

1981

# Hemispheric dominance and imagaic writing

Margaret Ann Johnson Mahoney  
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**MAHONEY, MARGARET ANN JOHNSON**

**HEMISPHERIC DOMINANCE AND IMAGIC WRITING**

*Iowa State University*

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**Hemispheric dominance and imagaic writing**

by

**Margaret Ann Johnson Mahoney**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirements for the Degree of  
DOCTOR OF PHILOSOPHY**

**Department: Professional Studies in Education  
Major: Education (Curriculum and  
Instructional Media)**

**Approved/**

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**Iowa State University  
Ames, Iowa**

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DEDICATION

To my children -

May each of you forsee within yourself  
the ability to capture the essence of  
life and hold it close to your being.

## INTRODUCTION

"Imagination, not slavery to fact, is the source of whatever is good in human life."

--Bertrand Russell

How frequently have adults chastized children for day-dreaming, fantasizing, or acting impulsively! Invariably, educators have clung to the handrail of logic, ignoring the creative potential within each human being. Jean Houston (1979, p. 32) states her perception of this situation very succinctly, "We are given as our birthright a Stradivarian, and we come to play it like a plastic fiddle".

Houston's statement would imply that educators should give focus to students' creativity in fantasizing as well as their logical analysis, thus enhancing those Stradivarius qualities and reducing those "plastic fiddle" characteristics. Another option for equal focus might include attention to the asymmetrical cerebral hemispheres of the human brain in terms of the degree to which students' written creative imagination images may be influenced. Additionally, Sperry (1974) proposes the theory that productivity increases when working of the brain is integrated. Support for this position may be found in the findings of several electroencephlogram (EEG) studies where performance on tasks calling upon primarily left hemispheric (verbal) processing

is improved when the right hemisphere is drawn into play (Kraft, 1976; Norman, 1977). Exactly how the right hemisphere facilitates performance is not clear. Yet, understanding how the right hemisphere functions might possibly lead to better training in how to select and use the skills of both hemispheres. However, "an early...and excessive emphasis on the development of processing skills of either the right or the left hemisphere to the neglect of the other can possibly lead to permanent cognitive (Passow, 1967; Rennels, 1976; Yakovlev & Lecours, 1967), or affective (Crinella, Beck & Robinson, 1971) deficits" (Sperry, 1974, p. 90).

Some researchers even speculate that many aspects of right/left hemispheric specialization begin before birth and are genetically programmed (Galaburda & Geshwind, 1978; Geshwind, 1979; Wada et al., 1975; Wada & Davis, 1977; Witelson & Pallie, 1973). If this is possible, then one might hypothesize that an individual is born with a certain hemispheric dominance potential, but the extent that this potential becomes a realization depends on whether it is enhanced by one's environment. For example, the survival value and social acceptability of the divergent, imaginative, holistic style of thought could be considered to be minimal in a totally rationalistic, convergent, verbal milieu.

Since the formal schooling of an individual is a very

relevant aspect of one's environment, educators need to acquire insights not only into the students themselves, but into the characteristics of specific cognitive processes, to maximize potential development. Such insights might include information ascertaining the relative performance of right and left hemispheric dominant students, the relative nature of their fantasies and imaginative productions, and their attitudes toward educational, integrative activities.

Students need to learn how to use their potential for original and vivid communication which lies in their creative right hemisphere to thus improve the preciseness of their communicated thoughts. The succinct communication of opinions, insights, concepts, or perspectives is of major import in our society. To increase the precision of communication, educators need to focus the detail of students' writing--not only the logical, analytical, sequential detail, but also the vividness of those written images as measured by their fluency, flexibility, originality, and quality.

Shepard (1978) has noted the central role of imagery in the thought processes of such geniuses as Einstein, Faraday, and Maxwell. He also noted that Kekule, the discoverer of the benzene ring, reported that many of his insights came from spontaneous kinetic images of dancing atoms hooked up to form chainlike molecules. The writing of Coleridge and the music of Mozart are reported to be the

result of visual and auditory imagery, respectively.

Zikmund (1972) summarizes research on the bioelectric activity of the brain during imaging and lends support to the notion that stimulating the right hemisphere of the brain increases imaging ability. Gowan (1980) states that to increase the use of the right hemisphere, one must remove some of the activities of the left hemisphere through relaxation, fantasy, meditation, or daydreaming. Consequently, to stimulate the right hemisphere, with respect to the production of written images, viable stimuli would appear to be music and guided imagery.

Thus, based upon the aforementioned studies supporting a localization of brain functioning and the linking of creativity with imagery, the present study is designed to obtain information to substantiate links between hemisphericity, creativity, and imagery research. Such information would offer educators an additional suggestion regarding the enhancement of human potential, as well as lessen the separation between the theorists and practitioners in education.

Research in the curriculum field has largely ignored the relationship of right and left hemispheric dominance to students' writing of creative imagination imagery. To close this gap in knowledge, this study related hemisphericity theory and application by investigating the degree to which music or guided imagery, or music and guided imagery influenced

the fluency, flexibility, originality and quality of creative imagination imagery in right or left hemispheric dominant students' writing. Investigated additionally was the degree to which music and guided imagery influence the attitudes of right or left hemispheric dominant individuals toward the writing of creative imagination imagery, which was defined as mental pictures conveying a vicarious experience, forming an organized pattern (Khatena, 1979), and measured in relation to their fluency, flexibility, originality, and quality.

#### Present Study

Betty Edwards, at the 11th Annual International Visual Literacy Association Conference, stated that one of the ways to increase use of the right hemisphere of the brain is to elude the left (Edwards, Note 1). This was later supported by Gowan in 1980. To accomplish this in this present study, relaxation and sensual appeal were stressed by the following four treatments: a) music, no guided imagery (M/NI), b) no music, guided imagery (NM/I), c) no guided imagery (NI), and d) music and guided imagery simultaneously (M/I).

Relaxation was presumably aided by the muted level of the music and unhurried pace of the guided imagery. The sensual appeal was conveyed via the music, "The ultimate

seashore" (Syntonic Research, 1970), as well as with the guided imagery, which alternately focused upon each of the five senses. In contrast, the students in the control group (MN/NI) were only told to write a descriptive paper for which the setting was the seashore.

It was predicted that all left hemispheric dominant subjects in the M/I, M/NI and NM/I treatment groups would surpass the left hemispheric dominant subjects in the NM/NI treatment group with respect to the fluency, flexibility, originality and quality of their written creative imagination images. Right hemispheres dominant subjects in all four treatment groups were also predicted to score higher than the left hemispheric dominant subjects in terms of their fluency, flexibility, originality and quality of their written creative imagination images. Of those subjects in the M/I treatment group, the right hemispheric dominant individuals were expected to achieve the highest score of all groups, since they would have the initial tendency to be more creative. Additionally, it was predicted that all the individuals in the M/I treatment group would have the highest fluency, flexibility, originality and quality scores on their creative imagination imagery, since they had received the greatest amount of sensory appeal. This latter prediction is supported by Taylor

(1970) who found the simultaneous sensory stimulation of two or more sensory modalities to be directly related to creative imagery expression. With respect to attitude, it was predicted that all subjects in the M/I, M/NI, and NM/I treatment groups would have more positive attitudes toward their respective writing exercises than did the subjects in the NM/NI treatment group. Also, those subjects in the M/I treatment group were expected to have the most positive attitudes.

### Hypotheses

Initial investigation of the effects of the treatments involved in this study and review of the previous research generated the following specific hypotheses to be tested within this study:

1. The left hemisphere dominant subjects in the music/guided imagery, music/no guided imagery, and no music/guided imagery treatment groups will score significantly higher than the left hemispheric dominant subjects in the no music/no guided imagery treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
2. The right hemispheric dominant subjects within each treatment group will score significantly higher than the left hemispheric dominant subjects within each treatment group with respect to fluency, flexibility, originality, quality, and attitude.
3. The right hemispheric dominant subjects in the music/imagery treatment group will score significantly higher than the right hemispheric dominant subjects in all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.



4. The music/guided imagery treatment group will score significantly higher than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
5. The no music/no guided imagery treatment group will score significantly lower than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
6. The music/no guided imagery treatment group will score significantly higher than the no music/no guided imagery treatment group but significantly lower than the music/guided imagery treatment group with respect to fluency, flexibility, originality, quality, and attitude.
7. The no music/guided imagery treatment group will score significantly higher than the no music/no guided imagery treatment group but significantly lower than the music/guided imagery treatment group with respect to fluency, flexibility, originality, quality, and attitude.

The design of this study and the generalization drawn from analysis of the data rested upon the following assumptions:

1. Creative imagination imagery reflects the abilities of fluency, flexibility, and originality found in other creative thought.
2. The factors which might influence the outcome other than the treatment would be randomly distributed (e.g., verbal fluency, prior creative writing experience).
3. Hemispheric functional asymmetries can be measured, and persons possessing dominant cognitive styles can be determined.
4. The attitudes toward this specific writing exercise can be assessed.

Efforts to add to the understanding of written creative

imagination imagery, hemispheric dominance, and the writing products which emerge bring with them many limitations, of which, the following were recognized at the outset of this research:

1. The instrument designed for evaluating the written creative imagination images is a construction of the researcher and has not been substantiated as an accurate operational definition of the construct it represents through repeated use by other researchers.
2. The results of this study apply to volunteer subjects from a large state university.
3. The IQ of the population from which the sample was drawn was not normally distributed, with respect to the general population.
4. The use of self-report measures to assess cognitive style may be influenced by the social desirability of responses.
5. The use of self-report measures to assess previous writing experience and attitude toward the writing exercise may lack reliability.

#### Definition of Terms

To increase the usefulness of this research to others, it is necessary to provide clear definition of the following terms as they are used in this study:

1. Right hemispheric dominant cognitive style was defined as a preferred use of the right hemisphere as indicated by a score in the upper third percentile for "right" answers on Your Style of Learning and Thinking (YSOLAT), form A (Torrance et al., 1977) (see Appendix A), and a correspondingly low score (within the lower third percentile) for "left" and "integrated" answers on this same instrument. This definition suggests the idea of the

right hemisphere being more efficient or having greater utilization in holistic, divergent, imaginative cognitive tasks (Bogen & Bogen, 1969; Ornstein, 1972; Torrance et al., 1977).

2. Left hemispheric dominant cognitive style was defined as a preferred use of the left hemisphere as indicated by a score in the upper third percentile for "left" answers on YSOLAT, form A (Torrance et al., 1977), and a correspondingly low score (within the lower third percentile) for "right" and "integrated" answers on this same instrument. This definition suggests the idea of the left hemisphere being more efficient or having greater utilization in convergent, deductive, analytical cognitive tasks (Bogen & Bogen, 1969; Ornstein, 1972; Torrance et al., 1977).
3. Integrated hemispheric dominant cognitive style was defined as an absence of preferred use of the right or left hemisphere as defined above.
4. Written creative imagination imagery was defined as mental pictures conveying a vicarious experience, forming an organized pattern (Khatena, 1979), and measured in relation to their fluency, flexibility, originality, and quality.
5. Fluency of the written creative imagination images was defined as the number of relevant written images--written images which contribute to the overall mental picture suggested by the paper. This definition of fluency was derived from the definition of fluency of creativity developed by Torrance (1962) and supported by Guilford (1962), Hammaker et al. (1975), Malgady and Barcher (1977), Shouk-smith (1972), and Wallach and Kogan (1965).
6. The flexibility of the written creative imagination images was defined as the number of different categories into which students' written images could be classified. The use of flexibility categories in creativity studies is supported by Guilford (1962), Lynch and Kaufman (1974), and Torrance and Hudgins (1974). Such categories included: visual (appealing to the sense of sight, e.g., the blue sky), auditory (appealing to the sense of hearing, e.g., the chirping bird), tactile

(appealing to the sense of touch, e.g., the rough table top), gustatory (appealing to the sense of taste, e.g., the salty water), and olfactory (appealing to the sense of smell, e.g., the stench of dead fish). Other categories were hyperbole, irony, metaphor, metonymy, personification, simile, and antithesis, and sustained metaphors. These eight latter categories possessed definitions derived from The Handbook To Literature (Thrall et al., 1960), a widely accepted handbook among literature and composition teachers (see Appendix B or Chapter Three.

7. Originality of the written creative imagination images was defined as the creative strength displayed by each image. Unoriginal images were images which are frequently used by adults in our society (e.g., the blue sky), and original images were defined as images which are infrequently used by adults in our society (e.g., the tufted sky).
8. Quality of the written creative imagination images was defined as the overall evaluation of the images --a composite score which consisted of the total fluency, flexibility, and originality, scores of all the written creative imagination images within one student's paper, just as the total of these same three scores equals the overall creativity score in Torrance's (1962) and Torrance and Hudgins' (1974) Tests of Creative Thinking.
9. Attitude was defined as "a learned predisposition to respond to an object or class of objects in a consistently favorable or unfavorable way" (Allport, as cited by Fishbein, 1967, p. 477). In this study, the attitudes were assumed to be overtly expressed through a paper and pencil response to a question.

## REVIEW OF LITERATURE

## Overview on Thinking Styles

Ecstasy is identity with all existence, and ecstasy showed in his bright paintings; like the Aurignacian hunter, who became the deer he drew on the cave wall, there was no 'self' to separate him from the bird or flower. . . .

Alex is eight, and already he has shut away the wilderness of the world. . . ."

--from The Snow Leopard  
(Matthiessen, 1979)

To what "wilderness" and "ecstasy" is Matthiessen referring? Might it be the ecstasy of the mind--of "knowing more than we can tell", as Polyani expresses it, or the unity of one's "self", one's "mind", one's "body", one's "soul"? This may appear to constitute a paradoxical statement, although many intelligent, creative individuals have perceived the mental images of an invention or hypothesis, could "feel" the idea and reach a "state of knowing" prior to possessing the means to communicate these mental images to another individual. Albert Einstein stated that he formed mental images of formulas and "felt" an hypothesis with his mental visions. Additionally, Einstein said he discovered the theory of relativity by picturing himself riding on a ray of light (Ghiselin, 1952, p. 43). Poets, Milton in particular, invoked the muse to enter their minds and souls and thus enable their pens and "selves" to flow as one.

