sexes were evidenced in the similar scores yielded by the Integrated females and males. However, contrary to predictions, when a comparison was made between the sexes at the Right and Left styles, no sex differences were identified on the creativity measures. Differences were identified for the females and males only at the Mixed level. The contrary findings lead to a further analysis of the differences between the sexes. An analysis of the differences between the higher creative females (Right and Integrated) and the low creative males (Left) revealed significant sex differences, with the Right and Integrated females yielding higher scores. These results tend to indicate that although males are higher on the creativity measures overall, females and males at higher

levels of creativity resemble each other in personality styles and creative achievements and behaviors more than females resemble males who are less creative. This is in general agreement with Bachtold and Werner (1970, 1972, 1973, 1974), who from their extensive research of specific populations (psychologists, scientists, biologists, microbiologists, chemists, biochemists, artists, writers and politicians), concluded that all (except for politicians) successful women resemble the men in their field more than they do the general population of their own gender.

An overall analysis of the sex differences for each of the factor orientations identified five sex differences. On the creative personality measure (WKOPAY?), only one significant sex difference was found. On the factor Acceptance of Authority, the females yielded the higher score. Thus, in effect, the female's creativity score on this particular measure was influenced by their being higher on a factor referred to as a non-creative orientation (Bledsoe & Khatena, 1974b).

The quality of the sex differences identified on this measure further indicate that the measure was designed to tap males' creative self-perceptions more accurately, and does not take into consideration the differing self-perceptions that females have been theorized to adopt. Carlson (1972) questions whether "women (should) define themselves in terms of a masculine-hierarchical-competitive construction of experience" (p. 18). She further strongly advocates examining how "femininity might contribute to enrichment of our presently impoverished approaches to the study of persons" (p. 18). Blaubergs (1978), similarly advises

that it should not be necessary to presuppose a masculine model of success in doing further research, nor to suggest to gifted women or girls that they conceal any part of their identity in order to succeed. Bruch (1972) proposed that certain stereotypically feminine characteristics contribute to creative production in women. This was evident in the present study.

On the creative achievements measure (SAM), the females were higher than the males on two of the factors: Environmental Sensitivity and Artistry. The males were higher on Self-Strength and Individuality. Interestingly, the females were higher than the males on the creative production factor (Artistry). This is in contradiction to the findings and theoretical positions of Gowan, Khatena and Torrance (1979), who have suggested from their literature review that creativity in women is process-oriented, whereas in men it is product-oriented. However, this may be reversed for adolescent females. Their involvement in creative production may be greater than that of males', but is subject to change due to the pressures of role differentiation in adulthood. Singer and Rummo (1973), and Kogan and Pankove (1972) have presented data indicative of age variations in the creative behaviors of females. The pattern to emerge from their findings is that male ideational fluency and uniqueness is largely determined by internal cognitive factors. Females seem more susceptible to external contexts. This position receives support from Laws (1976), who proposed that one solution women use to solve some of the conflicts surrounding achievement in relationship to femininity is to reduce the masculinity of achieving. According to Bardwick (1971) this becomes more

evident as the adolescent female strives to secure and satisfy the socially defined affiliative needs. Once the affiliative needs are satisfied, i.e., security in a nuclear family relationship, then they can permit the reemergence of achievement motivation.

However, according to the present study the adolescent females exhibited the potential for creativity and further reflected this potential in their greater number of creative achievements related to artistic productions. The males did not exhibit the involvement in creative production as did the females, but did exhibit certain characteristics, i.e., higher Self-Strength and Individuality, which with maturity will prove to be as asset in orienting to, and successfully carrying out creative endeavours.

Not hypothesized, but pertinent to the present study, were the findings of differences in degree of lateralization of functions within the sexes. More females than males were identified to exhibit a lack of preference for one hemisphere over the other in information processing. That is, significantly more females were found to belong in the Integrated and Mixed categories. This placement receives support from the empirical findings of various researchers (Davidson et al., 1976; McGlone, 1977; Witelson, 1976), who have also concluded that the psychological functions in women are not localized to the same degree as in men into one particular hemisphere of the brain. Thus, this research has revealed that females tend to exhibit a less specialized style of processing information than males. The males within the present study were identified to show a greater preference for one hemispheric style, either the Right or Left, rather than a combination.

