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THE UNIVERSITY OF OKLAHOMA  
GRADUATE COLLEGE

A STUDY OF PERCEPTUAL  
TYPE AND CONTEXTUAL STIMULI

A DISSERTATION  
SUBMITTED TO THE GRADUATE FACULTY  
in partial fulfillment of the requirements for the  
degree of  
DOCTOR OF PHILOSOPHY

BY  
ALAN DALE TODD  
Norman, Oklahoma

1976

A STUDY OF PERCEPTUAL  
TYPE AND CONTEXTUAL STIMULI

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# A STUDY OF PERCEPTUAL TYPE AND CONTEXTUAL STIMULI

## CHAPTER I

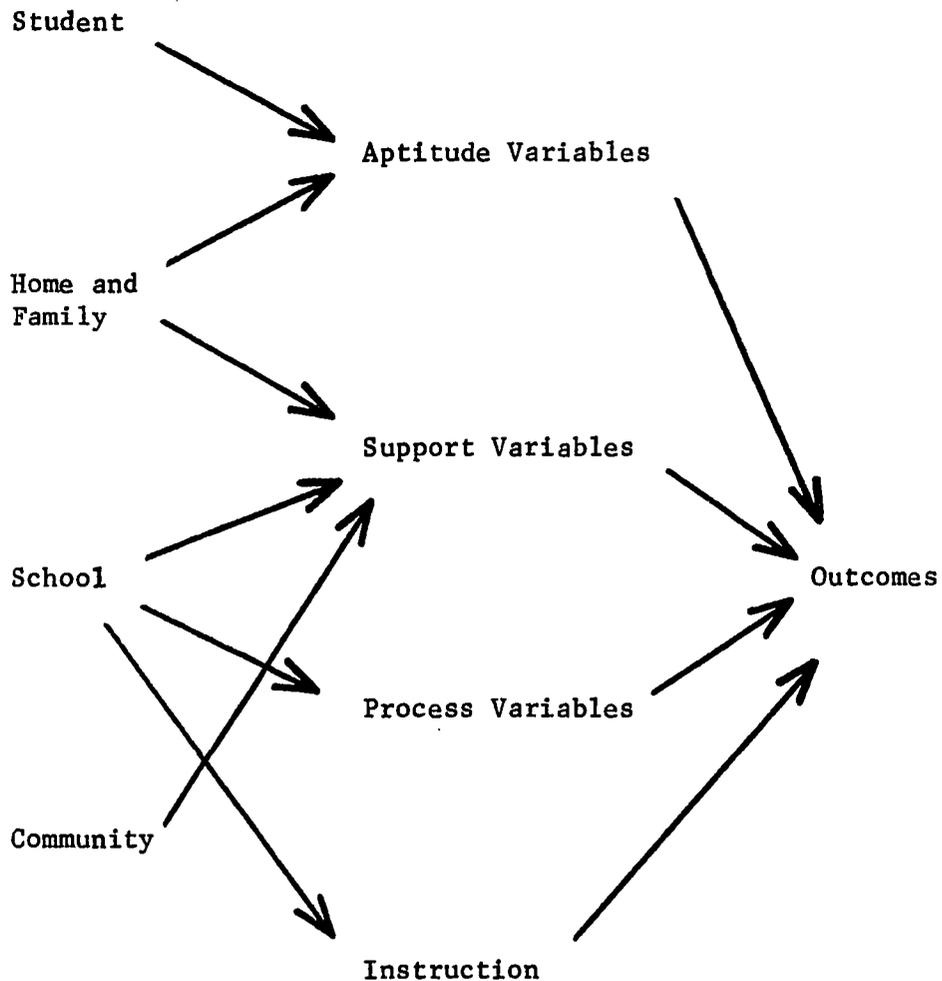
### INTRODUCTION

#### Background of the Study

As a result of the attempts by educators to make the transition in instruction from "art" to "science," increased attention is being given to the instructional variables which affect the educational process. Included in these variables are both learner characteristics and instructional setting characteristics. One of the outcomes of this transition has been the creation of more sophisticated learning environments. Included in the increased complexity created by this sophistication are changes in teachers' attitudes toward learners, a wider variety of materials available to teachers and learners, more flexible equipment available to teachers and learners, and other changes in physical settings.

One of the reasons for the increased sophistication has been the continued development of instructional theories. Such theories attempt to account for as many of the variables which influence instruction as possible. Figure 1 represents an attempt to systematically consider those variables which could influence the instructional process.

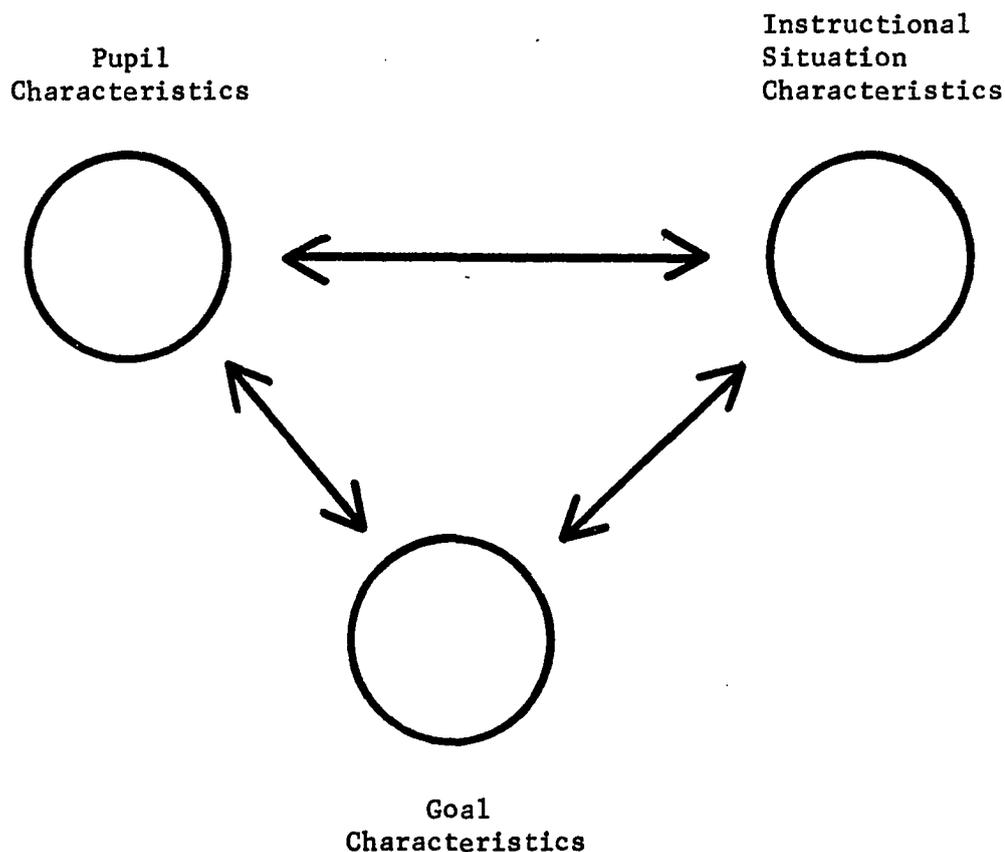
Figure 1. Gagne and Briggs' Variables Influencing the Outcomes of Instructional Programs