The composer, Wolfgang Mozart wrote in a letter in 1789, "My subject (music) enlarges itself, becomes methodized and defined, and the whole, though it be long, stands almost complete and finished in my mind, so that I can survey it, like a fine picture or a beautiful statue, at a glance. Nor do I hear in my imagination the parts successively, but I hear them as it were, all at once" (Ghiselin, 1952, p. 45).

American Indian culture reiterates these aforementioned thoughts, since the essence of Indian culture lies deep in their land--sacred and serenely unyielding to any but those whose inner souls are attuned to the rhapsodical flow of its forces. "As integral parts of the Creative Divinity that lives in all things, they evoked all the fertile unfoldments of nature through regular ritual urgings. They sang up corn, called down rains, and dwelt together in communal harmony--dancing out their periodic prayer--dreams in exquisite seclusion upon their share of the earth's brotherly face" (Hegepeth, 1970, p. 24). The American Indian viewed man, beast, earth, and stars as each being imbued with a spirit, all united in harmony--in a communion of oneness. Dreams, fantasies, and inner visions were valued over cognitive analytical thought. They did not "shut away the wilderness of the world," as Alex was forced to do in The Snow Leopard.

The value of dreams, fantasies, and images has not been

a high priority in our technological society. The view that a verbal, analytical cognitive style is the only efficient, adult, and legitimate form of thinking definitely prevailed in the late nineteenth and early twentieth centuries and still exhibits definite strength today. The "wilderness of the world", referred to above and exemplified by a imagaic, intuitive, holistic style of thought still struggles for acceptance in our rationalistic, verbally-oriented milieu.

The contrasting mental attitudes or styles, which are the focus of this current investigation, have been acknowledged as long ago as the era of Greek mythology. At that time, many abstract human qualities were personified and conceptualized as attributes of the gods. The verbal, analytical, and logical mode of thinking was related to the god Apollo, while the imagistic, holistic, and intuitive style was associated with the god, Dionysius. It was Dionysius who imparted inspiration to poets (Hamilton, 1940).

With the advent of the science of experimental psychology in the 1880s, the human mind was subjected to observation and experimentation via the method of introspection. The early investigators of the mind soon dichotomized their subjects on the basis of their thinking styles, using such

nomenclatures as "visual types" and "auditory-motor types" (Griffits, 1927) and "visualizers" and "verbalizers" (Bartlett, 1932). This latter dichotomy was used by Bartlett to explain patterns of performance in a memory task. He noted that visualizers tended to treat items of a series discretely, rather than as a whole, and were more apt to group stimuli on the basis of some easily perceived likeness. The verbalizer, on the other hand, attempted to learn the items by giving them names and used a system of grouping which relied on noticing the common essential relations among items, rather than peripheral aspects.

In the structure of the human mind which Freud (1949) elaborated, two types of cognitive process were also differentiated. The primary process, in the service of the id, was considered to operate without logic, a sense of reality or of temporal order, and be guided by wishes and expressed in imagery. Examples of this are dreams and hallucinations. The secondary process, on the other hand, was considered to be realistic, temporarily oriented, logical, and tied to language and abstract thought. Developmentally, primary process was considered to precede secondary process thinking and to be replaced



by it. However, an individual could regress to primary process thinking, as in psychosis or in dreaming.

It appears from the foregoing literature review that the creative process requires the union of imagination and logic. An understanding of both the holistic and analytical styles of thought is requisite to the enhancement of human potentials.

### Laterality

Dimond and Beaumont (1974) regarded the brain as a bilateral machine--two computers side-by-side--which handle different types of information and, perhaps, analyze this information in different ways. Laterality is a term which is used to refer to the asymmetry in the functional distribution of neurological capacities within the hemispheres of the brain. It is the phenomenon in which an individual can perform certain tasks more quickly or efficiently when stimulation is directed to one hemisphere (that hemisphere which is specialized for the type of stimulus or task presented). To say that a function is lateralized means that one hemisphere does it better, or is specialized for that function.

Cerebral laterality effects have emerged from a variety

of sources. In the 1860's, Broca localized speech in the left hemisphere on the basis of post mortem analyses of aphasic patients (Milner, 1970). Since that time, a number of researchers have conducted studies on patients with localized brain injury in order to elucidate the lateralization of functions. For example, Hecaen and Angelergues (1962) studied patients with left and right hemispheric lesions. They found the inability to recognize familiar faces was more frequent in patients with right hemisphere lesions. Kimura (1963) studied visual memory in lobectomized patients and found impairments in the ability to recognize visually nonsense syllables after a right temporal lobectomy, but not after a left one. Interestingly, when verbal stimuli were used instead, the trend reversed itself, and impairment was greatest with the left temporal lobectomized patients. Milner and Teuber (1968) found that, although patients with left temporal lobectomies could learn a maze as quickly as could normal subjects, significant deficits were revealed in the performance of the right temporal lobectomized patients. By contrast, patients with left temporal lobe damage recalled prose passages more poorly than did normal subjects (Milner & Teuber, 1968). Thus, with this brain-injured population, verbal tasks appeared to be processed primarily in the left hemisphere.

Another source of data on the asymmetrical functioning of the brain has come from studies of completely commissurotomed patients, that is, patients whose corpus callosum has been severed surgically. Now the independent activities of each cerebral hemisphere could, presumably, be studied since the major communicative link between the two hemispheres was severed. In 1961, Joseph E. Bogen severed the corpus callosum, the nerve tissue connecting the right and left cerebral hemispheres in a human being and found each hemisphere to function uniquely and independently as if it were a complete brain (Gazzaniga, 1967). Such evidence from commissurotomed patients suggest the hypothesis that the left cerebral hemisphere in approximately 98 percent of the right-handers and in approximately two-thirds of the left-handers specializes in convergent, deductive, rational, or analytical cognitive functions which are well adapted to learning and remembering details or verbal information. Correspondingly, the right hemisphere specialized in divergent, imaginative, holistic, or intuitive thought. One study exhibiting such results with commissurotomed patients is that by Levy-Agresti and Sperry (1968). Their subjects included ten patients on whom the forebrain commissures were surgically divided for therapeutic reasons. Tests were applied in which three-dimensional forms held in the right or left hand had to be matched with their unfolded shapes drawn as expanded patterns on cards and

presented visually. The right hemisphere was found to be superior to the left. The data thus indicated that the right hemisphere is specialized for holistic perception, "being primarily a synthesizer in dealing with information input. The left hemisphere, in contrast, seems to operate in a more logical, analytical, computer-like fashion" (Levy-Agresti & Sperry, 1968, p. 1511). Such findings are supported by Bogen (1973), Bogen and Bogen (1969), Bogen et al. (1972), Galin & Ornstein (1972), Gazzaniga (1970), Geschwind (1970, 1974), Geschwind & Fusillo (1966), Ornstein (1972), and Sperry (1975).

From work with commissurotomed patients, science has learned a great deal regarding the separate capabilities of each hemisphere, and prior to a further discussion of hemispheric specialization, it is requisite to emphasize the integration of the hemispheric processes; no dichotomy of function does justice to the complexity of the human brain. For example, for most individuals, the right hemisphere comprehends but cannot produce speech (Lassen et al., 1978; Luria, 1970). Neither hemisphere alone is totally competent; the two hemispheres must cooperate. Also, one must note that each hemisphere receives, in addition to the main sensory input, which is contralateral, a smaller proportion of ipsilateral stimulation "good mainly for 'cuing in' the hemisphere as to the presence or absence of stimulation and

relaying fairly gross information about the location of a stimulus" (Gazzaniga, 1974).

Galin (1974) has summarized findings from split brain studies. He noted that the left hemisphere was found to be capable of speech, writing, and calculation, but severely limited in solving problems involving spatial relationships and novel figures. The right hemisphere was found specialized for tasks involving complex spatial and musical patterns, but had use of relatively few words and the verbal comprehension of a two-year-old.

A third source of data on laterality has come from studies of normal samples. As Moscovitch (1973) noted, the data from lesion and split-brain studies are based on samples of individuals with some brain pathology. He questioned the generalizability of these findings to nonbrain-injured individuals and suggested a lack of laterality studies on normal samples. Studies of normal brain function have yielded results which generally corroborate the previous findings from pathological samples.

Ornstein (1978) has discussed several studies which utilized electroencephalogram (EEG) data on normal adults and supported the findings with commissurotomized patients. One of the studies was conducted with five ceramicists and five attorneys who were asked to perform a series of cognitive

and spatial tasks: writing a description of a passage of prose from memory, copying a similar passage of prose, reading a story, and reading technical material. Ornstein found the lawyers consistently used the left hemisphere more frequently than the ceramicists, who most frequently used their right hemisphere in all four tasks. Also, the writing of the prose from memory involved more of the left hemisphere in both groups, whereas the reading of the story used more of the right hemisphere in both groups. Thus, the less convergent and analytical the task, the more right hemisphere activity is involved. Ornstein's findings corroborated the findings of other researchers using normal adult subjects (Butler & Glass, 1974; Galin & Ornstein, 1972; Morgan et al., 1971; Robbins & McAdam, 1974).

Martindale (1975) observed the type of brain waves produced during various tasks including an Alternate Uses Test which requires creativity. He found that when attempting to perform a creative task, noncreative persons seem to use their brains in the same way as they do for other tasks, such as when taking an intelligence test. This also occurred with Ornstein's (1978) subjects. Creative individuals, in contrast to the noncreative persons displayed waves (relaxed state) when encountering a creative task. In addition to producing more alpha waves, these individuals who were creative tended to produce equal amounts of alpha

waves in both hemispheres. Medium creative persons produced comparatively more alpha in the right hemisphere than in the left. Equal amounts of alpha between the hemispheres may indicate that creative people were using both modes of thought, whereas the medium creative persons utilized primarily the left hemisphere. Low creative persons displayed very little alpha in either hemisphere giving indication that they were too anxious. Thus, creativity may involve mental relaxation and increased right hemisphere thought. Additionally, Ornstein's (1978) and Martindale's (1975) findings support the hypothesis that the right hemispheric dominant individuals in each treatment will perform significantly better than the left hemispheric dominant individuals, since initially they are more predisposed to creative thinking.

Other EEG data suggest that performance on analytical tasks is improved when the right hemisphere is drawn into play (Kraft, 1976). Eighteen six to eight-year-old children were the subjects in Kraft's (1976) study utilizing EEGs to investigate the lateral asymmetry in children's hemispheric brain functioning while performing a battery of tasks: Piagetian conservation tasks, Piagetian temporal tasks, spatial tasks, and curriculum related tasks. It was found that tasks which had initial visio-spatial components during the stimulus period tended to elicit right hemispheric

activity during that period. If that task had verbal or logical components during the subsequent response period, then left hemispheric activity tended to be elicited. High performers tended to show a greater proportion of right hemispheric activity during the subsequent response period. Kraft concluded that improved hemispheric communication facilitates efficient task performance. This is supported by Ghiselin (1952), Gilchrist & Taft (1970), Norman (1977), and Sperry (1974).

Other evidence supports the finding that learning and memory are enhanced by presenting subject matter to both hemispheres (Bower, 1971; Dimond, 1972; and Seamon, 1972).

Robert Nebes (1977, p. 105) comments:

Perhaps when people speculate about an inverse relationship between scholastic achievement and creativity, they are really talking about the effect of overtraining for verbal skills at the expense of nonverbal capacities. Many problems can be solved either by analysis or synthesis; but, if people are taught to habitually examine only one approach, their ability to choose the most effective and efficient answer is diminished. Increased understanding of how the minor hemisphere works will hopefully lead to better training in how to choose between and to use the skills of both hemispheres of the human brain.



### Implications

From laterality literature, several suggestions for the proposed treatments in this present study are evident. If the right hemisphere specializes in holistic, imaginative, and divergent thought, then a treatment designed to increase the use of written creative imagination imagery could stress this thought via guided imagery and sounds such as those from the seashore. A relaxed atmosphere should be encouraged, since creative individuals exhibit a more relaxed state than noncreative individuals when they encounter a creative task. Even though the guided imagery is verbal, the task performance should improve since the right hemisphere would be maximally stimulated.

### Creative Imagination Imagery and Cognitive Style

And, as imagination bodies forth  
The forms of things unknown, the poet's pen  
Turns them into shapes, and gives to airy nothing  
A local habitation and a name.

--Shakespeare  
Midsummer Night's Dream

### Overview of imagery research

The capacity to possess and utilize imagery is an integral component of right hemisphere cognitive style. As such, imagery has been defined in two major ways--as a form of

mental representation and as a cognitive process (Paivio, 1971, 1975a, 1975b). An image as mental representation has been defined as a perceptual analogue which can exist in the absence of an external stimulus (Shepard, 1978). People may differ in the extent to which they can experience images, whether their images are spontaneous or controlled, and in the vividness or clarity of their images (Forisha, 1978).

In terms of imagery defined as a cognitive process, Paivio (1971) functionally distinguished imaginal and verbal systems in terms of parallel and sequential processing, respectively. He described the visual system as being spatially organized and capable of receiving, transmitting, and processing information simultaneously given in a spatial array. Such simultaneously given information can be processed over a broad area of the retina. Thus, because of this ability to simultaneously process information, the visual system (and the visual imagery system), is a parallel processing system.

In his theory of imagery and verbal processes, Paivio (1971), attempted to show the relationships among, and the differences between, the two coding systems (parallel and sequential). He labeled verbal processes as sequential. By this he meant that these processes are organized in such a way that the successive steps involved are interdependent. That is, the outcome at one point determines the next step in

the sequence. He used the auditory perceptual system as a metaphor for this in the sense that it is specialized for dealing with temporally (serially) organized stimulus patterns. He asserted that, to the extent that the verbal system is linked to the auditory senses, it must also be characterized as a sequential system. This characterization is clearest in the case of auditory speech input. The verbal system is also sequentially organized by virtue of its syntactical nature: its grammar depends upon temporal ordering and an interdependence of elements.

The results of several empirical investigations (Bower, 1970; Seamon, 1972; Neilson & Smith, 1973) have supported the existence of these processing modes. In Paivio's theory (and in research results) everyone is capable of both types of processing. However, it is also possible to study these modes in terms of the degree to which different individuals utilize each type. That is the focus of the present study. Also, imagery, seen as a cognitive mode which processes information holistically, or in parallel, appears to be more akin to the concept of the right hemisphere cognitive style than the view of imagery as a discrete ability measured by vividness or frequency, which is more left.