In general, the more creative females did not lack the personality characteristics that appear to be descriptive of the creative person. It was identified that Right and Integrated females share more characteristics with the more creative males at the similar hemispheric style than with females or males utilizing other hemispheric styles. Furthermore, on the creative achievement measure, females were identified as having greater involvement in creative production than males. However, one must be cognizant of the consideration that creative expression in females is strongly influenced by external factors. This influence may serve more as a barrier to the expression of their full creative potential, particularly at specific developmental levels. Finally, females do show achievement motivation. The expression of their achievement motivation will differ from that of males, as they will inhibit or rechannel their energies.

More research remains to be done, as this study would imply. Particularly, more creativity research is needed which will investigate gender differences or similarities with normal population samples. Also, more research is needed on creativity measures and how those measures evaluate creative achievements between the sexes. Longitudinal developmental studies to determine the changes and/or variations at the differing developmental levels are required. Another important area for further investigation on creativity between the sexes would be the examination of the coping strategies that each develops in order to realize their potential in a society that still imposes sex-role restrictions.

CONCLUSIONS:

The results of this study suggest the following

conclusions:

- (1) Left style of information processing is negatively related to creativity in both females and males.
- (2) A significant proportion of subjects from the general population and of this particular age group fall into a Mixed category.
- (3) Subjects with Mixed style of information processing exhibit the potential for creativity, reflected in their creative personality styles, but do not possess the ability to express their potential in productive creative behaviors and achievements.
- (4) A Right style of information processing is positively related to the creative personality measure (WKOPAY?).
- (5) An Integrated style of information processing is positively related to the creative achievement measure (SAM).
- (6) Integrations, although lower than Rights on the overall measure of creative personality style, exhibit personality characteristics, (in particular the Self-Confidence), and reflect creative achievements and behaviors, suggestive of the fact that they are functioning at a "higher" level of creative development than the Rights.
- (7) Right-dominant and Integrated females and males resemble each other in personality structure and creative achievements more than they resemble members of the opposite sex (Left), who are less creative.
- (8) More females than males exhibit a less specialized style of information processing (being either Integrated or Mixed). More males than females tend to demonstrate dependence on one of the two hemispheres.

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APPENDIX A

Write only on separate answer sheet

YOUR STYLE OF LEARNING AND THINKING
(Form B)

INSTRUCTIONS: People differ in their preferred ways of learning and thinking. On the answer sheet provided, describe your style of learning and thinking by blackening the appropriate blanks. In each item, three different styles of learning or thinking are described. Select the one that describes most accurately your strength or preference.

1. (a) not good at remembering faces
(b) not good at remembering names
(c) equally good at remembering names and faces
2. (a) respond best to verbal instructions
(b) respond best to instruction by example
(c) equally responsive to verbal instruction and instruction by example.
3. (a) able to express feelings and emotions freely
(b) controlled in expression of feelings and emotions
(c) inhibited in expression of feelings and emotions
4. (a) playful and loose in experimenting (in sports, art, extra curricular activities, etc.)
(b) systematic and controlled in experimenting
(c) equal preference for playful/loose and systematic/controlled ways of experimenting
5. (a) prefer classes where I have one assignment at a time
(b) prefer classes where I am studying or working on many things at once
(c) I have equal preference for the above type classes

6. (a) preference for multiple-choice tests
(b) preference for essay tests
(c) equal preference for multiple-choice and essay tests
7. (a) good at interpreting body language or the tone aspect of verbal communication
(b) poor at interpreting body language; dependent upon what people say
(c) equally good at interpreting body language and verbal expression.
8. (a) good at thinking up funny things to say and/or do
(b) poor at thinking up funny things to say and/or do
(c) moderately good at thinking up funny things to say or do
9. (a) prefer classes in which I am moving and doing things
(b) prefer classes in which I listen to others
(c) equal preference for classes in which I am moving and doing things and those in which I listen
10. (a) use factual, objective information in making judgments
(b) use personal experiences and feelings in making judgments
(c) make equal use of factual, objective information and personal experiences/feelings in making judgments
11. (a) playful approach in solving problems
(b) serious, all-business approach to solving problems
(c) combination of playful and serious approach in solving problems
12. (a) mentally receptive and responsive to sounds and images more than to people
(b) essentially self acting and creative mentally with groups of other people
(c) equally receptive and self acting mentally regardless of setting
13. (a) almost always am able to use freely whatever is available to get work done
(b) at times am able to use whatever is available to get work done
(c) prefer working with proper materials, using things for what they are intended to be used for