Of interest to this researcher are the instructional situation characteristics, pupil characteristics, and the possible interaction of these two sets of variables. The terms instructional situation characteristics and pupil characteristics are the ones used by Gordon (1968) in his criteria for assessing instructional theories. Figure 2 is a pictorial representation of Gordon's model. Gagne and Briggs (1974) refer to these two elements as aptitude variables and process variables in their model (See Figure 1). Although different termino-

logy is used for the two models, the basic concepts are similar. By pupil characteristics or aptitude variables the authors are referring to an individual's cognitive style, and other related variables such as level of intellectual development, self-concept, and academic achievement. By instructional situation characteristics or process variables the authors are referring to instructional settings and other related variables such as management techniques, teaching style, and media.

Figure 2. Gordon's Network of Interrelations for Assessing the Formal Properties of a Theory of Instruction



This researcher will use an individual's perceptual type (Lowenfeld, 1939, 1945) as a dimension of pupil characteristics or aptitude variables, and contextual stimuli (Bevan, 1968) as a dimension of

instructional situation characteristics or process variables.

Lowenfeld (1939, 1945) demonstrated the existence of a typological classification of individuals who vary with respect to their psychological orientation toward sensory perception. His typology classifies individuals as either visual, haptic, or indeterminate. This study will focus on individuals of the visual and haptic perceptual type.

Contextual stimuli or background changes will be utilized to address the problems of instructional situation characteristics or process variables. Research in this area indicates that when a testing environment is different from the learning environment, the student's recall will be hindered (Dulsky, 1935; Abernathy, 1940; Bevan, 1968; Todd, 1976). Studies in this area include research in classroom testing, experimental psychology, and perception. Although these three areas approached the concept of contextual stimuli from different viewpoints, they all found that a change in context has a deleterious effect upon learning.

#### Statement of the Problem

The problem of this research is: Is there a relationship between the effect of contextual stimuli and perceptual type upon learning?

#### Purpose of the Study

The purpose of this study is to answer questions dealing with contextual stimuli, perceptual type, and the possible interaction of these two variables in the instructional process. The concepts expressed by Lowenfeld (1939, 1945) and Bevan (1968) have laid the

foundation for describing some of the characteristics of learners and noting the impact of environmental settings during learning. These two concepts, contextual stimuli and perceptual type, function as elements in the instructional theories previously mentioned.

### Statement of Hypotheses

The research conducted by Lowenfeld (1939, 1945, 1957, 1970) and Bevan (1968) provided the theoretical basis for this study, and led the researcher to the following hypotheses.

H<sub>1</sub> Scores are higher on a teacher made achievement test when subjects are tested in the same location in which the material was presented than when they are tested in a different location, irrespective of an individual's perceptual type.

H<sub>2</sub> Visual subjects obtain higher scores than haptic subjects on a teacher made achievement test, regardless of the testing location.

H<sub>3</sub> There is an ordinal interaction of perceptual type and testing location on scores on a teacher made achievement test, with visual subjects decreasing performance more than haptic subjects.

### Limitations of the Study

Due to the presence of the many extraneous variables (sociological, psychological, etc.) which can affect an individual's performance on an achievement test, the study of instructional processes is difficult to control. The limitations in this study's design which result from these variables have been kept to a minimum, but have not been eliminated.

The limitation of most concern is the sample population. All of the students participating in this study are enrolled in one course in the College of Education at the University of Oklahoma. Due to this, any generalizations beyond the representativeness of this sample must be made with caution.

This study was purposely limited to perceptual type and contextual stimuli as they relate to achievement on a single teacher made achievement test. Perceptual type and contextual stimuli are just two of the variables which have a bearing on student achievement. Every attempt was made to control for and standardize these extraneous variables, (e.g., use of a random number table for selection of subjects, establishment of a time limit for material presentation, and presentation of material to all subjects in the same location), yet due to the nature of these variables, complete control was not accomplished and limitations do exist. Examples of the variables which affect a student's achievement include achievement motivation, intellectual development, and a student's self concept.

Another limitation of this study is the teacher made achievement test itself. Although content validity has been established for this examination, the results obtained from this study will provide information dealing with this examination only. Any generalizations beyond this instrument must be kept to a minimum, and are only appropriate as far as the representativeness of this teacher constructed test is concerned.

A final limitation is that an individual's perceptual type has been measured only with regard to his/her ability to integrate partial impres-

sions into a whole. The utilization of the Successive Perception Test 1 (SPT-1) as a measure of perceptual type is further discussed in Chapter III.

#### Definition of Terms

For the purposes of this study, the following terms are defined.

Perceptual Type - Term used to categorize individuals who possess similar perceptual characteristics.