The first systematic research of imagery was conducted in the late 1800s by Francis Galton (1880). His questionnaire

focused upon an individual's capacity to evoke differing types of images. Subjects were asked to create such images as "an oil-lamp blown out" or "the taste of lemon juice." But spanning the period of time between Galton and the 1950s, relatively little research was conducted on imagery. Perhaps one cause for this neglect can be attributed to Watson's rejection of imagery as an appropriate subject of study and the ascendancy of behaviorism in the 1920s. Resurgence of interest in imagery has tended to be limited to studies related to memory imagery (Bower, 1971; Paivio, 1971; Paivio & Madigan, 1970; Paivio & Yuille, 1969; Richardson, 1969; Yarmey & Ure, 1971; Yuille & Note 2).

Studies attempting to focus upon imaginative imagery were primarily concerned with hypnogogic imagery (Horowitz, 1970; McKellar, 1957, 1965; McKellar and Simpson, 1954; Oswald, 1962; Owens, Note 3), perceptual isolation imagery (Goldberger & Holt, 1961; Holt & Goldberger, 1960). hallucinogenic drug imagery (Barron, 1963; Izumi, 1968; Klüver, 1942; McKellar, 1957; Steinberg, 1956), and pictorial stimulation (Bower & Winzenz, 1970; Bugelski et al., 1968). Common to all these studies is the reduction of external stimuli affecting an individual to a level which frees this person to focus on an inner world which facilitates imagination imagery (Richardson, 1969). However, the need for research on creative imagination imagery, hitherto neglected, is advocated

strongly by Richardson (1969) and Paivio (1971). Richardson (1969) cites only two studies which focus upon the creative correlates of imagination imagery--one concerning perceptual isolation and its positive correlates with Guilford's measures of creativity (Kubzansky, 1961), and the other the facilitatory effects of LSD on creative problem solving (Harman et al., 1966).

#### Stimulating creative imagination imagery

In a recent publication, Joe Khatena (1979), a prominent researcher in the field of imagery, defines imagery as "mental pictures that have organized themselves into some kind of pattern" (p. 408). He continues in his definition to state that the details one includes in one's imagaic depiction of the world are dependent upon "the emotional-intellectual, composition of the person and the creative, energizing forces functioning at that time of imaging" (p. 408). This review of literature explores the relationship between these emotional-intellectual, and creative aspects mentioned by Khatena and creative imagination imagery as defined in Chapter One.

Sensory appeal "In the outer world, we are limited by the laws of matter in what we can experience" (Samuels & Samuels, 1975, p. 181). How one stimulates this inner world of experience seems to be a viable concern. Generally, the

focus has been fixed upon the visual component of imagery (Bower & Winzenz, 1970; Bugelski et al., 1968), although imagery appealing to the visual mode has been found to be relatively unimportant in the blind (Duran, 1969). The neglect of other sensory modalities also typifies normative studies which have established the imagery value of words in relation to familiarity and other verbal dimensions (Haagen, 1949).

Leonard and Lindauer (1973), however, gave 45 sensory words in the sense modalities of visual, auditory, tactile, gustatory, and olfactory references, with imagery scores differentiating aesthetic participation scores to 21 males and 21 female undergraduate volunteers. Findings indicated a significant positive correlation between participation in aesthetic activities and imagery arousal as measures by self-rating scales relative to participation in English, art, music, and theater and to ease and vividness of imagery produced. This finding appears to support the hypothesis stating that the M/I, NM/I, and M/NI treatment groups will all score significantly higher than the NM/NI treatment group with respect to fluency, flexibility, originality, quality, and attitude, since former three groups possess more aesthetic appeal than the latter group.

Khatena (1976) studied 77 college adults (33 males, 44 females) randomly assigned to one treatment and one

experimental group. The experimental subjects were asked to rate the vividness of their auditory imagery on a five point scale. Then they were instructed to use the auditory sense modality to produce images in response to the sound stimuli of Sounds and Images, form 2A (Torrance et al., 1973), a measure of verbal originality. Following this training, subjects of both treatment groups were administered Onomatopoeia and Images, form 2A (Khatena & Torrance, 1973), another measure of verbal originality. The verbal images produced on Onomatopoeia and Images, form 2A were scored for originality and the use of various sense modalities. Findings indicated that these college adults tended to use the visual, auditory, or visual and auditory senses combined to most frequently produce original verbal images and exhibited a preference for multiple sense modalities (i.e., a combination of two or more senses). Additional research advocating simultaneous sensory stimulation includes McKim (Note 4) and Taylor (1959). These findings would support the hypothesis indicating that the M/I treatment group will perform above the other three treatment groups, since the M/I group will receive the greatest amount of multiple sensory stimulation. The more stimuli the right hemisphere receives (specifically, the music in addition to the guided imagery), the better the fluency, flexibility, originality, quality, and attitude scores.

Irving Taylor (1959) used a qualitative analysis in supporting his hypothesis that simultaneous sensory stimulation of two or more sensory modalities is directly related to creative imagery expression. A subsequent study by Taylor (1970) also supported the application of simultaneous sensory stimulation in producing increased size and aesthetic creativity in the productions of gifted young adults.

It is this multi-sensory experience to which the Imaginarium at Stanford University appeals. Robert McKim, professor of design engineering at Stanford and the creator of the Imaginarium, states that this geodesic dome "allows people to discover the imaginative activity that already exists in them. The person who cannot budge his or her imagination to see other viewpoints experiences only a one-sided view of reality" (McKim, cited by Bry, 1978, p. 118).

In the Imaginarium, the sophisticated sound system fills the auditory consciousness with sounds and music. Additionally, the sound system is connected underneath the dome platform, thus allowing the sound to be experienced tactilely. A spherical optical lens and projection equipment cast images onto the dome's entire visual field. To complete the sensory input, scents can be introduced into the dome through the air-conditioning system. This entire sensory creation is used to expand imaginative, creative thinking. Speaking at the 1979 International Visual Literacy Association Conference, McKim



purported the advantages of the imaginarium's simultaneous sensory stimulation in improving his design engineering students' ability to think creatively. By improving their command of right hemisphere skills, the quality of their design products improved (McKim, Note 4). The sensory stimuli used by McKim is neither too controlled nor too uncontrolled, a necessary balance in the development of creative ideas. Richardson (1969) has noted that uncontrolled imagery may be a hindrance to problem solving by interfering with a consistent line of thought. This might constitute another reason why the NM/NI treatment group would be expected to perform lower than the other three treatment groups. The subjects will have received less direction with respect to their imagery.

Relaxation      Imaging is an inner state of mind. Thus, to create effective images of high quality, it seems requisite for people to place themselves in a state in which they can be aware of inner processes. In the 1920s, Edmund Jacobson, an American physician, found that people could become aware of tension and learn to relax. From his research, Jacobson developed a technique designated "progressive relaxation" (Jacobson, 1942).

Psychological openness and relaxation has been posited by several researchers as a necessary condition for creativity.

Rogers (1959) believes that an openness to experience each stimulus freely is "an important condition of constructive creativity" (p. 74). Osborn (1953, p. 127) states that open-mindedness and a relaxed state is essential to creativity. Alamshah (1967), Barron (1968), Chaney and Andreasen (1972), Lauer and Goldfield (1970), and Wilson and Wilson (1970), similarly purport the positive effects of a relaxed, open-minded state as being essential to creativity. Maslow's (1954) concept of mental health also seems synonymous with psychological openness and a relaxed state, since he identified these characteristics in self-actualized persons. J. C. Gowan (1979) encourages educators to teach children the techniques of relaxation and assist them in the practice of imagination and imagery during such relaxed periods.

Robert McKim (1974) designates this state as "relaxed attention" . . . "relaxation is important to thinking generally, because we think with our whole being, our body as well as our brain" (p. 265). McKim (1974) continues, "Although frequently taught to athletes and performing artists, the art of relaxed attention is rarely even mentioned to those who should develop skill in thinking. Negative thinking habits are reinforced by education for thinking that does not treat relaxed attention as an essential preparation" (p. 275). Bernard Gunther (1968), in Sense Relaxation, refers to the state delicately balanced between total

relaxation and muscular tension as "optimal tonus."

In his captivating book Imagination, Harold Rugg (1963, pp. 39-40) writes of this psychological state:

It is my thesis that the illuminating flash of insight occurs at a critical threshold of the conscious-non-conscious continuum on which all of life is lived. The true locus of the creative imagination is the border state that marks off the conscious from the non-conscious. This is the state between conscious alert awareness, about which Dewey wrote for 50 years, and the deep nonconscious in which Freud was intensely absorbed. James was aware of it, calling it "the fringe," the "walking trance." Others spotted it long ago. Galton named it "antechamber;" Varendonck, "foreconscious;" Schelling, "preconscious;" Freud, "subconscious;" more recently Kubie, "preconscious;" and Tauber and Green, "pre-logical." This is the Taoists' state of "letting things happen," where day-dreaming and reveries go on, where Whitehead's prehension and Wild's intuition, as primal awareness, function; where we know before we know we know. My hypothesis makes it the true creative center.

I have never succeeded in finding an adequate name for it. I have tried many: intuitive, autistic, quiet, relaxed, permissive, accessible, hospitable. The state is certainly permissive, yet it is more than that. It is actively magnetic, attracting materials out of the non-conscious into the vestibule of the conscious mind. Such across-the-threshold power suggests the name which I have given it: the trans-liminal mind.

One may hypothesize that relaxation in this study will be aided by the soft, steady sounds of the seashore recording and the hushed tones of the guided imagery.

Imagery and reception of creative ideas      The idea that images are vital to thought has captured the attention of philosophers for centuries. In the late nineteenth

century, imagery was analyzed by Fechner, Wundt, Galton, James, and Titchener, during the early development of psychology (Segal, 1971). Ironically, though, there has been a negligible amount of experimentally based research into the relationship between the two thought processes of creativity and imagery, even though factors common to both constructs, such as originality and fluency, spatial abilities, and spontaneous associations are emphasized in testing instruments used for measuring the two abilities. Kubzansky (1961), employing 16 adult male subjects, studied perceptual isolation and its positive correlates with Guilford's measures of creativity. The subjects were rank-ordered for creativity by performance on brief paper and pencil tests developed by Guilford. Tests were scored for originality, cleverness, flexibility, and ability to perceive unusual spatial relationships. Subjects were then placed in isolation for two hours. Following this procedure, subjects were then interviewed in detail about all images, including visual, auditory, tactile and gustatory. Results indicated a significant positive relationship between creativity and the number of images experienced (fluency).

Elsewhere, Khatena and Parnes (1974) studied the relationship of creativity to imagery and found the University of Buffalo program of creative studies to increase original image production of course participants. Other studies have

focused on the relationship of creativity and imagery by investigating the facilitatory effects of LSD on creative problem solving (Harman et al., 1966), the transliminal experiences of subjects in hypnotic state (MacKinnon, 1971), the tendency of adolescents and young adults to produce images of unusual visual perspective, and the relationship of aesthetic activities, imagery arousal, and creativity correlates (Leonard & Lindauer, 1973), and verbal originality (Khatena, 1971, 1972, 1975).

Elsewhere, Jensen (1975) purports the great value of metaphorical thought in the problem solving process, and Schaefer (1975) emphasizes the importance of metaphor to the creative thinking process, which is an approach the Synectics group (Synectics, 1968) has applied to stimulate creative writing of children and adolescents. Other investigators have considered the relationship between the flexibility, fluency, and originality of creativity and imagination activities (Pulaski, 1970; Singer, 1973; Torrance, 1962).

A study by Schaefer in 1971 found that creative students spontaneously produced more metaphors, symbolisms, and dialogues in their written stories than a comparable control group. The subjects in his study were 10 female, highly creative, high school seniors and 14 noncreative, female, high school seniors. The subjects were administered Thematic Apperception Test cards and allowed to write stories at

their own pace. Two judges blind to subjects' identity rated the stories, and the creative subjects were found to outperform the noncreative subjects. This would correspond to the flexibility category of "metaphor" in the rating of subjects' written creative imagination images in this present study.

Arnheim (1954), Taylor (1959), and Singer (1966) stress the importance of imagery to creative thinking, and Walkup (1967), among other authors (Benham, 1929; Osborn, 1953; Taylor, 1969), suggest the use of imagery in encouraging creative thought. Helen Durio (1975, p. 237) has commented on relationship of imagery and creativity:

The use of iconic representations in the cognitive formulations of young children before language maturity appears a reasonable explanation of the developmental process. It can be allied to creativity by the very nature of imagery, which is concrete, individualistic, and not bound by a common basis of abstraction; and children do evidence a richness of response unseen in the majority of adults. It also seems logical to assume that adults can recapture this vividness of perception in the form of visual, auditory, and kinesthetic imagery are capable of more imaginative and novel responses. However, the creative adult must also utilize the system of language to transmit his fanciful responses to others. Thus, the creative adult cannot be viewed as a child still tied to iconic representation, or he fails to meet the complete criteria of creativity. Originality of response is a necessary but not sufficient criterion for behavior which is to be labelled as creative.

The theoretical position that imagery is a language system separate from symbolic coding, available to both child and adult, offers perhaps the best perspective from which to consider creative functioning. It allows for the possibility that an adult may make use of vivid

and individualistic imagery in the development of a creative product, and at the same time utilize the generalizations of his society to judge the product's relevancy by a symbolic language which he shares with others. Thus, both iconic and symbolic systems are needed to achieve the highest level of creative functioning.

Relating Durio's comments to hemisphericity research, one might hypothesize that ideally, both imagery and verbal language systems work together to affect the mental operations and problem solving processes of humans. Also, the use of imagery allows more concrete elaboration of the components of a problem than does linguistic coding alone. A visual representation may allow playful shifting of the elements in a problem situation, providing a measure of novelty in the imager's solution process that is not available to the verbalizer (Harman et al., 1966; Kubzansky, 1961; Taylor, 1969; Walkup, 1967). Additionally, the use of figurative language (e.g., metaphor, simile, synecdoche) is suggested by recent studies in psycholinguistics as being indicative of verbal creativity (Gardner et al., 1975; Malgady, 1977).