14. (a) like for my classes or work to be planned and know exactly what I am supposed to do
 (b) like for my classes or work to be open with opportunities for flexibility and change as I go along
 (c) equal preference for classes and work that is planned and those that are open to change
15. (a) very inventive
 (b) occasionally inventive
 (c) never inventive
16. (a) think best while lying flat on back
 (b) think best while sitting upright
 (c) think best while walking or moving about
17. (a) like classes where the work has clear and immediate applications (e.g., mechanical drawing, shop, home economics)
 (b) like classes where the work does not have a clearly practical application (literature, Algebra, history)
 (c) equal preference for the above type of classes
18. (a) like to play hunches and make guesses when I am unsure about things
 (b) rather not guess or play a hunch when in doubt
 (c) play hunches and make guesses in some situations
19. (a) like to express feelings and ideas in plain language
 (b) like to express feelings and ideas in poetry, song, dance, etc.
 (c) equal preference for expressing feelings and ideas in plain language or in poetry, song, dance, etc.
20. (a) usually get many new insights from poetry, symbols, etc.
 (b) occasionally get new insights from poetry, symbols, etc.
 (c) rarely ever get new insights from poetry, symbols, etc.
21. (a) preference for simple problems
 (b) preference for complex problems
 (c) equal preference for simple and complex problems
22. (a) responsive to emotional appeals
 (b) responsive to logical, verbal appeals
 (c) equally responsive to emotional and verbal appeals

23. (a) preference for dealing with one problem at a time
(b) preference for dealing with several problems at a time
(c) equal preference for dealing with problems sequentially or simultaneously
24. (a) prefer to learn the well established parts of a subject
(b) prefer to deal with theory and speculations about new subject matter
(c) prefer to have equal parts of the two approaches to learning
25. (a) preference for critical and analytical reading as for a book review, criticism of a movie, etc.
(b) preference for creative, synthesizing reading as for making applications and using information to solve problems
(c) equal preference for critical and creative reading
26. (a) preference for intuitive approach in solving problems
(b) preference for logical approach to solving problems
(c) equal preference for logical and intuitive approaches to solving problems
27. (a) prefer use of visualization and imagery in problem solving
(b) prefer language and analysis of problem in order to find solutions
(c) no preference for either method
28. (a) preference for solving problems logically
(b) preference for solving problems through experience
(c) equal preference for solving problems logically or through experience
29. (a) skilled in giving verbal explanations
(b) skilled in showing by movement and action
(c) equally able to give verbal explanations and explanations by action and movement
30. (a) learn best from teaching which uses verbal explanation
(b) learn best from teaching which uses visual presentation
(c) equal preference for verbal explanation and visual presentation
31. (a) primary reliance on language in remembering and thinking
(b) primary reliance on images in remembering and thinking
(c) equal reliance on language and images

32. (a) preference for analyzing something that has already been completed
(b) preference for organizing and completing something that is unfinished
(c) no real preference for either activity
33. (a) enjoyment of talking and writing
(b) enjoyment of drawing or manipulating objects
(c) enjoyment of both talking/writing and drawing/manipulating
34. (a) easily lost even in familiar surroundings
(b) easily find directions even in strange surroundings
(c) moderately skilled in finding directions
35. (a) more creative than intellectual
(b) more intellectual than creative
(c) equally creative and intellectual
36. (a) like to be in noisy, crowded places where lots of things are happening at once
(b) like to be in a place where I can concentrate on one activity to the best of my ability
(c) sometimes like both of the above and no real preference for one over the other
37. (a) primary outside interests are aesthetically oriented, that is, artistic, musical, dance etc.
(b) primary outside interests are primarily practical and applied, that is, working, scouts, team sports, cheerleading, etc.
(c) participate equally in the above two types of activities
38. (a) vocational interests are primarily in the general areas of business, economics, and the hard sciences, i.e., chemistry, biology, physics, etc.
(b) vocational interests are primarily in the general areas of the humanities and soft sciences, i.e., history, sociology, psychology, etc.
(c) am undecided or have no preference at this time
39. (a) prefer to learn details and specific facts
(b) prefer a general overview of a subject, i.e., look at the whole picture
(c) prefer overview intermixed with specific facts and details