Visual Perceptual Type - Term used to identify the perceptual type which possesses the ability to view a whole image, break it down into its component parts, then rearrange these parts into a new whole. This type uses vision as the main intermediary with the environment and have the capability to hold these visual images. These individuals will score 60 percent or more items correct on the Successive Perception Test 1.

Haptic Perceptual Type - Term used to identify the perceptual type which uses the body-self, muscular sensations, kinesthetic experiences and touch as the main intermediaries with the environment, and is unable to hold a mental image of the environment. This type individual will score 40 percent or fewer items correct on the Successive Perception Test 1.

Indeterminate Perceptual Type - Term used to identify those individuals who cannot be categorized as either the visual or haptic perceptual type. These individuals possess some characteristics of both the visual and haptic perceptual types.

Contextual Stimuli - Term used to describe the physical characteristics of the stimulus setting. In this study, the term refers to

classrooms used for the presentation and testing situations, and mode of presentation in both situations. Examples include study carrels, group testing situations, and the sound-filmstrip segments used for the presentation of material.

#### Significance of the Study

It is intended that this study aid in informing educators of the importance of these two variables of classroom instruction. Results of this study may suggest that the concept of contextual stimuli is an appropriate variable to consider when dealing with sound-filmstrip presentations, and possibly other forms of expository presentation. In addition, this study may suggest that the interaction between an individual's perceptual type and the contextual stimuli concept may have a greater impact on the visual type than on the haptic type. With approximately 50 percent of the population being of the visual type, this could have a great impact for the user of visual information. Hartman (1961) concluded that multi-channel communication is more effective than single-channel communication in the learning process. The questions should now be raised as to whether this is true of all individuals, and if it is true for learners regardless of the instructional setting.

## CHAPTER II

### THEORETICAL FRAMEWORK

The theoretical framework for this study ~~emerged from two areas:~~ contextual stimuli and perceptual type. These concepts are directly related to the two theoretical approaches to instruction previously mentioned (Figure 1, Figure 2). This chapter addresses these two theoretical foundations.

#### Theoretical Foundation of Contextual Stimuli

The interference theory of forgetting provides an explanation for the poorer recall which results from a change in contextual stimuli. One of the principles of the interference theory is that an association, once learned, is not absolutely forgotten, but temporarily displaced. As a result of this displacement, the learned association is not as accessible to recall. One way to evaluate the learning of an association (A-B) is to present a stimulus, A, and have the student attempt to produce the associated B. Let an altered stimulus, A', be substituted for the original stimulus, A, and the association is weakened (Hilgard and Bower, 1966).

Another possible explanation for this weakened association is the principle of stimulus generalization, which like the interference theory of forgetting predicts that a learned association is less likely to

occur when the initial stimulus is altered than when the initial stimulus is unchanged. As the altered stimulus becomes more dissimilar, either through actual change in the stimulus itself or the stimulus setting, it is even less likely to produce the original association (Hilgard and Bower, 1966).

Travers (1967, p. 325) follows this line of thought when he raises the question of "whether irrelevant cues present during learning should be present in the recall situation if recall is to be facilitated?" Bugelski (1956) had provided a possible answer to this question when he commented that if material presented is to be retained, the stimulus pattern present during learning should also be present during testing. When this belief is applied to instructional processes, this researcher believes that forgetting would be highly correlated with differing stimulus patterns.

Guthrie's (1959) contiguous conditioning learning theory addresses this instructional problem with his revised law of association, which emphasizes the learner's role of scanning and selecting the stimuli to which she/he will attend. This revised law of association states that "what is being noticed becomes the signal for what is being done" (Gibson, 1959, p. 196). Guthrie (1959) goes on to discuss eight assumptions concerning association learning. Two of these relate directly to contextual stimuli. One refers to the physical stimulus pattern being accepted by the observer as a cue, and the other refers to the cueing effect of what is being noticed as a response is elicited.

These three dimensions of educational psychology (the interference theory of forgetting, the principle of stimulus generalization, and

Guthrie's contiguity conditioning learning theory) led this researcher to investigate the possible impact of contextual stimuli in the instructional process.

#### Theoretical Foundation of Perceptual Type

Lowenfeld (1939, 1945, 1970), an art educator, has classified individuals as one of two perceptual types, visual or haptic. These two types should be thought of as ends on a continuum. Each refer to a person's model of perceptual organization and conceptual categorization of the external environment. For Lowenfeld (1957) the term "visual perception" is used when impressions coming from other senses are subordinate to the eyes, and when visual impressions are the dominant feature in the environment. The term "haptic perception" refers to the synthesis between tactile perceptions of the external environment and subjective experiences that are closely bound to experiences of the self.

Lowenfeld (1945) tested 1128 subjects and found 47 percent of the sample to be of the visual type, 23 percent of the sample to be of the haptic type, and 30 percent of the sample to be indeterminate of type. These indeterminates possess some characteristics of both visuals and haptics, but cannot be clearly identified as either type. Lowenfeld (1957) further states that few individuals have equal amounts of both visual and haptic predisposition. The importance of these two antipodes for proper stimulation in creative activity and life in general is stressed by Lowenfeld. He states that the "tendency toward these

two antipodes of experience plays a vital part in life, especially in the proper choice of occupations" (Lowenfeld, 1945, p. 101).

Much of Lowenfeld's (1939, 1945, 1970) work is devoted to describing the characteristics of the two perceptual types. In Lowenfeld's descriptions, one of the major characteristics of the visual type is the ability to approach the environment in an analytical fashion as a spectator who finds experiences in the observation of the constantly changing environment. When observing, the Visual will first see an outline, then fill this in by visual analysis. This person approaches the environment from its appearance and feels as a spectator might. In a word association task, if given the word "mountain," the visual type's response will indicate she/he is seeing the mountain. A typical response would be "high".