Auditory, tactile, and kinesthetic imagery have received even less attention than visualizations in the study of creativity. In 1922, Agnew did conduct a study asking musicians, psychologists, children of school age, and college students to rate the first phrase of "America," and found musicians to report the most vivid images and psychologists

the least.

Any degree of theoretical commonality has yet to be verified empirically, but Guilford's Structure-of-Intellect (1959, 1967) at least suggests a model from which one may consider the unique and similar factors of imagery and creativity. From Guilford's matrix, one may surmise that divergent thinkers can use imagery as well as verbal contents in their creative products, and conversely, that figurative content (imagery) can play a role in information processing through the operations of memory, cognition, convergent thinking, and evaluation, as well as to figural constructions of divergent thinking.

<u>Physiological aspects of imagery</u>	Research findings
regarding the physiological processes underlying particular phenomena of imagery are also scant, and the majority of physiological studies of mental imagery are based upon the experiential similarity between imaging and perceiving, thus focusing almost singularly upon the visual modality.	

Barratt (1956) groups the physiological changes studied in visual imagery into three main categories: (a) changes in autonomic functions; (b) changes in bioelectric activity of the brain; and (c) changes in eye movement activity. Related to the changes in autonomic functions, several attempts have been made to describe breathing patterns characteristic of



visual imagery as compared to the imagery aroused in other sensory modalities (Golla & Antonovitch, 1929; Paterson, 1935; Wittkower, 1934). The findings of these studies support the association of visual imagery with a regular rate of breathing, while verbal-auditory imagery is associated with a more irregular rate.

Vladislav Zikmund (1972) comments on the bioelectric activity of the brain during imaging:

The first EEG studies of visual imagery were concerned with the relationship between characteristics of the EEG  $\alpha$  rhythm and general characteristics of imagery ability (Golla, Hutton and Walter, 1943; Short, 1953; Short and Walter, 1954). Simpson, Paivo, and Rogers (1967) and Brown (1968a) reported recently that the EEG recordings of subjects categorized as "nonvisualizers" contain little  $\alpha$  rhythm. Barratt (1956), Mundy-Castle (1957), Stewart, Smith, and MacFarlane (1959), and Slatter (1960) all reported visual imagery as accompanied by more expressed suppression of  $\alpha$  rhythm than the imagery of other sensory modalities, but at the same time emphasized the necessity to take into account other factors which may influence the  $\alpha$  rhythm in EEG (Zikmund, 1972, p. 364).

It would appear that Zikmund's comments would lend support to the idea of stimulating the right hemisphere of the brain to produce alpha rhythms, thus increasing imaging ability.

Much of brain activity involved in the creative imagination concerns imagery or the re-experiencing of images and its language correlates. Eccles (1972) suggests that by association, one image is evocative of other images, and when these images are of beauty and subtlety, and blend in

harmony, as should the music and guided imagery stimuli, and are expressed verbally, pictorially, or musically, as the stimuli will be in this study, creative imagination increases. Eccles (1972, p. 40) further speculates:

The creative brain must first of all possess an adequate number of neurons, having a wealth of synaptic connection between them. It must have, as it were, the structural basis for an immense range of patterns of activity. The synapses of the brain should also have a sensitive tendency to increase their function with usage, so that they may readily form and maintain memory patterns. Such a brain will accumulate an immense wealth of engrams of highly specific character. In addition, this brain possesses a peculiar potency for unresting activity, weaving the spatio-temporal patterns of its engrams in continually novel and interacting forms, the stage is set for the deliverance of a 'brain child' that is sired, as we say, by creative imagination.

### Implications

From the imagery literature, several suggestions for the proposed treatments in this present study are evident. A relaxed atmosphere will be aided by the guided imagery and the hushed seashore sounds. Simultaneous multi-sensory stimulation such as that of the music and guided imagery treatment group will maximize creativity. A balance between controlled and uncontrolled imagery will aid in the most productive thinking.

## METHODOLOGY

The literature examined in the previous chapter has led to a clearer conception of the dominant hemispheric cognitive style of the brain and the relationship of imagery to dominance and to creativity. Thus, a theoretical basis for testing a practical application of the relationships between hemispheric dominance, creativity and imagery was provided.

## Subjects

Subjects in the initial subject pool were 240 undergraduate students enrolled in psychology courses at Iowa State University and participating in the psychology pool during winter quarter, 1981.<sup>1</sup> The total population of the psychology pool numbers 2,000. Students are predominantly from middle to upper middle class homes. Minimal credit was given in the introductory psychology courses for participation. Such credit had either negligible or no effect upon subjects' psychology grades, according to the persons instructing the aforementioned courses.

The initial sample included students for whom English was their first language, and who were willing to cooperate

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<sup>1</sup>Approval of student participation in this research was granted by the Iowa State University Human Subjects Committee November 12, 1980. A copy of the consent form is included in Appendix C.

in this study, had not participated in the pilot study, had signed consent slips (see Appendix D), were present during the days of testing, and on whom dominance, attitude, fluency, flexibility, originality, and quality measures were available. From the initial sample of 240 students, 160 (60 male and 100 female) were selected for this experiment based upon their extreme left or right dominant scores on Your Style of Learning and Thinking (YSOLAT), form A (Torrance et al., 1977).

The subjects ranged in age from 17-28 years, with a mean age of 19.4 years. Their cumulative college GPA ranged from 1.30-4.00, with a mean of 2.79 and a mode of 2.00. Previous creative writing experience as measured by the self-report question on the general questionnaire (see Appendix E) was not significantly different between the treatment groups. It was determined on a scale of one to four, with one indicating no previous creative writing experience and a four a large amount of previous creative writing experience, the mean of the sample was 2.60, with a mode equal to 3.00 and a median of 2.72. ACT composite scores were obtained for 119 subjects who had a mean score of 22.69. The ACT mean was not significantly different between the treatment groups. The ACT language score had a mean of 20.64 and was available on only 47 subjects of the sample. Although such means are

somewhat low for Iowa State University (the ISU mean is 24-25 for Act composites as well as language sections), they are still above the Iowa mean score of 19 for language and composite (Menne, Note 5).

The majority of subjects participating in this study were from the College of Science and Humanities, with 40 being the number of students in the humanities areas and 39 the number in the science areas. Additional breakdowns by college major are in Table 1.

Subjects were categorized with respect to cognitive style differences on the basis of scores on the YSOLAT, form A. Only subjects whose scores on the questionnaire were in the extreme direction of right or left hemisphere dominance were selected for placement in the four experimental groups: M/I, M/NI, NM/I, NM/NI. Half of the subjects selected possessed a right dominant hemispheric cognitive style and half possessed a left dominant hemispheric cognitive style, resulting in 40 subjects per treatment group--20 left dominant style, 20 right dominant style. Thus, of the 240 subjects initially tested, only 160 subjects possessed extreme scores with respect to dominant hemispheric cognitive style. These groups were indeed extreme, since they fulfilled the criteria required under the operational definition of right and left dominant hemispheric cognitive style offered the Introduction. These 160 subjects also possessed

Table 1. College major

College	N
<b>Science and Humanities</b>	
<u>Sciences</u>	39
Biological Chemistry	
Bacteriology	
Botany	
Mathematics	
Pre-Vet. Med.	
Pre-Human Med.	
Zoology	
<u>Humanities</u>	40
Business Administration	
Journalism and Mass Communication	
Political Science	
Psychology	
Sociology	
Speech	
Engineering	27
Design	14
Home Economics	14
Agriculture	9
Education	5
Undeclared	<u>12</u>
<b>TOTAL</b>	160

mean right and left scale scores which were beyond one standard deviation from their corresponding means, as reported in the table of YSOLAT, form A norms for college students and as calculated by this researcher for the .240

Iowa State University undergraduates initially administered the test. One may note that the right and left means for the 240 Iowa State University subjects and the reported YSOLAT, form A means for right and left cognitive styles were identical to within .30 points. This suggests that the two experimental groups in this present study did, in fact, represent extremes of right and left cognitive styles and were, indeed, similar to Torrance's sample from which the reported YSOLAT, form A means were derived.

#### Instrumentation

Since the present study focused upon the right and left dominant cognitive styles, the YSOLAT, form A was selected as a classifying instrument. Treatment presentation was made via four author developed cassette tapes. Also developed by this author were a general self-report questionnaire to ascertain cumulative college GPA, age, college major, sex, previous writing experience, handedness, and attitude toward the writing exercise, as well as an instruction booklet for the evaluation of written creative imagination images.

Your Style of Learning and Thinking (YSOLAT), form A

Scores from this machine scored, multiple choice, self-report instrument permit one to estimate the relative psychological dependence of an individual upon the right or left hemisphere of the brain (dominant hemispheric cognitive style). Each item presents the respondent with three choices: one represents a function (e.g., memory for faces) which has been typically associated with the right hemisphere; a second choice represents a parallel specialized function of the left hemisphere or the lack of a right hemisphere function (e.g., memory for names); the third choice represents the complementary, or integrated functioning of both hemispheres (e.g., equal facility of memory for faces and names). Test-takers are asked to indicate which of the specific functions of learning or thinking best describes their own typical behavior. The questionnaire yields three scores for each subject, revealing the degree to which the subject relies on left, right, or integrated cognitive functioning.

DiVesta, Ingersoll, and Sunshine (1971), in a factor analytic study of self-report questionnaires found that self-report scales were loaded heavily toward social desirability. Persons dependent upon the recognition and approval of others would certainly be susceptible to response bias on this type



of self-report questionnaires. The YSOLAT, form A, may be avoiding some of the problems associated with the social desirability of responses by presenting three options to the respondent, one option (the integrated scale) constituting a mid-range response.

The authors of the YSOLAT, form A, have reported several approaches in attempting to validate their instrument. In some cases, YSOLAT results have been compared to results of performance tests of certain cognitive functions. For example, Kaltounis (Torrance et al., 1978) compared the performance of 130 college students on a test of figural creativity which measures fluency, originality, flexibility and elaboration of subjects' drawings to performance on the right hemisphere scale of the YSOLAT. They did a median split of scores on the right hemisphere scale and found  $t$ -values which were significant at the .001 level. In another study using the same figural creativity test, Torrance (Torrance et al., 1978) used a more detailed scoring procedure for the figural creativity results and did an analysis of variance of the results for three subject groups (Rights, Lefts and Integrateds) who had been classified thus by the YSOLAT. He found Rights to be significantly higher scorers than Lefts and Integrateds in the areas of unusual visual perspective, internal visualization, breaking and extending

boundaries and expression of emotion. This was statistically at the .001 level. The Lefts and Integrateds were not found to be significantly different.

Finally, the authors have reported several studies of performance on imagery ability tests as compared with the YSOLAT. Twenty-eight graduate students, classed on the basis of YSOLAT scores, were rated on their ability to produce images in response to onomatopoeic words. An analysis of variance and Duncan Multiple Range Test showed that subjects classified as Rights had significantly better performance ( $p < .02$ ) than those classed as Lefts or Integrateds. In another study reported by the authors (Torrance et al., 1978), 30 graduate students were given a test requiring them to describe line drawings in either an objective way (according to structural characteristics) or on a feeling-tone basis. Correlations of feeling-tone responses with YSOLAT scores were as follows: Right scale  $r = .71$ ,  $p < .01$ ; Left scale  $r = .34$ ,  $p < .05$ ; and Integrative scale  $r = .63$ ,  $p < .01$ . These same authors reported another study using 147 college students, in which Left and Integrated did not correlate significantly, although the patterns were in the same direction.

All of the above performance test results depicted statistically significant relationships with the right

hemisphere scale of the YSOLAT. This may be because the attributes tested involved imagery, divergent thinking, emotional expression and related right hemisphere types of functions. The authors have done very little testing of performance in so-called left hemisphere functions such as sequential thinking or verbal analysis. Preliminary norms for the YSOLAT, form A, have been established for large groups of undergraduate college students (Torrance et al., 1978). These were used in establishing the subject groups in the present study.

#### Cassette tapes

Four author-developed cassette tapes were used in the treatment presentations. The tapes included a recording of The "Ultimate Seashore" (Syntonic Research, 1970), guided imagery, "The Ultimate Seashore" as background for the guided imagery, and instructions to write a descriptive paper using the seashore as a setting. All cassette tapes included the following directions:

In the next 30 minutes, you are to write a descriptive paper using the seashore as a setting. When you have completed your descriptive theme, please respond to the few questions in the booklet provided for you.

Within this booklet was the YSOLAT, form A (Torrance et al., 1977), the general information questionnaire (see Appendix F), and a request for permission to obtain ACT composite and language scores.

The M/Ni treatment group utilized music from The "Ultimate Seashore" (Syntonic Research, 1970) prior to the aforementioned directions. This recording consists solely of restful sounds of the sea lapping upon the shore.

The NM/I treatment group listened to a cassette tape consisting of the following guided imagery prior to the final common directions:

As you listen to this music, I want you to close your eyes, relax, and imagine yourself at the seashore. (Pause) Find a place where you can see the water and hear the waves as they sweep the shore, where you can feel the sand, the wind, and the sun. (Pause) Immerse yourself in the depth and intensity of the scene. (Pause) Explore your feelings. (Pause) What emotions are surfacing? (Pause) Are you walking? Running? What do you convey by the way in which you are moving? (Pause) Are you alone? What happened just prior to your arrival on the beach? (Pause) What color is the sky? Does it remind you of something else? (Pause) What sounds do you hear? (Pause) Do you see any other people--animals? (Pause) Smell the air. What do you notice? (Pause) Taste the saltiness. (Pause) Feel the sand moving under you. (Pause) What other things do you feel upon your skin? (Pause) Is there a breeze? What are you thinking? (Pause) Slowly open your eyes now, retaining these pictures in your mind.

The NM/Ni treatment group received only the aforementioned directions, and the M/I treatment group received the same guided imagery as the NM/I group and the same music as the M/Ni group. The only difference was that the seashore sounds provided a background for the guided imagery prior to those final common directions.

General information questionnaire

As stated previously, this questionnaire ascertained students' cumulative college GPA, their age, college major, sex, previous writing experience (none, very little, average amount, or very much), handedness, and attitude toward the writing exercise itself. Cumulative college GPA was randomly verified to be accurately reported by subjects when their reported cumulative college GPA was compared with their actual cumulative college GPA (see Appendix F).