40. (a) mentally receptive and responsive to what I hear
and read
- (b) mentally searching, questioning, and self-initiating
in learning
- (c) equally receptive/responsive and searching/self-
initiating

PREVIOUSLY COPYRIGHTED MATERIAL
IN APPENDIX A, LEAVES 71 - 74.
WHAT KIND OF A PERSON ARE YOU?
by Joe Khatena and E.P. Torrance

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MAY BE OBTAINED FROM:

Stoelting Company
1350 S. Kostner Ave.
Chicago, Illinois
60623

Subject's Name _____ Age _____ Sex _____ Grade _____
 School _____ Date _____ Scorer _____

WHAT KIND OF PERSON ARE YOU?

by E. PAUL TORRANCE

Below is a list of characteristics frequently used in talking about people. Indicate by placing a check mark (✓) beside a or b of your test sheet the one term of each pair that best describes you. Remember, even if neither term describes you exactly, select the one term of each pair which is nearest to being a description of yourself.

- | | |
|--|---|
| 1. <input type="checkbox"/> a. Likes to work alone
<input type="checkbox"/> b. Prefers to work in a group | 15. <input type="checkbox"/> a. Disturbs existing organization and procedures
<input type="checkbox"/> b. Accepts the judgments of authorities |
| 2. <input type="checkbox"/> a. Industrious
<input type="checkbox"/> b. Neat and orderly | 16. <input type="checkbox"/> a. A good guesser
<input type="checkbox"/> b. Remembers well |
| 3. <input type="checkbox"/> a. Socially well-adjusted
<input type="checkbox"/> b. Occasionally regresses and is playful and childlike | 17. <input type="checkbox"/> a. Quiet
<input type="checkbox"/> b. Obedient |
| 4. <input type="checkbox"/> a. Persistent
<input type="checkbox"/> b. Does work on time | 18. <input type="checkbox"/> a. Independent in judgment
<input type="checkbox"/> b. Considerate of others |
| 5. <input type="checkbox"/> a. Popular, well-liked
<input type="checkbox"/> b. Truthful even if it gets you into trouble | 19. <input type="checkbox"/> a. Critical of others
<input type="checkbox"/> b. Courteous, polite |
| 6. <input type="checkbox"/> a. Considerate of others
<input type="checkbox"/> b. Courageous in convictions | 20. <input type="checkbox"/> a. Feels strong emotions
<input type="checkbox"/> b. Reserved |
| 7. <input type="checkbox"/> a. Conforming
<input type="checkbox"/> b. Nonconforming | 21. <input type="checkbox"/> a. Emotionally sensitive
<input type="checkbox"/> b. Socially well-adjusted |
| 8. <input type="checkbox"/> a. Sophisticated
<input type="checkbox"/> b. Unsophisticated | 22. <input type="checkbox"/> a. Imaginative
<input type="checkbox"/> b. Critical |
| 9. <input type="checkbox"/> a. Sense of humor
<input type="checkbox"/> b. Talkative | 23. <input type="checkbox"/> a. Receptive to ideas of others
<input type="checkbox"/> b. Negativistic |
| 10. <input type="checkbox"/> a. Visionary
<input type="checkbox"/> b. Versatile | 24. <input type="checkbox"/> a. Fault-finding
<input type="checkbox"/> b. Popular, well-liked |
| 11. <input type="checkbox"/> a. Adventurous
<input type="checkbox"/> b. Does work on time | 25. <input type="checkbox"/> a. Determined
<input type="checkbox"/> b. Obedient |
| 12. <input type="checkbox"/> a. Becomes absorbed in tasks
<input type="checkbox"/> b. Courteous, polite | 26. <input type="checkbox"/> a. Intuitive
<input type="checkbox"/> b. Thorough |
| 13. <input type="checkbox"/> a. Curious
<input type="checkbox"/> b. Energetic | 27. <input type="checkbox"/> a. Never bored
<input type="checkbox"/> b. Refined |
| 14. <input type="checkbox"/> a. Attempts difficult tasks
<input type="checkbox"/> b. Desires to excel | 28. <input type="checkbox"/> a. Haughty
<input type="checkbox"/> b. Courteous |