The Visual's ability to observe a whole, break it down into its component parts, then synthesize these parts into a new whole is the result of two factors according to Lowenfeld. First, Visuals analyze the characters of shape and structure, and secondly they observe changes due to light, shadow, color, and distance. It should be pointed out that it is not just being able to see an object which separates Visuals from Haptics, but the Visual's aptitude to observe the environment. When presented with tactile or kinesthetic stimuli, the Visual will transform these into visual experiences. Because of this type's dependence upon visual stimuli, if they are in a dark room their first reaction is "how does it look?"

Due to Lowenfeld's (1970) interest in the area of art education, many of his examples of visual characteristics are directly related

to the art field. He points out that a Visual's drawings have correct proportions and measurements. Figure 3 (Appendix C) is an example of the art produced by a visually minded individual.

The term haptic is derived from the Greek haptos, meaning "laying hold of." The appropriateness of this term is seen by the characteristics displayed by the haptic individual. Haptics use their eyes as the main intermediary with the environment only when they are forced to do so, otherwise they are content with the tactile and kinesthetic modes, and react to the environment as a blind person would. Lowenfeld (1945) states that haptic types will not visualize unless they are required to report in visual terms.

The haptic type apparently relies predominantly on nonvisual sensory perception and imagery. Of primary concern to the Haptic are body sensations and subjective experiences. As a result, the experiences haptics have tend to place them in value relationships with the world in general. Since these tactile and kinesthetic impressions are perceived in partial and sequential form, Haptics will only arrive at a synthesis of the environment if they become emotionally involved. Where a Visual will respond to the word "mountain" on a word association task in terms of seeing it, the Haptic will respond as if involved with it. A typical response to this word is "climbing" for a haptic individual.

In art activities, the Haptic's pictures represent subjective experiences, and proportions are related to the emotional value placed on them by the individual. In terms of creativity, the Haptics lack of concern for visual impressions is basic to their art and drawings. This is best exemplified by the haptic's drawing of the human figure.

In drawings involving humans, the haptic uses the human form as the interpreter of his/her own emotions. Figure 4 (Appendix C) is an appropriate example of this phenomenon.

One method of determining whether individuals are of the visual or haptic perceptual type is to evaluate their drawings. "In haptic representations S draw (Sic.) the object in its proportions and view (plain, elevation, or side view) in accordance with his tactile impressions, whereas in visually perceived pictures he draws an objective view which does not change according to its meaning" (Lowenfeld, 1945, p. 104). Figures 5 and 6 are examples of these characteristics.

One interesting phenomenon observed by Lowenfeld (1957) is that there appear to be partially blind as well as completely and congenitally blind individuals who react visually or haptically in the same way as sighted people. Blind individuals are identified as the visual type if they are able to receive from the touch impressions a simultaneous image of the whole. Blind people classified as the haptic type will react to impressions from within themselves. This means their feelings are expressed without regard to realistic external qualities of the stimuli. When discussing the partially sighted, Lowenfeld (1957, p. 462) states that "visual minded partially blind individuals will be blessed by the remnants of sight left to him and the haptic minded individual will be disturbed by it." Figures 7 and 8 (Appendix C) depict the art of blind individuals, and figures 9 and 10 (Appendix C) depict the art of partially sighted individuals.

Figure 5. Representations of Haptically Minded Person

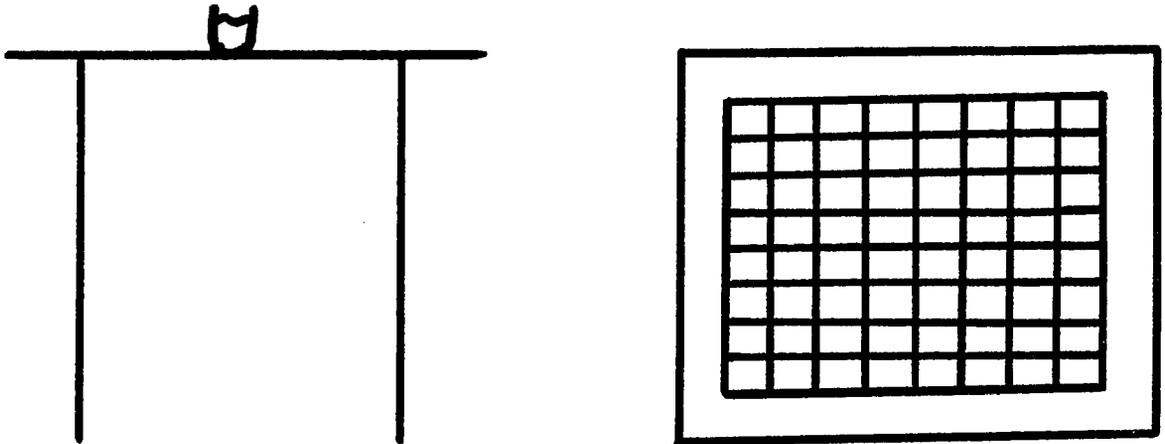
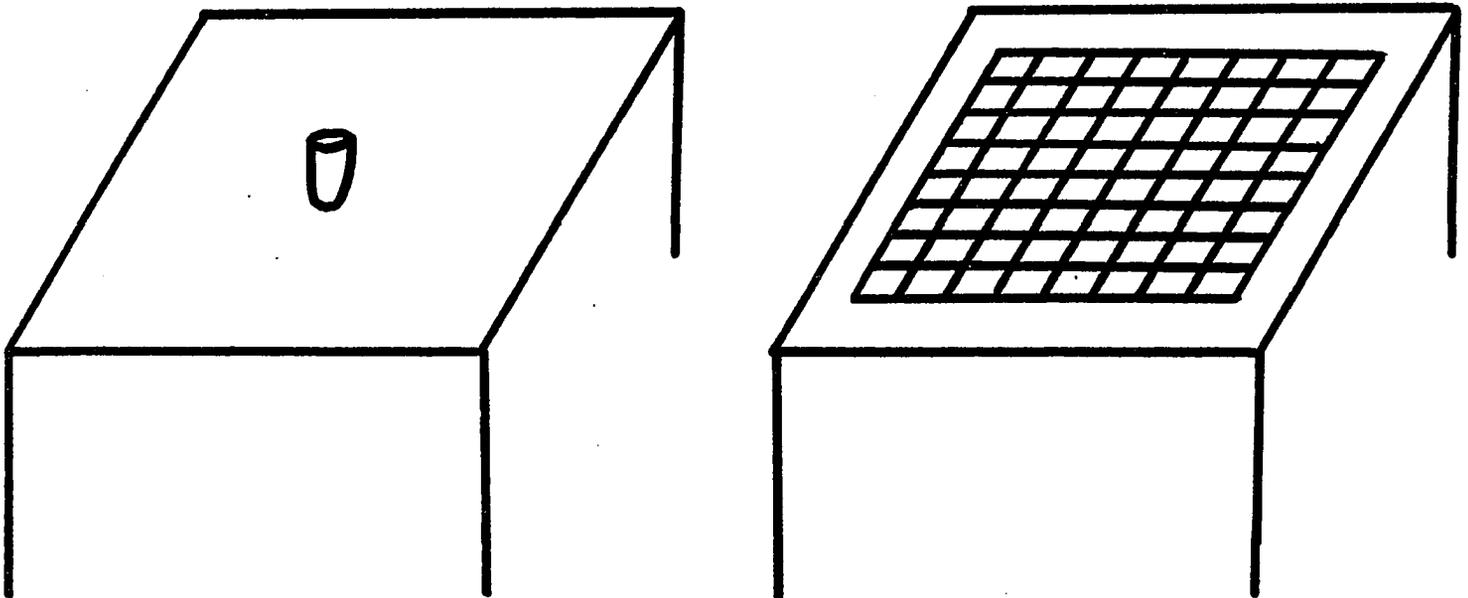