Attitudes toward the total imagaic writing exercises were assumed to be overtly expressed through a paper and pencil response to the following question:

Given the following scale, circle the number which represents your attitude toward the writing exercise you just completed.

Very negative	1	2	3	Very positive
0				4

A response of 0 means a very negative attitude. A response of 4 means a very positive attitude. The intermediate responses indicate varying degrees of possessing a positive attitude toward this writing exercise.

Handedness was determined by subjects' response to the following three questions:

Given the following three questions, circle either "Right", "Left", or both "Right" and "Left" to indicate your preference.

With which hand do you write?

Right Left

If thrown a ball, with which hand do  
you catch the ball? Right Left

With which hand do you brush your teeth? Right Left

If a subject responded "right" or "left" to two of the three questions, a corresponding handedness classification was then assigned.

#### Instruction Booklet for the Evaluation of Imagaic Writing

This instrument was devised as an outgrowth of the theories and evaluation systems of Arnheim (1954), Durio (1975), Guilford (1968), Osborn (1953), Pulaski (1970), Schaefer (1971), Singer (1966, 1973), Taylor (1959, 1970), & Torrance (1962), and Torrance & Hudgins (1974), and was used to evaluate written creative imagination images with respect to their fluency, flexibility, originality, and quality. It is Taylor who advocates the use of qualitative as well as quantitative analysis of images, while Pulaski, Singer, and Torrance have focused upon the relationship between fluency, flexibility, and originality of creativity and imagination activities. Arnheim, Durio, Guilford, Osborn, Schaefer, and Singer have all stressed the theoretical importance of divergent thinking and imagery to creativity. The instrument was critiqued by three members of the Iowa State University English faculty for its validity prior to its use in a training session of the three evaluators.

In addition to the definitions of written creative imagination imagery, fluency, flexibility, originality, and quality, identical to those listed in the first chapter, the 13 flexibility categories, scoring sheets, and three sample scored essays were included in the booklet (see Appendix B).

### Procedure

#### Phase I

In October, 1980, the study was pilot tested with students enrolled in Secondary Education 305 classes at Iowa State University. Following revisions based upon the pilot testing, a sample of 240 undergraduate students from the Psychology pool were requested to participate in the study. It was required that the students had not participated in the pilot study and that English was their first language. Students then scheduled a 45 minute time block during which they were randomly assigned to one of the four treatment groups and were administered one of the four treatments via stereo headphones and the cassette tape appropriate to each particular treatment. Following the writing exercise, each student completed Your Style of Learning and Thinking (YSOLAT), form A (Torrance et al., 1977), and the general information questionnaire which ascertained each subject's attitude toward the writing exercise, one's cumulative college GPA, age, previous writing experience, college major, sex,

handedness, and permission to obtain ACT composite and language scores. The scheduling of one time block assisted in the reduction of mortality, and individual testing in separate rooms ensured independence of observations. After completion of all information, the purpose of the study and subjects' reaction to the treatment were discussed with each individual.

### Phase II

The second phase of this study commenced with the analysis of YSOLAT for the 240 who completed the instrument. Only the 160 subjects who scored in the extreme categories of the sample (one standard deviation or more beyond the right or left mean, respectively) were then used in the remainder of the analyses of this study.

Three judges were selected to evaluate the descriptive essays. They were secondary level instructors who had taught writing courses a minimum of three years. After familiarizing themselves with the information contained within the evaluation training booklet, the judges met with this researcher to discuss evaluative criteria and scoring procedures. Three sample essays, previously scored by the researcher were used to assist the explanation. Subsequent to this discussion, all judges independently evaluated three additional unscored sample essays. Each individual image meeting the fluency



criteria was circled. Images were labeled for specific flexibility categories (e.g., sensual imagery, hyperbole, synecdoche, etc.) as designated in the instruction booklet. Originality and quality scores were recorded. Comparison of evaluation scores was made, and discrepancies were discussed. Additional sample essays were evaluated by each judge until agreement of 90 percent or better was achieved on four consecutive essays.

From those students who scored in the extreme categories of hemispheric dominance, the corresponding 160 descriptive essays were separated and the three judges as well as this researcher were provided with typed transcripts. Only spelling and minor grammatical errors (e.g., agreement or verb tense) were corrected, and the transcripts were labeled only as to subject number. Two judges evaluated 64 essays, and one judge evaluated 65 essays. This total number of essays included 11 essays which were evaluated by all three judges as well as this researcher, thus providing a further check for inter-rater reliability.

### Design

For this study, a randomized 2 (music, no music) X 2 (imagery, no imagery) X 2 (right or left dominance) factorial design was used (Campbell & Stanley, 1966). Left and right dominant subjects were exposed to one of four treatment

conditions. The independent variables were music, guided imagery, and hemispheric dominance, and judges. All independent variables were nested within subjects. Presentation of treatments was made via four stereo cassette tapes. The dependent variables, as a response to the four treatments, were the fluency, flexibility, originality, and quality of written creative imagination imagery as measured by a panel of three judges, following the criteria explained under the instrumentation section of this chapter. Attitude toward this particular creative imagination imagery writing exercise was measured by an attitude question ascertained subsequent to treatment and was analyzed separately with a 2x2x2 design (judges were omitted). Subjects in each group were matched with respect to extreme right or left hemispheric dominance. This selection of extremes is supported by Cronbach and Snow (1977), who maintain such a selection intensifies the strength of the treatments being investigated.

Initial analysis consisted of determining inter-rater reliability estimates by determining the average inter-rater correlations between the judges on fluency, flexibility, originality and quality. Inter-rater reliability ranged from 0.60798, for flexibility evaluation, to 0.99923 for fluency evaluations. Originality and quality inter-rater reliability estimates were 0.99241 and 0.99893, respectively. All other raters agreed .98689-1.000.

Among those qualified, the selected judges did constitute a representative sample of secondary composition teachers who had taught creative writing a minimum of three years, thus affording validity to further analysis. Two raters evaluated 64 essays, and one rater evaluated 65 essays. This total number of essays included 11 essays which were evaluated by all three judges as well as this researcher. The average rating for each of those 11 essays on each scale was determined and used in all further analyses. Thus, for all essays, fluency, flexibility, originality, and quality scores were subjected to 2 X 2 X 2 ANOVAs and subsequently to 2 X 2 X 2 ANCOVAs with cumulative college grade point average (GPA) and previous writing experience being covaried.

## ANALYSIS AND DISCUSSION OF RESULTS

The review of the literature encouraged this researcher to suspect that: 1) written creative imagination imagery was a valid construct which could be operationally as well as theoretically defined; and 2) the three experimental treatments encouraged the fluency, flexibility, originality and quality of written creative imagination images.

These propositions were made specific in the hypotheses presented in the first chapter of this dissertation. Data for testing these hypotheses came from three main sources: Your Style of Learning and Thinking (YSOLAT), form A, (Torrance et al., 1977), the general information questionnaire, and judges' scores relating to each essay's fluency, flexibility, originality, and quality.

A total of 160 students comprised the experimental and control groups. Students were included in phase II of the study only if their YSOLAT scores fell in the extreme categories described under Methodology. For no subject were data missing with respect to dominance, treatment group, cumulative college GPA, age, sex, previous writing experience, attitude, college major, handedness, fluency, flexibility, originality, or quality. ACT composite scores were available for 121 subjects, but ACT language scores were recorded for only 47 subjects.

Although inter-rater reliability was very acceptable for those papers common to all judges, to ensure the elimination of any possible rater bias with the remaining scored papers, the ratings were standardized before being combined for any analysis. Such standardization is recommended by Strahan (1980). This ensured that the contributions of raters using different ranges of the same rating scale were given equal weight in the final pooled rating.

Since the hypotheses referring to dominance were relevant to the initial analyses computed on the data, they will be considered prior to the other hypotheses.

1. The left hemisphere dominant subjects in the music/guided imagery, music/no guided imagery, and no music/guided imagery treatment groups will score significantly higher than the left hemispheric dominant subjects in the no music/no guided imagery treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
2. The right hemisphere dominant subjects within each treatment group will score significantly higher than the left hemispheric dominant subjects within each treatment group with respect to fluency, flexibility, originality, quality, and attitude.
3. The right hemispheric dominant subjects in the music/imagery treatment group will score significantly higher than the right hemispheric dominant subjects in all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.

Standardized scores on the essays were tabulated and an analysis of variance was completed on each of the dependent variables (fluency, flexibility, originality, quality, and attitude) to determine the statistical differences between the combined treatment groups. The difference was found to

be significant beyond the  $p < .0001$  level for each analysis of variance relating to treatment effects. With respect to the forementioned dependent variables, dominance was not significant (see Tables 2-6), although the right and left dominant means for fluency, originality, and quality were in the expected direction stated in the first three hypotheses. Treatment had a significant effect upon the mean performance and attitude of the four treatment groups, but dominance had no such effect. Thus, the hypotheses denoting an effect for dominance were rejected.

Table 2. Analysis of variance of standardized fluency scores on the essays of the combined treatment groups

Source	D.F.	Sum of squares	Mean squares	F-ratio	F-Prob.
Treatment	3	2339.150	>79.717	18.369	<0.0001
Dominance	1	40.000	40.000	0.942	0.333
Treatment by Dominance	3	64.950	21.650	.510	0.676
Residual	152	6452.086	42.448		
TOTAL	159	8896.188			

Table 3. Analysis of variance of standardized flexibility scores on the essays of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Treatment	3	169.025	56.342	26.982	<0.001
Dominance	1	0.100	0.100	0.048	0.827
Treatment by Dominance	3	4.250	1.417	0.678	0.567
Residual	152	317.392	2.088		
TOTAL	159	490.767			

Table 4. Analysis of variance of standardized originality scores on the essays of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Treatment	3	1358.431	452.810	19.447	<0.0001
Dominance	1	60.025	60.025	2.578	0.110
Treatment by Dominance	3	31.237	10.412	0.447	0.720
Residual	152	3539.220	23.284		
TOTAL	159	4988.914			

Table 5. Analysis of variance of standardized quality scores on the essays of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Treatment	3	9611.559	3203.853	28.861	<0.0001
Dominance	1	182.756	182.756	1.646	0.201
Treatment by Dominance	3	117.106	39.035	0.352	0.788
Residual	152	16873.711	111.011		
TOTAL	159	26785.133			

Table 6. Analysis of variance of attitude toward the writing exercise of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Treatment	3	61.419	20.473	42.542	<0.0001
Dominance	1	0.056	0.056	0.117	0.733
Treatment by Dominance	3	1.119	0.373	0.775	0.510
Residual	152	73.149	0.481		
TOTAL	159	135.743			

Previous research, as reported in the literature, appeared to support a dominance effect; thus, one must find it necessary to ascertain plausible explanations for the rejection of the hypotheses relating to dominance. True, the use of metaphors is linked to right hemisphere superiority (Galín, 1974; Torrance et al., 1978), but there is also the usual left hemisphere superiority when stimuli are verbal. Perhaps the requirement of a verbal response contaminated the findings relating to dominant hemispheric cognitive style. If some type of manual response, for example, had been required, both hemispheres would have had equal access to the motor system without having to use the corpus callosum as a communication channel (Filbey &



Gazzaniga, as cited in Dimond & Beaumont, 1974). In the case of verbal response, however, direct access to speech output is only from the so-called speech dominant left hemisphere. The right hemisphere is at a disadvantage, as it must operate across the corpus callosum. Thus, in order to control for possible confounding based on differential access to verbal centers, a nonverbal response perhaps should have been used.

Although imagery is basically a parallel cognitive processing system (Paivio, 1971) as described in the second chapter, it is also capable of sequential processing if a response sequence is intrinsic to the imagery (e.g., imaging oneself walking along a familiar shoreline), or if its elements are linked to sequential operations involving the verbal system (e.g., counting the branches of an imaged tree). The overlap and interplay between the two systems may have precluded any rigid dichotomy in the instance of this particular study. If so, the verbal aspect of the guided imagery in the NM/I and M/I treatment groups may have enabled the left hemispheric dominant cognitive style subjects to process their corresponding images sequentially, since the response sequence was intrinsic to the imagery-- thus accounting for the nonsignificant differences between left and right dominant subjects within each of the NM/I

and M/I treatment groups.

Just as too much control can result in an unproductive mental set, Richardson (1969) has noted that uncontrolled imagery might be a hindrance to problem solving by interfering with a consistent line of thought. For the subjects within the NM/NI treatment group, the few directions could have resulted in a situation that was too uncontrolled. Due to this hindrance, both left and right dominant subjects may have depended on the sequential mode of processing. The verbal, analytic cognitive style is most frequently viewed as the efficient form of thinking in our technological society and is thus the most often used. This would offer an explanation for the higher standard scores from the left dominant subjects and the lower standard scores from the right dominant subjects within this NM/NI treatment group. The concept of uncontrolled imaging and a subsequent dependence upon the analytical mode may offer an explanation, also, to the personal observation of this researcher that the subjects within the NM/NI treatment group frequently utilized the entire allotted time frame to complete their essays, while the other three treatment groups did not. At the same time, the essays of the NM/NI treatment group appeared to be much shorter in length than those of the other three treatment groups. Also, during the debriefing sessions, the NM/NI treatment group subjects frequently commented that it was

difficult for them to narrow the topic of their writing.

The results of several EEG studies suggest an improvement of performance on verbal processing tasks when the right hemisphere is drawn into play (Kraft, 1976; Norman, 1977). Perhaps such a situation existed within the M/I, NM/I, and M/NI treatments of this experiment--left hemispheric dominant subjects improved their abilities to utilize written creative imagination images when they were relaxed and fantasizing. Thus, the significant differences between the right and left hemispheric dominant subjects would be lessened. The research of McKim (Note 4) would also support such a conclusion.

One may also suggest that for the particular treatments in this study, YSOLAT, form A, did not sufficiently discriminate between right and left hemispheric dominant cognitive style subjects. Perhaps additional validity studies need to be conducted by researchers other than the instrument's authors. As stated in the third chapter, the authors have done very little testing of performance in left hemisphere functions such as sequential thinking or verbal analysis. This may have contributed to the rejection of the hypotheses relating to an effect based on dominance.