(Over)

29. a. Cautious
 b. Willing to take risks
30. a. Affectionate, loving
 b. Courteous, polite
31. a. Always asking questions
 b. Quiet
32. a. Competitive
 b. Conforming
33. a. Energetic
 b. Neat and orderly
34. a. Remembers well
 b. Talkative
35. a. Self-assertive
 b. Reserved
36. a. Sense of beauty
 b. Socially well-adjusted
37. a. Self-confident
 b. Timid
38. a. Versatile
 b. Popular, well-liked
39. a. Self-sufficient
 b. Curious
40. a. Thorough
 b. Does work on time
41. a. Eccentric
 b. Socially well-adjusted
42. a. Self-confident
 b. Spirited in disagreement
43. a. Spirited in disagreement
 b. Talkative
44. a. Prefers complex tasks
 b. Does work on time
45. a. A good guesser
 b. Receptive to ideas of others
46. a. Curious
 b. Self-confident
47. a. A self-starter
 b. Obedient
48. a. Intuitive
 b. Remembers well
49. a. Unwilling to accept things on mere say so
 b. Obedient
50. a. Altruistic, working for the good of others
 b. Courteous, polite

Subject's Name	Age	Sex	Grade
School	Date	Scorer	

SOMETHING ABOUT MYSELF

by JOE KHATENA

List of statements is given to you below. All you have to do is read them carefully and decide if they are applicable to you or not. If a statement is applicable to you show this by placing a check mark (✓) on the space provided on your test sheet. If a statement is not applicable to you leave the space blank.

- . When I think of an idea I like adding to it to make it more interesting.
- . I am talented in many different ways.
- . I like making guesses, testing them, and if I am proved wrong will make new guesses.
- . I am an imaginative person, a dreamer or visionary.
- . Others consider me eccentric.
- . I have composed a dance, song or musical piece for voice or instrument.
- . I have painted, drawn, designed, sculptured, carved on wood, made models of my own design, did pottery, or creative photography.
- . My productions were on exhibitions or won prizes.
- . I like breaking down something organized in a certain way into its component parts and reorganizing it in a different way to make it something no one else would have thought of.
- . I have planned or carried out experiments.
- . When I am faced with a problem I try to think of original ideas.
- . I have played the lead role, directed or produced a play or musical evening.
- . I have confidence matching my talents against others.
- . I am not afraid to take risks should a need arise.
- . I get so interested in what I am doing that I do not know what is happening around me.
- . I have been instrumental in bringing about major changes in rules, procedures, organization or structure.
- . I do not take for granted the accuracy of what others tell me.
- . To make an idea more easily understood I try to relate it to what can be seen, touched or heard.
- . I like to temper my thinking with my feelings especially when I am trying to produce.
- . I am resourceful.
- . I have invented a new product.
- . I can spot the source of a problem and define it.

(Over)

- I have improvised in dance, song or instrumental music.
- I have designed stage lighting for a dramatic or musical evening.
- I like to take various things or ideas that have not been put together before and combine them to make something original.
- I can work for long periods of time without getting tired.
- To be able to laugh or see the funny side of things helps me cope with everyday problems.
- The beautiful delights me.
- I experiment in cooking and make new recipes.
- I see the answers to problems suddenly.
- I have written a story, poem, play, TV or radio script, imaginative essay and the like.
- I prefer to strive for distant goals even if present goals appear more attractive.
- My relations with others must be real and meaningful.
- To risk entering into the unknown would thrill me.
- I am critical of others in a way that leads to improvements and advances.
- I have always the urge to question.
- I am very interested in and open to the ideas of others.
- I think for myself though I may not always be right.
- I prefer to work on my own rather than in a group.
- I can delay making judgments until I have sufficient information.
- I can easily spot missing elements or gaps in knowledge or situations.
- I do not hesitate to be playful and childlike when I am trying to be productive.
- I do not like to have to do things in the way others prescribe for me.
- I am a self-starter and do not have to depend on others to maintain my interest level.
- I like to attempt tasks which others would consider difficult or challenging.
- My desire to excel makes me productive.
- I have produced a new formula.
- I have shown organizational ability.
- I have designed sets or scenery for a dramatic or musical evening.
- I am prepared to review my judgments when new information turns up.