Figure 6. Representations of Visually Minded Person



It should be noted at this point that Lowenfeld never applied empirical tests to follow-up his observations. Thus, Lowenfeld's written statements regarding characteristics of his two perceptual types are not backed up with empirical evidence as to their nature. Lowenfeld's contribution would appear to be that of identification of a typology through instrument development, and in the formulation of hypotheses or assumptions regarding the nature of the perceptual phenomena discovered. However, other researchers have performed studies which, if not explaining the phenomena, do add credibility to their existence and potential significance.

#### Foundation for Hypotheses

From what is known about the concept of contextual stimuli, it can be predicted that a student's achievement will be increased if tested in the same location in which the material is presented. The specific cause of this phenomenon has not been determined, but it is known that alteration of the environment does reduce student achievement as measured by teacher made achievement tests (Dulsky, 1935; Abernathy, 1940; Todd, 1976). It can be posited that the visual field is the most immediately and directly changed, and that this alteration provides the basis for the phenomenon. To put this concept in the form of a researchable question: Does a change in classroom location decrease performance on a teacher made achievement test due to retention of visual images? Of the theories which have evolved to account for this decrease in performance, the adaptation-level theory of contextual stimuli is preferred by this researcher because

of its recognition of two types of contextual stimuli: residuals of past events and ambient background, both of which could hinder the retention of visual images.

When discussing the second dimension of this study, perceptual type, Lowenfeld (1945, p. 232) states that, "75 percent of the population have an appreciable tendency toward one or the other perceptual types, and only few individuals have equal amounts of visual and haptic predisposition." His results indicate that 47 percent of the population are clearly visual, 23 percent of the population are clearly haptic, and 30 percent are not identifiable as either type. From this, it appears that only half the population can receive the full impact of visual stimuli.

Due to the perceptual characteristics of the visual type, it would be expected that the visual student will perform better than the haptic student on an achievement test over material presented via sound-filmstrip lesson segments. Put as a question then: Do visuals perform better than haptics on teacher made achievement tests covering material presented via sound-filmstrip lesson segments?

If these two instructional issues, perceptual type and contextual stimuli, are combined, one might anticipate that while performance of both visuals and haptics will be altered by a change in context, it would be expected that the larger decrease in performance on a teacher made achievement test will occur for the visual type because of their increased retention of mental pictures of the learning environment. Put as a question then: Does an interaction exist between perceptual type and contextual stimuli?

## CHAPTER III

### REVIEW OF SELECTED LITERATURE

This study is concerned with the perceptual type dimension of pupil characteristics and the contextual stimuli dimension of instructional situation characteristics. The literature reviewed here represents that which has a bearing on these two areas. This review is divided into two main sections. One dealing with perceptual type and one dealing with contextual stimuli. The latter of these two dimensions will be reviewed first.

#### Selected Research Related to Contextual Stimuli

The experimental literature in the area of contextual stimuli is limited due to attempts by researchers to try and reproduce the learning situations rather than deliberately introduce changes. Following are selected studies conducted on this topic which are related to the present research.

In studies conducted in the area of classroom testing and the development of associations during the instructional process, Abernathy (1940) found that if contextual stimuli are altered, i.e., a change in room and a change in instructor, recall is poorer. This

study corroborated Dulsky's (1935) findings that a change in background has a detrimental effect upon recall. His interpretation of contextual stimuli is "new environmental conditions." Dulsky (1935, p. 739) drew the following conclusion: "When the materials become associated with the environment during learning, any change of that environment is likely to prove detrimental to recall." More recently, these studies were supported through work by Todd (1976). He also concluded that environmental changes from presentation of material to evaluation of materials had a detrimental effect upon student performance.

In studies conducted in the area of experimental psychology, Bower (1972) discussed contextual stimuli in terms of background and interoceptive stimulation during presentation of the experimental stimuli. Bower refers to this stimulation as the free flow of the "stream of consciousness." He interprets this as the internal monologue as the subject describes to himself/herself what is going on around him/her and comments on this description. He explains the poorer recall that resulted from changed context in his experiment as an alteration of the encoding process. Bower, (1972) concludes that if background context is altered, different encoding operations are at work within our stream of consciousness.

Bilodeau and Schlosberg (1951) conducted studies dealing with retroactive inhibition in which they altered rooms, presentation apparatus, and posture. The results of these studies indicate that the stimulus setting should be given serious consideration when measuring retention.