It was originally hypothesized that previous creative writing experience might influence the standardized essay scores and subjects' attitudes even though the treatment groups did

not significantly differ in terms of previous creative writing experience (see Table 7).

Table 7. Analysis of variance of previous creative writing experience of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Between groups	3	0.350	0.117	0.209	0.8902
Within groups	56	87.150	0.559		
TOTAL	159	87.500			

No single category of information collected (previous creative writing experience, cumulative college GPA, age, sex, dominant hemispheric cognitive style, college major, ACT composite, or ACT language scores) was known to serve as a reliable predictor of writing ability. However, previous creative writing experience, cumulative college GPA, ACT composite, and ACT language scores are generally accepted as being positively correlated predictors of performance at academic tasks.

Minor differences among groups with respect to previous creative writing experience could have been extremely influential. If researchers analyze only group differences with respect to the dependent variable, without considering the apparently trivial differences between groups on other measures, they frequently obtain misleading pictures of the true

differences between groups.

The initial differences on any relevant variable which one may wish to covary need not be statistically significant. "It is not sufficient merely to test for significant differences between groups on variables relevant to the dependent variable and, if no significant differences are found, to conclude that the groups are essentially equal" (Popham & Sirotnik, 1973, p. 210).

Such a situation existed with previous creative writing experience, one of the two covariates in this study. The NM/NI treatment group possessed the least amount of previous creative writing experience ( $\bar{x} = 2.5750$ ), on a scale of one to four, and the M/I treatment group possessed the greatest amount of previous experience ( $\bar{x} = 2.7000$ ), with the M/NI and NM/I treatment groups being more equal in previous creative writing experience ( $\bar{x} = 2.6250$ ,  $\bar{x} = 2.6000$ , respectively). The same rank order of treatment groups existed for cumulative college GPA: NM/NI,  $\bar{x} = 2.58$ ; NM/I,  $\bar{x} = 2.77$ ; M/NI,  $\bar{x} = 2.82$ ; M/I,  $\bar{x} = 3.02$ ; although cumulative college GPA was found to be significantly different between the treatment groups (see Table 8). Since the same groups were superior on both cumulative college GPA and previous creative writing experience, these two independent variables were used as covariates. The composite effect of these advantages on the

Table 8. Analysis of variance of cumulative college GPA scores of the combined treatment groups

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Between groups	3	3.830	1.277	3.338	0.0209
Within groups	156	59.659	0.382		
TOTAL	159	63.489			

favored group could have had possible important effects on the results reported in Tables 1-6. Therefore, analysis of covariance was used to detect the possible effects on subjects' standardized fluency, flexibility, originality, quality, and attitude scores. Cumulative college GPA and previous creative writing experience, uncorrelated independent variables, were available on each subject. Since ACT composite scores were not available on all subjects but do correlate significantly ( $p < 0.0001$ ) with cumulative college GPA, the cumulative college GPA was used instead of the ACT composite score as a covariate along with previous creative writing experience. The ACT language score was not used as a covariate since the available number of ACT language scores was too small to permit meaningful interpretation. When analyses of covariance were completed on each of the dependent variables (fluency, flexibility, originality, quality, and attitude), treatment was again found to have a

significant effect while dominance did not (see Tables 9-13). Thus, rejection was reiterated regarding the latter three hypotheses, and additional testing needed to be completed to confirm the area of these significant differences between the treatment groups.

Since significant differences in mean fluency, flexibility, originality, quality, and attitude standard scores continued to exist with the two covariates, cumulative college GPA and previous creative writing experience, Duncan's Multiple Range tests were conducted to compare all possible pairs of group means and thus test hypotheses four through seven:

4. The music/guided imagery treatment group will score significantly higher than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
5. The no music/no guided imagery treatment group will score significantly lower than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude.
6. The music/no guided imagery treatment group will score significantly higher than the no music/no guided imagery treatment group but significantly lower than the music/guided imagery treatment group with respect to fluency, flexibility, originality, quality, and attitude.
7. The no music/guided imagery treatment group will score significantly higher than the no music/no guided imagery treatment group but significantly lower than the music/guided imagery treatment group with respect to fluency, flexibility, originality, quality, and attitude.

Table 9. Analysis of covariance of standardized fluency scores on the essays of the combined treatment groups with previous creative writing experience and cumulative college GPA covaried

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Previous Experience	1	0.037	0.037		
GPA	1	456.361	456.361		
Treatment	3	1990.927	663.642	15.848	<0.0001
Residual	154	6448.797	41.875		
TOTAL	159	8896.188	55.951		

Table 10. Analysis of covariance of standardized flexibility scores on the essays of the combined treatment groups with previous creative writing experience and cumulative college GPA covaried

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Previous Experience	1	0.198	0.198		
GPA	1	72.700	72.700		
Treatment	3	129.590	43.197	23.065	<0.0001
Residual	154	288.419	1.873		
TOTAL	159	490.767	3.087		

Duncan's test was selected due to its extreme power as an a posteriori contrast test. The results of Duncan's tests, significant at the  $p < .05$  level, indicated all treatment groups on all measures differed from one another except for



Table 11. Analysis of covariance of standardized originality scores on the essays of the combined treatment groups with previous creative writing experience and cumulative college GPA covaried

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Previous Experience	1	6.580	6.580		
GPA	1	472.260	472.260		
Treatment	3	1074.487	358.162	16.043	<0.0001
Residual	154	3437.988	22.325		
TOTAL	159	4988.914	31.377		

Table 12. Analysis of covariance of standardized quality scores on the essays of the combined treatment groups with previous creative writing experience and cumulative college GPA covaried

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Previous Experience	1	8.376	8.376		
GPA	1	2663.041	2663.041		
Treatment	3	7833.641	2611.213	24.692	<0.0001
Residual	154	16285.707	105.751		
TOTAL	159	26786.133	168.460		

the M/NI and NM/I treatment groups. Furthermore, the M/I treatment group had the highest mean standardized scores on each measure and treatment group NM/NI the lowest (see Appendix G). Thus, the Duncan's Multiple Range test on the mean fluency, flexibility, originality, quality, and attitude standard scores

Table 13. Analysis of covariance of attitude scores on the essays of the combined treatment groups with previous creative writing experience and cumulative college GPA covaried

Source	D.F.	Sum of squares	Mean square	F-ratio	F-Prob.
Previous Experience	1	4.333	4.333		
GPA	1	8.318	8.318		
Treatment	3	53.045	17.682	39.038	<0.0001
Residual	154	69.751	0.453		
TOTAL	159	135.743	0.854		

for each treatment group supported hypotheses four through seven, relating to treatment effects.

Zikmund's (1972) summary of research on the bioelectric activity of the brain during imaging supports the concept of stimulating the right hemisphere of the brain to increase imaging ability and thus would lend support to these aforementioned results. The more stimuli the right hemisphere received (specifically, the music in addition to the guided imagery), the better the fluency, flexibility, originality, quality, and attitude standard scores. Hence, this provides an explanation for the superiority of the M/I treatment group over the other three treatment groups. Additional research advocating simultaneous sensory stimulation which was supported by this study included that by Khatena (1976), McKim (1978), and Taylor (1959).

The treatment effects also add to the data supporting

the importance of metaphor to creativity (Schaefer, 1975), the importance of imagery to creative thought (Arnheim, 1954; Benham, 1929; Osborn, 1953; Taylor, 1959; Taylor, D., 1969; Singer, 1966; Walkup, 1967), and the use of both iconic and symbolic systems to stimulate creativity (Durio, 1975). Since hypotheses one through four were confirmed, the relationship between fluency, flexibility, and originality to creative thought was strengthened. This would add confirmation to the theories of Pulaski (1970), Singer (1973), and Torrance (1962), which purport such a relationship.

Eccles (1972) suggested that by association, one image is evocative of other images, and when these images blend in harmony, as did the music and guided imagery stimuli, and are expressed verbally, pictorially, or musically, as were the stimuli in this study, creative imagination increases. This appeared to be true, since the latter four hypotheses regarding treatment effects were supported.

Leonard and Lindauer (1973) found a significant positive correlation between participation in aesthetic activities and imagery arousal. This finding appears to be supported with the results of this study, since the M/I, NM/I, and M/NI treatment groups all scored significantly higher than the NM/MI treatment group with respect to fluency, flexibility, originality, quality, and attitude, and the M/I treatment group

scored the highest of all.

Many theorists and researchers (Gowan, 1980; McKim, 1974, Note 4; Osborn, 1953; Rugg, 1963) advocated relaxation and fantasy as being necessary to creativity and imaging. One may hypothesize that relaxation in this study was indeed aided by the soft, steady sounds of the seashore recording and the hushed tones of the guided imagery. This was a factor in the support for the hypotheses relating to treatment effects, but no definite, empirical support for the relaxation criteria can be offered by the findings of this study.

With respect to supplementary findings, significant positive correlations were found to exist between cumulative college GPA, composite ACT scores, and fluency, flexibility, originality, quality, and attitude. General predictors of academic performance appeared also to be predictive of student success in using written creative imagination imagery as well as student positive attitude toward creative writing (see Appendix H).

Pearson correlations were also computed for handedness and previous creative writing experience with fluency, flexibility, originality, quality, attitude, dominance, cumulative college GPA, ACT composite scores, and ACT language scores. No significant correlations were found (levels of

significance ranged from  $p < .07$  to  $p < 1.000$ ) except that between attitude and previous creative writing experience ( $r = 0.1847$ ,  $p \leq 0.019$ ). Thus, a more positive attitude toward this creative writing exercise was associated with a greater amount of prior creative writing experience.

In addition to the aforementioned analyses, a separate analysis of variance test was run on each sex separately and on right and left handed individuals separately, as determined by their responses on the instrument discussed on pages 52-53.

#### Summary

The treatment utilized in this research afforded support for the first four hypotheses. The music/guided imagery treatment group did score significantly higher than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude. The no music/no guided imagery treatment group did score significantly lower than all other treatment groups with respect to fluency, flexibility, originality, quality, and attitude. Also, the music/no guided imagery treatment group did score significantly higher than the no music/no guided imagery treatment group with respect to fluency, flexibility, originality, quality, and attitude. And finally, the no music/guided imagery

treatment group did score significantly higher than the no music/no guided imagery treatment group but significantly lower than the music/guided imagery treatment group with respect to fluency, flexibility, originality, quality and attitude. In terms of dominance, the right hemispheric dominant subjects did not score any differently than the left hemispheric dominant subjects.

## IMPLICATIONS AND RECOMMENDATIONS

The relationship between theory and application is, at times, a tenuous one, even though each construct, to impart the greatest impact, must enhance the other. Research in the curriculum field has largely ignored the relationship of right and left hemispheric dominance to students' writing of creative imagination imagery. Therefore, this study, in an attempt to strengthen the foundation relating hemisphericity theory and application, investigated the degree to which music, guided imagery, and music and guided imagery combined influence the fluency, flexibility, originality, and quality of creative imagination imagery in right and left hemispheric dominant students' writing. Investigated additionally was the degree to which music and guided imagery influence the attitudes of right and left hemispheric dominant individuals toward the writing of creative imagination imagery.

This researcher intended to build upon the formulations of other scholars, to contribute to the theoretical background relating written creative imagination imagery to creativity, and to offer educators additional suggestions regarding the enhancement of human potential, as well as lessen the separation between the theorists and the practitioners in education. In contributing to theory, this study

supported the research denoting uncontrolled imagery as an interference to a consistent line of thought (Richardson, 1969). The relationship between written creative imagination imagery and creativity in terms of fluency, flexibility, originality and quality was given additional confirmation. Data supported stimulation of the right hemisphere to increase imaging ability. Also, in terms of right hemisphere stimulation, simultaneous sensory stimulation would appear to elicit the most positive results with respect to the production of written creative imagination imagery. Additionally, the existence of written creative imagination imagery, itself, was supported. Also, an author-developed instrument to measure the construct was offered.

In terms of fluency, flexibility, originality, quality, and attitude, these dependent variables were greater when the cumulative college GPA and/or the ACT composite scores were higher. One may suggest that general predictors of academic success are also predictors of performance with written creative imagination imagery.

In drawing from these theoretical confirmations to infer practical implications, one may suggest fostering relaxation through the use of music and guided imagery to increase the use of the right hemisphere, as well as the use of the creative imagination. The use of either music or guided



imagery is effective, but the use of both stimuli is recommended for maximal input. The use of music and guided imagery by educators to enhance students' learning how to use their potential for original and vivid communication which lies within themselves, in their creative right hemisphere, is a viable activity. Moderately controlled imaging would be advantageous to that which is uncontrolled.

All of the implications thus far point to the suggestion of improved performance on verbal processing tasks when the right hemisphere is drawn into greater use. As to the positive attitude toward the written creative imagination imagery experience, one may state that the greater the amount of creative writing previously experienced, the more positive one's attitude becomes toward present creative writing experiences. One may also speculate that persons who possess a positive attitude toward creative writing seek those experiences because of their positive attitude toward them. Thus, no definite recommendations may be generated regarding attitude and previous creative writing experience. One may state that creative writing experiences employing music and guided imagery will result in a more positive attitude toward creative writing than experiences using only music, imagery, or neither stimuli. Also, persons experiencing music or imagery will possess a more positive attitude toward creative

writing than persons not experiencing one stimuli or the other.

The findings indicate several areas in need of further empirical research. It would appear beneficial to investigate the use of a nonverbal response to eliminate possible contamination of the findings relating to dominant hemispheric cognitive style. This might reduce over reliance on the verbal left hemisphere.

Secondly, the use of nonverbal guided imagery would be of viable concern to future researchers. Perhaps the guided imagery in this investigation overlapped into a sequential processing system, since the response sequence was intrinsic to the imagery, to a certain extent (e.g., thinking of images in the order dictated by the guided imagery).

Although this research confirmed that an instrument could be designed for identifying fluency, flexibility, originality, and quality in written creative imagination imagery, additional testing of the validity and reliability of the instrument needs to be conducted by other researchers. Determining the originality of an image is a subjective task. Systematic appraisal might be improved through an expansion of the original criteria to require more specific judgments on the part of the readers.