While reviewing and summarizing his studies conducted in the area of perception, Bevan (1968) discusses experiments which were designed to investigate the influences on behavior that can be attributed to properties of the stimulus setting. The fundamental concern in all of his studies was the role of context in the shaping of behavior. He concludes that perceptual constancy cannot be fully understood without considering context.

Epstein and Park (1963) report perceptual studies using no background (a stimulus presented in a darkened room), backgrounds of varying color, and stimuli presented tilted on the horizontal axis and rotated around the vertical axis. These researchers found that these presentations influenced the perceptual judgment of subjects, and furthermore, they believe that this alteration of judgment is due to the changed context.

Although these areas of research dealt with context for different reasons, they all reported similar results. Whether it be a result of associations developed, encoding, or perceptual judgment, a change in background does have a deleterious effect on learning.

#### Selected Research Related to Perceptual Type

The second main area of concern to this researcher is that of perceptual type. Blankenship (1971, p. 40) defines perception as "the thinking process which gives meaning to a sensation or stimuli; it is the knitting together of nerve impulses into a conscious impression of the external world." In question is the issue of why two individuals having similar background, training, and cultural heritage react differently to the same stimulus. Two opposing views to

account for these differences in behavior are expressed by Hunt (1961) and Lowenfeld (1939, 1945).

Hunt (1961), and others, believe that a person's quality and quantity of environmental transactions determine the quality and style of information processing (Concannon, 1966; Arnheim, 1971). Another view, expressed by Lowenfeld (1939), and others, is that learners can be classified according to their cognitive style (Witkin, 1963; Getzels and Jackson, 1962). Lowenfeld's classification of individuals as either the visual or haptic perceptual type is of particular interest to this researcher due to the increasing number of automated independent study courses being developed, and the possibility of an artificial environment being created by the automated courses. Lowenfeld demonstrated that his visual-haptic classification occurs in individuals who vary with respect to their psychological orientation toward sensory perception.

#### Perceptual Development As It Relates to Age

Several research studies have been conducted in attempts to determine the mode preferred by young children when interacting with the environment. In a study conducted on preschool children, Pick, Pick, and Klein (1967) report that evidence exists which indicates that visual tasks are easier than haptic tasks for these children. These results indicate that visual recognition stimuli are superior to haptic recognition stimuli on a recognition and comparison task involving three and four year old subjects. These results indicate that visual cues are dominant over haptic cues for young children in tasks involving comparison and recognition.

In yet another study utilizing form dominance as the criterion, it was found that visual form dominance comes about earlier and is relatively unaffected by whether the stimuli are planometric (two dimensional) or stereometric (three dimensional) (Siegel and Barber, 1972). These authors concluded that haptic and visual form dominance occur at the same time when stereometric stimuli are used, but that form dominance occurs later for haptic tasks when planometric stimuli are used.

The last study to be discussed dealing with form recognition tasks (Butter and Zung, 1970) indicates that haptic performance is worse than visual performance on bimodal performance tasks throughout kindergarten and college students. It was noted in this study that haptic performance improved gradually between kindergarten and third grade, but that visual performance has stabilized by approximately five and one-half years of age.

Other studies suggest that sensory functioning is the foundation of knowledge (Piaget, 1964; Bruner, 1966). Bruner has identified three steps in the cognitive development sequence. These are:

1. Inactive or tactile/kinesthetic processes
2. Ikonic or visual processes
3. Symbolic or language processes

This suggests that the visual processes displayed by learners are built upon tactile-kinesthetic processes. Most of the research available does not support this observation, however. Gibson (1969) found that visual cues were dominant throughout a learner's development. This is not surprising since the visual system gains more information per unit of time than the haptic system. Jackson's (1973) results indicate that

children with haptic tasks had poorer recollection of shape than children (first, third, and fifth graders) with visual tasks. Her results also show that as age increases, there is an improvement for both types of tasks. One suggested reason for the superiority shown for visual tasks was that the lowered tactile performance may result from the inability of the tactile memory storage to retain information long enough to last through the sequential input demanded in recognizing the stimulus items (Goodnow, 1971).

In a study dealing with haptic selective attention, Lehman (1972) found that even five year olds can focus on the relevant property in a stimulus setting if the property is made clear to them. If these relevant parts are not pointed out, however, selective attention on haptic tasks did not emerge until approximately ten years of age.

One study (Abravanel, 1971) used students with a median age of 18.2 years in an experiment in which they were required to perceive length by means of visual experiences, then form an equivalent length by means of the haptic system. The data obtained indicate that exploratory movement noted at 18 years of age was present at 13 years of age and earlier. After 18 years, there appears to be a leveling off effect of the intersensory process. After this age, improvement is in a consolidation and economical development of perceptual activities.

There are several conclusions which could be drawn from the above studies. Most of the research conducted indicate that there is some perceptual development involved at an early age, but that this development appears to be in the same mode throughout the perceptual process.

Therefore, learners appear to be identifiable at an early age as preferring visual or haptic experiences, and develop within these categories.

#### Perception As It Relates to Developmental Theories

Zaporozhets (1965) reviewed the Russian developmental theories and found that they, like Piagetian developmental theories, involve a copying of the external world by the perceiving organism. These Russian theorists hypothesize that haptic information is more basic to children than visual information. These findings are diametrically opposed to the findings just mentioned which relate to the individual development of perceptual style (Siegel and Vance, 1970; Siegel and Barber, 1972).

It is hypothesized that haptic perception is important early in life; but for its contribution to visual perception, not as a modality in its own right. Studies in this country do not support this notion, however. Butter and Zung (1970) and Millar (1971) report negative results for haptic performance facilitation on recognition tasks. Another possible reason for the Russian's hypothesis is that their studies use stimuli which are less analyzable into component parts than studies in this country. It should be pointed out that the ability to analyze images into component parts is a characteristic of Lowenfeld's (1939, 1945) visual type. This capability may explain, to some extent, the superiority noted for visual cues in the studies carried out in this country.

### Research Supportive of Lowenfeld's Typology

In an encephalographical study, Walter (1963) tested 600 individuals' alpha rhythm patterns. He classified the visualizer as the M Type, the nonvisualizer as the P Type, and the mixed individuals as the R Type. His results indicated that persons with persistent alpha rhythms tend to tactile perceptions rather than visual perceptions. He feels that these alpha rhythm patterns and characteristics are hereditary, which accounts for the continuance of these rhythms even when an attempt to block them with mental effort is made.

In another study dealing with Walter's (1963) classification, Drewes (1958) found that nonvisualizers produce kinesthetic responses to Rorschach samples. These findings support Lowenfeld's (1939) description of haptic characteristics and Walter's (1963) characteristics of the nonvisualizer.

Witkin (1963) classified individuals as either field dependent or field independent. This classification refers to a person's ability to overcome embeddedness and locate a specific two dimensional drawing embedded in another drawing. Rouse (1965) compared this classification with that of Lowenfeld (1939) and found no correlation. Ausburn (L. J., 1975) also studied the relationship between these two typologies, but her results indicate that a relationship does exist between the two typologies. She concludes that field independent individuals analytically approach stimuli and perceive items as discrete from background stimuli, whereas field dependent individuals have a global perceptual view of stimuli and are heavily influenced by the total context. Ausburn's conclusion is from data which suggest that field independence is

correlated with the visual perceptual type and field dependence is correlated with the haptic perceptual type.

Other researchers discuss similar characteristics of perceptual type while using different terminology. Kagan, Moss, and Sigel (1963) found results similar to Lowenfeld's visual-haptic typology in what they termed analytic and non analytic responses. Table 1 is a condensation of other researcher's typologies and the characteristics of their perceptual types (Mendelson, 1969, p. 15).

Table 1. A Comparison of Several Perceptual Typologies.

Witkin	Field Independent analytical, less bound by stimulus	Field Dependent global, less analyti- cal, bound by visual physical field
Lowenfeld	Visual able to analyze and synthesize, transcends media	Haptic works within media bounds
Biettel and Burkhart	Spontaneous analytical	Academic global, bound by stimulus
Getzels and Jackson	High Creative not bound by stimulus, inner- directed	High Intelligence global, bound by stimulus
Guilford	Divergent Thinking limitless solutions	Convergent Thinking narrow search for a single correct answer

Erickson's (1969) research in the area of reading indicates that Lowenfeld's (1939) typology has implications for the instructional

process in areas other than art. In this study, he found that the mean reading level of visuals was significantly greater than that of the indeterminates, and that both visuals and indeterminates were higher than haptics. Erickson also found that slow readers display nonvisual traits while reading (1969). Examples of these traits include: 1) pointing with the finger, 2) reading aloud to oneself, and 3) silently mouthing the words. All of these examples are classified as kinesthetic aids. The visually oriented readers on the other hand, tend to: 1) focus on the middle of the page, and 2) read whole lines, sentences, or phrases. This author concludes that an individual's visual-haptic aptitude is a significant factor in the development of reading skill.

Templeman (1962) found that Haptic elementary children had more trouble learning to read than Visuals. In a study conducted to determine if middle and secondary school students' perceptual aptitude is correlated with achievement scores in selected academic subjects, Bruning (1974, p. 60) states that "students who possess high visual aptitude may be expected to become better achievers in reading and mathematics." This supports research conducted in visual literacy which indicates reading improvement for students engaged in visual literacy activities (Debes, 1973).

From these studies (Erickson, 1969; Templeman, 1962; Bruning, 1974) it appears that Lowenfeld's typology is transferable from art to other areas in education, especially reading.

One method to circumvent the haptic's inability to hold visual images mentally and make mental note of visual cues has been suggested

by Ausburn (F.B., 1975). He suggests the use of multiple imagery, which produces the supplantation effect. Supplantation refers to providing a mental process for a learner who is unable to perform this process for himself/herself. Ausburn's results indicate that the use of multiple imagery aided all learners in a comparison task, but haptics benefited most on a task which required apprehension, retention, and utilization of visual cues. He concluded that the use of multiple image presentations did supplant the mental process of retaining visual images.

#### Research Opposed to Lowenfeld's Perceptual Typology

The concept of perception held by Lowenfeld (1939, 1945) is not agreed upon by all researchers in the field of perception. Arnheim (1971) views perception as a process which cannot be divided into different types or categories. He sees perception as a completely visual process which individuals have developed to differing degrees. This belief supports Kephart's (1960) comments that perceptual (visual) and psychomotor (haptic) skills should not be considered as two separate activities.

Piaget and Inhelder (1956) define haptic perception as the ability to recognize objects without visual stimulation. Their use of the term "haptic," however, usually implies the translation of tactile impressions into visual images. This use of the term is diametrically opposed to Lowenfeld's (1939) definition of the term. Lowenfeld (1939) uses this definition when referring to the visual type. The theory expressed by Piaget relies on the concept of schema. The

development of the elements within the schema are accomplished through assimilation and accommodation. Table 2 is a summary of the stages of perceptual development identified by Piaget and Inhelder (Concannon, 1970, p. 250). It should be noted that Piaget and Inhelder's (1956) research is supported by other educational researchers (Lovell, 1959; Page, 1959; Fisher, 1965).

Zaporozhets (1965) believes that practice and learning influence the development of perception. This supports Concannon's (1970) view that an individual's haptic perceptual abilities can be trained and improved. It is, however, opposed to Piaget's (1956) view that training in perception will not aid in the development of stages of one's thinking. Hunt (1961) supports Zaporozhets' (1965) views on perception when he comments that the quality and quantity of one's environmental transactions determine the style of an individual's information processing.

When discussing information processing, Millar's (1972) research reveals yet another possible source of differences between the visual type and the haptic type. This researcher, as Posner (1967), believes the difference between individuals is a result of individual differences in coding processes.