In terms of a discriminating instrument for dominant

hemispheric cognitive style, additional validity studies using Your Style of Learning and Thinking (YSOLAT), form A (Torrance et al., 1977), need to be conducted. Testing the performance of left hemisphere functions subsequent to using the YSOLAT, form A, as a categorizing instrument would also constitute an area in need of further research. The use of another test to discriminate left and right dominant hemispheric groups in a replication of this study would afford additional insights into the differences between these two groups in terms of written creative imagination imagery.

As a final comment, one might challenge the hemispheric dominance construct itself. This research was conducted in a thorough manner on a very adequate size sample, yet a nonsignificant effect for dominance was found. Therefore, this researcher would tend to question the validity of the concept of hemispheric dominance.

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APPENDIX A: YOUR STYLE OF LEARNING AND  
THINKING, FORM A

YOUR STYLE OF LEARNING AND THINKINGForm A

INSTRUCTIONS: On the answer sheet provided, describe your style of learning and thinking by blackening the appropriate blanks. Try to describe your own strengths and preferences as accurately as possible.

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 visual and kinesthetic instructions  
(c) equally responsive to verbal and visual/kinesthetic instructions.
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 cooking, art, athletics, writing, research, teaching, etc.)  
(b) systematic and controlled in experimenting  
(c) equal preference for playful/loose and systematic/controlled ways of experimenting.
5. (a) preference for dealing with one problem or variable at a time  
(b) preference for considering several problems or variables simultaneously  
(c) equal preference for sequential or simultaneous consideration of problems/variables.
6. (a) preference for multiple-choice tests  
(b) preference for open-ended tests which have no single "right" answer  
(c) equal preference for multiple-choice and open-ended tests.
7. (a) good at interpreting body language  
(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 humorous things to say and do  
(b) poor at thinking up humorous things to say and do  
(c) moderately good at thinking up humorous things to say or do
9. (a) preference for kinesthetic stimuli (movement and action)  
(b) preference for auditory, verbal stimuli  
(c) equal preference for kinesthetic and auditory stimuli.
10. (a) objective in obtaining information or making judgments  
(b) subjective in obtaining information and making judgments  
(c) equally objective and subjective in obtaining information and judgments.
11. (a) playful approach in solving problems  
(b) serious, all-business approach to solve problems  
(c) combination of playful and serious approach in solving problems.
12. (a) mentally receptive and responsive to environmental stimuli  
(b) essentially self acting and creative mentally  
(c) equally receptive and self acting mentally.
13. (a) able to improvise freely with whatever is available  
(b) at times able to improvise with whatever is available  
(c) dislike improvising; prefer working with proper materials.
14. (a) like for experiences to be planned, structured  
(b) like to keep things open, fluid, spontaneous  
(c) equal preference for planned and open experiences.
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) equal preference for thinking while lying down and sitting upright.
17. (a) preference for thinking concretely  
(b) preference for abstract thinking  
(c) equal preference for concrete and abstract thinking.
18. (a) highly psychic  
(b) moderately or occasionally psychic  
(c) little or no psychic ability

19. (a) frequently use metaphors and analogies  
(b) occasionally use metaphors and analogies  
(c) rarely use metaphors and analogies.
20. (a) usually get many new insights from analogies  
(b) occasionally get new insights from analogies  
(c) rarely ever get new insights from analogies.
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) grasps best well established, certain information  
(b) grasps best that which is still elusive and uncertain  
(c) equal preference for certain and uncertain truth.
25. (a) preference for critical and analytical reading  
(b) preference for creative, synthesizing reading  
(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) enjoy using symbols in solving problems (algebra, models, etc.)  
(b) dislike of using symbols in solving problems  
(c) neither enjoy nor dislike using symbols in solving problems.
28. (a) preference for solving problems logically  
(b) preference for solving problems experientially  
(c) equal preference for solving problems logically and experientially.
29. (a) skilled in giving verbal explanations  
(b) skilled in showing explanations by movement and action  
(c) equally able to give verbal explanations and explanations by action and movement.

30. (a) preference for teaching by verbal exposition  
(b) preference for teaching by visual presentation  
(c) equal preference for verbal exposition 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 analytical thinking  
(b) preference for synthesizing  
(c) equal preference for analysis and synthesis.
33. (a) enjoyment of talking and writing  
(b) enjoyment of drawing or manipulating objects  
(c) equal enjoyment of 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.



APPENDIX B: INSTRUCTION BOOKLET FOR THE EVALUATION  
OF WRITTEN CREATIVE IMAGINATION IMAGERY

INSTRUCTION BOOKLET FOR THE EVALUATION OF WRITTEN CREATIVE  
IMAGINATION IMAGERY:

Scoring Guide

Creative imagination imagery is defined as the mental pictures conveying a vicarious experience, forming an organized pattern, and measured in relation to their fluency, flexibility, originality, and quality. Written creative imagination images are scored for fluency, flexibility, originality, and quality. In the pages which follow, guides for scoring these four characteristics will be given. Please skim all of the student papers before you begin scoring.

Fluency

Fluency of the written creative imagination images is the number of relevant written images--written images which contribute to the overall mental picture suggested by the paper. Meaningless images are eliminated from consideration in all the scoring. One point is given for each relevant image, and all relevant images are circled.

Before beginning the scoring, it is important that checks be made for these repetitious responses.

Flexibility

The flexibility of the written creative imagination images depends upon the number of different categories into which the student's written images can be classified. The

flexibility categories included hyperbole, irony, metaphor, metonymy, personification, a simile, antithesis, and sustained metaphors, as well as visual, auditory, tactile, gustatory, and olfactory appeal. Subjects will be given one point for each different category into which their written creative imagination images could be classified. Sustained metaphors will be given one bonus point under flexibility, since they are most frequently used by the more creative writer.

### Originality

The originality scale in the instruction booklet measures the imagination and creative strength displayed by a written creative imagination image. The originality scale itself ranges from 0-4, with zero designating unoriginal images and four, very original images. Unoriginal images are those which are frequently used by adults in our society (e.g., clichés). Original images are those which are infrequently used by adults in our society. To compute the final originality score, all of the originality scores are combined and then divided by two. This final dividend is then the subject's final originality score.

For example, for each image you are to complete the following scale, recording on the score sheet the number which

represents your opinion of the originality of this one particular image.

0	1	2	3	4
unoriginal				very original

A response of 0 means an unoriginal image.

A response of 4 means a very original image.

The intermediate responses indicate varying degrees of possessing originality.

When you have completed all of the originality scorings, then add them together and divide by two. This final originality score should then be recorded in the appropriate box at the bottom of the scoring page.

### Quality

The final score computed is the quality score, which is derived by adding the student's scores for fluency, flexibility, and originality, thus making the quality score a composite score which is recorded in the appropriate box on the scoring sheet. This overall quality score is comparable to the overall creativity score in Torrance's (1974) Square's Test of Creative Thinking.

Flexibility Categories: (Thrall et al., 1960)

1. Antithesis: A figure of speech characterized by strongly contrasting words, clauses, sentences, or ideas. A balancing of one term against another for impressiveness and emphasis. An attractive device when used within reason, antithetical expression with some authors becomes a vice. Certain writers make a mannerism of it. Pope, in the Rape of the Lock for example, relies on this figure so frequently that its significance, which lies in the quality of surprise afforded by the sudden contrast, is likely to be lost in the regularity of its recurrence. "Man proposes, God disposes" is an example of antithesis, as is the second line of the following characteristic Pope couplet:

The hungry judges soon the sentence sign,  
And wretches hang that jury-men may dine.

(Thrall et al., 1960, p. 231)

2. Hyperbole: A figure of speech in which conscious exaggeration is used without the intent of literal persuasion. It may be used to heighten effect or it may be used to produce comic effect. Macbeth is using hyperbole in the following lines:

No; this is my hand will rather  
The multitudinous seas incarnadine,  
Making the green one red.

(Include all abstractions under hyperbole)

(Thrall et al., 1960, p. 248)

3. Irony: A figure of speech in which the actual intent is expressed in words which carry the opposite meaning. IRONY is likely to be confused with SARCASM but it differs from SARCASM in that it is usually lighter, less harsh in its wording though in effect probably more cutting because of its indirectness. It bears, too, a close relationship to INNUENDO. The ability to recognize IRONY is one of the surest tests of intelligence and sophistication. Its presence is marked by a sort of grim HUMOR, an "unemotional detachment" on the part of the writer, a coolness in expression at a time

when the writer's emotions are really heated. Characteristically it speaks words of praise to imply blame and words of balm to imply praise, though its inherent critical quality makes the first type much more common than the second. The great effectiveness of IRONY as a literary device is the impression it gives of great restraint. The writer of IRONY has his tongue in his cheek; for this reason IRONY is more easily detected in speech than in writing since the voice can, through its intonation, so easily warn the listener of a double significance. One of the most famous ironic remarks in literature is Job's "No doubt but ye are the people, and wisdom shall die with you." Antony's insistence, in his oration over the dead Caesar, that "Brutus is an honorable man" bears the same ironic imprint. Goldsmith, Jane Austen, Thackeray—these authors have in one novel or another made frequent use of this form; Jonathan Swift is an arch-ironist; his "Modest Proposal" for saving a starving Ireland, by suggesting that the Irish sell their babies to the English landlords, is perhaps the most savagely sustained ironic writing in our literature. The novels of Thomas Hardy and Henry James are elaborate artistic expressions of the ironic spirit, for IRONY applies not only to statement but also to event, SITUATION, and STRUCTURE. In DRAMA, IRONY has a special meaning, referring to knowledge held by the audience but hidden from the relevant actors. In contemporary criticism, IRONY is used to describe a poet's "recognition of incongruities" and his controlled acceptance of them. Among the devices by which IRONY is achieved are UNDERSTATEMENT, and SARCASM. See DRAMATIC IRONY.

(Thrall et al., 1960, p. 249)

4. Metaphor: An implied ANALOGY which imaginatively identifies one object with another and ascribes to the first one or more of the qualities of the second or invests the first with emotional or imaginative qualities associated with the second.

(Thrall et al., 1960, p. 281)

5. Metonymy: A common figure of speech which is characterized by the substitution of a term naming an object closely associated with the word in mind for the word itself. In this way we commonly speak of the king as "the crown," an object closely associated with kingship thus being made to stand for "king." So, too, in the book of Genesis we read, "In the sweat of thy face shalt thou eat bread," a FIGURE OF SPEECH in which "sweat" represents that with which it is closely associated, "hard labor." See HYPALLAGE, SYNECDOCHE.

(Thrall et al., 1960, p. 286)

6. Personification: A figure of speech which endows animals, ideas, abstractions, and inanimate objects with human form, character, or sensibilities; the representing of imaginary creatures or things as having human personalities, intelligence, and emotions; an impersonation in DRAMA of one character or person, whether real or fictitious, by another person. Keat's personification of the Grecian urn as the

Sylvan historian, who canst thus express  
A flowery tale more sweetly than our thyme:

(Thrall et al., 1960, p. 349)

7. Simile: A figure of speech in which a similarity between two objects is directly expressed, as in Milton's

A dungeon horrible, on all sides round,  
As one great furnace flamed;

Here the comparison between the dungeon (Hell) and the great furnace is directly expressed in the as which labels the comparison a simile. Most similes are introduced by as or like. In the illustration above, the similarity between Hell (the dungeon) and the furnace is based on the great heat of the two. So it is generally with this figure of speech: the comparison of two things essentially unlike, on the basis of a resemblance in one aspect, forms a simile. It is, however, no simile to say, "My house is like your house," although, of course,

comparison does exist. Another way of expressing it is to say that in a simile both TENOR and VEHICLE are clearly expressed and are joined by an indicator of resemblance, "like" or "as." See METAPHOR, EPIC SIMILE.

(Thrall et al., 1960, p. 461)

8. Sustained Metaphor: An IMAGE or METAPHOR which runs throughout and determines the form or nature of a literary work. The controlling image of the following poem by Edward Taylor is the making of cloth:

Make me, O Lord, thy Spinning Wheele compleat;  
 Thy Hole Worde my Distaff make for mee.  
 Make mine Affections thy Swift Flyers neate,  
 And make my Soule thy holy Spoole to bee.  
 And Conversation make to be thy Reelee,  
 And reele the yarn thereon spun of thy Wheele.

Make me thy Loom then, knit therein this Twine:  
 And make thy Holy Spirit, Lord, winde quills:  
 Then weave the Web thyselfe. The yarn is fine.  
 Thine Ordinances make by Fulling Mills.  
 Then dy the same in Heavenly Colours Choice,  
 All pinkt with Varnish't Flowers of Paradise.

Then cloath therewith mine Understanding, Will,  
 Affections, Judgment, Conscience, Memory;  
 My Words and Actions, that their shine may fill  
 My wayes with glory and thee glorify.  
 Then mine apparell shall display before yee  
 That I am Cloathed in Holy robes for glory.

The sustained metaphor may approach the extent and form of allegory, which is a form of sustained metaphor in which objects and persons in a narrative, either in prose or verse, are equated with meanings that lie outside the narrative itself. Thus, it represents one thing in the guise of another—an abstraction in that of a concrete IMAGE. The characters are usually PERSONIFICATION of abstract qualities, the action and the setting representative of the relationships among these abstractions. Allegory attempts to evoke a dual interest, one in the events, characters, and setting presented, and the other in the ideas they are intended to convey or the significance they bear. The characters, events, and setting



may be historical, fictitious, or fabulous; the test is that these materials be so employed in a logical organization or pattern that they represent meanings independent of the action described in the surface story. Such meaning may be religious, moral, political, personal, or satiric. Thus, Spenser's *The Faerie Queene* is on one level of chivalric ROMANCE, but it embodies moral, religious, social, and political meanings. Bunyan's *Pilgrim's Progress* describes the efforts of a Christian man to achieve a godly life by triumphing over inner obstacles to his faith, these obstacles being represented by such outward objects as the Slough of Despond and Vanity Fair. In Swift's *Gulliver's Travels* many of man's contemptible attributes are given satiric objective expression through the adventures of a ship's surgeon.

It is important that one distinguish clearly between allegory and SYMBOLISM, which attempts to suggest other levels of meaning without making a structure of ideas a formative influence on the work as it is in allegory.

Among the kinds of allegory, in addition to those suggested above, are PARABLE, FABLE, APOLOGUE, EXEMPLUM, and BEAST EPIC. See also ANAGOGUE.

(Thrall, et al., 1960, p. 281)

- 9-13. Also note the visual, auditory, tactile, gustatory, and olfactory appeals.

A sustained metaphor will receive 15 extra points under "fluency" and one extra point under "flexibility".

Sample Scored Essays

So nice to be by the ocean-- something bigger than me--  
bigger than graduate school-- bigger than all those problems.  
I'm all by myself-- no kids, no voices, no demands, no

questions, no decisions, no choices-- just sand, sand, sand,

2 tactile personification 4 warm uncritical sand, and a visual 3 tufted sky, big and personification 4 whimsical,

and going by on its way to other far places. Sounds are  
just the same visual 2 swirling, washing hyperbole 1 eternal sea-sounds, auditory 1 gull cries

from visual 2 soaring, swooping fragments-of-light creatures reflecting metaphor 4

whiteness, or generating light. (I'm not moving-- just being. Visual 1

just pure observation-- metaphor 4 I am the scenario inside out-- a

reflecting pool, metaphor 4 not altering, not touching up a brushstroke

here-- faulty line there-- I just absorb and am absorbed in hyperbole

return. The breeze is a tactile 2 little warm; it just personification 3 touches

carefully and says "Hum, it's you... Don't mind me, I'll

just personification 2 slip on around you and go personification 3 (hover near those rocks there. sustained image

Nice to see you... Take your time... The beach is free today...

We hyperbole 3 stopped time for awhile."

I've hyperbole 3 joined the air now-- the essence of the salt, the

water, the sand, the sky-- they're all together in some hyperbole 4 fifth

dimensional, cosmic, time-space discontinuity, and I'm there, too.

Somewhere far away, the tactile 4 sand is prickling. I change positions,

close my eyes, and see hyperbole 0 nothing different than when they were

open. Surely the world is suspended, too. There can be no

depersonalization 3 bus fumes, no auditory 3 static on car radios, no visual 1 children ill, visual 1 no one tired

or visual 1 lonely-- surely all this air has personification 2 transformed the other world,

too. These waves will visual 1 chrrn on forever in their joyful communion personification 4

visual 1 hyperbole 0 personification 0 personification 4

with the moon. I can see my soul there, light and laughing,  
 cradled in the waves, frolicking, waving at me, whooping, star-  
 eyes bright with mischief. I wave back and smile.

*hyperbole* <sup>3</sup>  
*visual* <sup>2</sup>  
*personification* <sup>2</sup>  
*metaphor* <sup>4</sup>  
*visual* <sup>4</sup>  
*visual* <sup>4</sup>  
*auditory* <sup>4</sup>  
*metaphor* <sup>4</sup>  
*visual* <sup>3</sup>

Fluency Tally

Flexibility Tally

Originality Scoring

0	1	2	3	4
very unoriginal		neither original nor unoriginal		very original

Individual Image Scores:

41

+15 - sustained image

Categories:

tactile = III

Personification = III IIII

visual = III IIII

hyperbole = III IIII

Auditory = III

Metaphor = IIII

olfactory = I

7 diff. categories + 1 for sustained image.

2	0	1
4	2	2
3	3	2
4	0	2
2	3	2
1	4	2
2	4	2
4	4	2
0	0	2
4	3	2
4	3	2
3	1	2
34	29	30

93

Add the fluency tally marks and record in box "X" below. Final Fluency Score:

56 Box "X"

Add the flexibility tally marks and record in box "Y" below. Final Flexibility Score:

8 Box "Y"

Add the numerical scores for originality, and place that number here 93. Divide the number in box A by two, and record that dividend in box "Z"

46.5 Box "Z"

Quality Score: Add the numbers recorded in boxes X, Y, and Z, and record this sum in box Q.

110.5 Box "Q"

After a <sup>gustatory = 0</sup> delicious meal at Phillip's House, we <sup>visual = 0</sup> walked across the highway to our cottage at Pepper's Seaside Resort. It was hightide. We changed our clothes, <sup>visual</sup> grabbed our beach chairs, and <sup>visual = 0</sup> ran to the beach. Carrying our chairs, we passed three other cottages, and ran onto the sandy beach. The <sup>tactile</sup> sand felt cool on our feet. <sup>2</sup>

We opened our chairs and set them <sup>visual</sup> close to the waterline on the shore, which indicated how high the water had risen.

The six of us relaxed in our chairs and chatted while our <sup>visual</sup> feet rested in the water. <sup>2</sup> As the <sup>visual = 0</sup> tide rolled in, the water would crawl further and further up our legs. <sup>visual</sup> The water's edge kept getting higher and higher. <sup>2</sup>

Suddenly, <sup>visual</sup> one large wave rolled in and climbed over our feet, up our legs, and into our laps. <sup>3</sup> Our towels, which were hanging on the backs of our chairs, also got wet. Quickly, <sup>visual</sup> we jumped and dragged our chairs another five feet away from the shoreline. <sup>2</sup>

c

Scoring Page

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OBSERVATION # \_\_\_\_\_

Fluency Tally

~~||||~~  
|||| 1

Flexibility Tally

Categories:

gustatory = 1

visual = 9

tactile = 1

*3 different categories*

Originality Scoring

0	1	2	3	4
very unoriginal		neither original nor unoriginal		very original

Individual Image Scores:

0  
0  
2  
0  
2  
0  
2  
0  
2  
3  
2

Add the fluency tally marks and record in box "X" below.  
Final Fluency Score:

Box "X"

Add the flexibility tally marks and record in box "Y" below.  
Final Flexibility Score:

Box "Y"

Add the numerical scores for originality, and place that number here . Divide the number in box A by two, and record that dividend in box "Z":

Box "Z"

Quality Score: Add the numbers recorded in boxes X, Y, and Z, and record this sum in box Q.

Box "Q"

The upper New England coastline epitomizes the <sup>visual</sup> energy of the sea. In contrast to the peaceful shoreline of warmer climates, the <sup>visual</sup> unexpected rocks and cliffs at the northeastern United States restate the <sup>personification</sup> rugged independence of the ocean.

As the <sup>visually</sup> expansive sand beaches of the South allow waves to <sup>visual</sup> ease upon the shore, the <sup>visual</sup> abrupt rocks in the North force waves to <sup>visual</sup> surge upon the sand. Each mile of northern coastline contains a different arrangement of rocks, sand, and cliff. That variety, combined with the <sup>visual</sup> abrupt coastline emphasize the <sup>personification</sup> vigor of the ocean.

Fluency Tally

Flexibility Tally

Originality Scoring

### ###

Categories:

Personification = 2  
visual = 7  
auditory 1

0	1	2	3
very unoriginal		neither original nor unoriginal	

Individual Image Sc

1	
1	
2	
3	
1	
1	
1	
2	
1	
<hr/>	
14	

Add the fluency tally marks and record in box "X" below.  
Final Fluency Score:

Box "X"

Add the flexibility tally marks and record in box "Y" below.  
Final Flexibility Score:

Box "Y"

Add the numerical originality, and pl number here . number in box A by record that dividen

Quality Score: Add the numbers recorded in boxes X, Y, and Z, and record this sum in box Q.

B



Fluency Tally

Flexibility Tally

Originality Scoring

### ###

Categories:

Personification = 2  
visual = 7  
auditory 1

0	1	2	3	4
very unoriginal		neither original nor unoriginal		very original

Individual Image Scores:

1  
1  
2  
3  
1  
1  
1  
2  
1  

---

14

fluency tally marks recorded in box "X" below.  
Fluency Score:

Box "X"

Add the flexibility tally marks and record in box "Y" below.

Final Flexibility Score:

Box "Y"

Add the numerical scores for originality, and place that number here . Divide the number in box A by two, and record that dividend in box "Z"

Box "Z"

Score: Add the numbers recorded in boxes X, Y, and Z, and record this sum in box Q.

Box "Q"

**APPENDIX C: HUMAN SUBJECTS APPROVAL OF STUDENT  
PARTICIPATION**

**INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH**  
**IOWA STATE UNIVERSITY**  
 (Please follow the accompanying instructions for completing this form.)

1. Title of project (please type): Hemisphericity and Imagaic Writing  
 121

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

Margaret A. Mahoney 11/3/80 Margaret A. Mahoney  
 Typed Name of Principal Investigator Date Signature of Principal Investigator

Secondary Ed., 8 Quadrangle 294-8907  
 Campus Address Campus Telephone

3. Signatures of others (if any) Date Relationship to Principal Investigator  
[Signature] Nov 3, 1980 Major Professor

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- Medical clearance necessary before subjects can participate
- Samples (blood, tissue, etc.) from subjects
- Administration of substances (foods, drugs, etc.) to subjects
- Physical exercise or conditioning for subjects
- Deception of subjects
- Subjects under 14 years of age and(or)  Subjects 14-17 years of age
- Subjects in institutions
- Research must be approved by another institution or agency



5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- Signed informed consent will be obtained.
- Modified informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted: 12 2 80  
 Anticipated date for last contact with subjects: 1 16 81

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments:

Month Day Year

8. Signature of Head or Chairperson Date Department or Administrative Unit  
[Signature] 11/9/80 Professional Studies

9. Decision of the University Committee on the Use of Human Subjects in Research:  
 Project Approved  Project not approved  No action required  
George G. Karas 11/12/80 G. Karas  
 Name of Committee Chair Date Signature of Committee Chairperson

APPENDIX D: STATEMENT OF INFORMED CONSENT

In this study, you will be asked to write a few paragraphs on a specified topic. Additionally, several brief questions will be posed regarding your age, background, etc. Every effort will be made to keep confidential any data you provide, and you are free to discontinue participation in the project at any time without affecting your Psychology grade.

Any inquiries regarding the procedures or results connected with this study will be most welcomed.

Thank-you for giving so generously of your time! It is greatly appreciated!

Sincerely,

Margaret Mahoney

Your signature of consent to participate: \_\_\_\_\_

Your name, printed: \_\_\_\_\_

APPENDIX E: GENERAL INFORMATION QUESTIONNAIRE

GENERAL INFORMATION QUESTIONNAIRE:  
(Please print your responses)

NAME \_\_\_\_\_  
SOCIAL SECURITY NUMBER: \_\_\_\_\_

CUMULATIVE COLLEGE OF G.P.A.: \_\_\_\_\_

AGE: \_\_\_\_\_

COLLEGE MAJOR: \_\_\_\_\_

SES: MALE FEMALE

PREVIOUS CREATIVE WRITING EXPERIENCE: NONE VERY LITTLE  
AVE. AMOUNT VERY MUCH

GIVEN THE FOLLOWING SCALE, CIRCLE THE NUMBER WHICH REPRESENTS  
YOUR ATTITUDE TOWARD THE WRITING EXERCISE YOU JUST COMPLETED.

very negative					very positive
0	1	2	3	4	

A RESPONSE OF 0 MEANS A VERY NEGATIVE ATTITUDE.  
A RESPONSE OF 4 MEANS A VERY POSITIVE ATTITUDE.  
THE INTERMEDIATE RESPONSES INDICATE VARYING DEGREES OF  
POSSESSING A POSITIVE ATTITUDE TOWARD THIS WRITING EXERCISE.

Given the following three questions, circle either "Right",  
"Left", or both "Right" and "Left" to indicate your preference.

With which hand do you write? Right Left

If throwing a ball, with which hand would you  
catch the ball? Right Left

With which hand do you brush your teeth? Right Left

Do I have your permission to obtain your verbal fluency scores  
from your ACT composite sheet? yes no

YOUR SIGNATURE: \_\_\_\_\_

Thank you again, for your kind participation in this study.  
Your efforts are greatly appreciated!

APPENDIX F: REPORTED AND ACTUAL CUMULATIVE COLLEGE GPA



Reported Cumulative GPA  
through Fall, 1980

2.00  
3.47  
1.87  
2.00  
4.00  
2.40  
2.43  
2.70  
3.80  
2.57  
2.87  
2.80  
3.23  
3.62  
2.60  
3.20  
2.70  
3.68  
2.79  
3.10  
2.00  
3.33  
3.46  
3.36  
2.00  
2.30  
2.22  
3.69  
2.93  
3.77  
3.07  
1.95

Actual Cumulative GPA  
through Fall, 1980

2.00  
3.47  
1.87  
1.95  
4.00  
2.35  
2.43  
2.70  
3.79  
2.57  
2.87  
2.80  
3.23  
3.62  
2.60  
3.14  
2.63  
3.68  
2.79  
3.10  
2.00  
3.00  
3.46  
3.36  
2.00  
2.29  
2.20  
3.63  
2.93  
3.77  
3.07  
1.95

APPENDIX G: DUNCAN'S MULTIPLE RANGE TEST ON THE  
MEAN STANDARDIZED SCORES FOR EACH  
TREATMENT GROUP

Table 14. Duncan's multiple range test on the mean standardized fluency, flexibility, originality and quality scores, and mean attitude scores for each treatment group

	Group 1 M/NI	Group 2 NM/I	Group 3 NM/NI	Group 4 M/I
Group 1 M/NI	-	N.S. <sup>a</sup>	- *	- *
Group 2 NM/I		-	- *	- *
Group 3 NM/NI			-	- *
Group 4 M/I				-

<sup>a</sup>N.S. indicates not significant.

\* Indicates significant difference ( $p \leq .05$ ).

APPENDIX H: PEARSON  $r$  CORRELATIONS BETWEEN GPA AND ACT  
SCORES AND FLUENCY, FLEXIBILITY, ORIGINALITY, QUALITY,  
AND ATTITUDES SCORES

Table 15. Pearson r correlations between cumulative college GPA, composite ACT scores and fluency, flexibility, originality, quality, and attitude scores

	Fluency	Flexibility	Originality	Quality	Attitude
Cumulative College GPA	r=0.2265* p=0.0040*	r=0.3845* p<0.0001*	r=0.3069* p<0.0001*	r=0.3150* p<0.0001*	r=0.2519* p=0.0010*
ACT Composite	r=0.2174* p=0.0170*	r=0.3109* p=0.0010*	r=0.3200* p<0.0001*	r=0.3102* p=0.0010*	r=0.2413* p=0.0080*
ACT language	r=0.1853* p=0.2130	r=0.3405* p=0.0190*	r=0.2828* p=0.0540*	r=0.2853* p=0.0520*	r=0.2413* p=0.0080*

\*Indicates significant difference ( $p \leq .05$ ).