Still another view was expressed in a study by Chalfant and Scheefelin (1969) which reviewed central processing dysfunctions. In their discussion of visual processing of stimuli they conclude that the processing of such stimuli at higher cortical levels involves:

- 1) visual analysis or the division of wholes into their elements,
- 2) visual integration or the coordination of mental processes, and

Table 2. Piaget and Inhelder's Stages of Perceptual Development

Stage I-A	Tactual exploration relatively passive
Age 2-6 to 3-6	Child recognizes familiar objects but not shapes
Stage I-B	Beginning of abstraction of shape
Age 3-6 to 4-0	Topological shapes recognized
4-0 to 4-6	Beginnings of crude differentiation of rectilinear (square, rectangle) form curvilinear (circle, ellipse) shapes.
Stage II-A	Progressive differentiation of shapes
Age 4-6 to 5-0	according to their angles and dimensions.
Stage II-B	Recognition of more complex forms
Age 5-0 to 6-0	Not always systematic.
Stage III	Methodological exploration.
Age 6 to 7 years and older	Drawings show exact correlation with power of recognition.

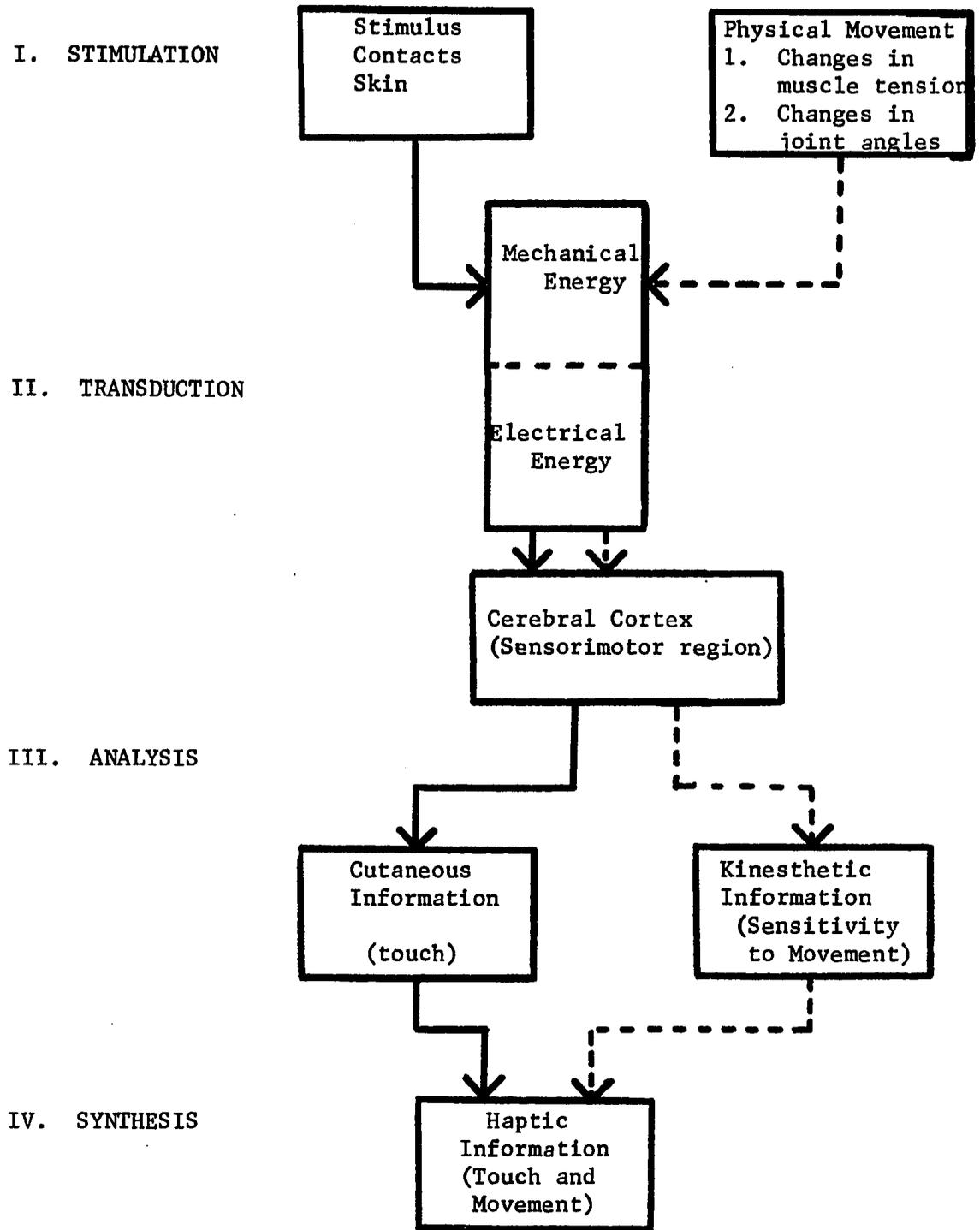
3) visual synthesis or the combination of elements into a new whole. This very closely parallels Lowenfeld's description of the visual perceptual process.

When discussing dysfunctions related to the visual process, two major problems were identified by Chalfant and Scheefelin (1969). The first was weak eye muscles, which hinder the reception of visual stimuli, and the second was the extirpation of the occipital portion of the cortex, which hinders the analysis and synthesis of visual stimuli. This indicates that physical factors contribute to failures in the early stages of perceptual development might possibly be responsible for the differences in perceptual aptitudes. Erickson's (1969) study would lend support to this view.

In Chalfant and Scheefelin's (1969) discussion of the haptic perceptual processes, they state their belief that the haptic system is important in gathering information about object qualities, bodily movements, and the interrelationship of these two information gathering functions. They define haptic perception as "information which is acquired as a result of the central processing and synthesis of cutaneous and kinesthetic information" (Chalfant and Scheefelin, 1969, p. 40). They also report that haptic perception signifies information acquired as a result of the central processing and synthesis of cutaneous (touch) and kinesthetic (body movement) information. These authors identify four phases in the haptic system: stimulation, transduction, analysis, and synthesis (See Figure 11).

A more recent line of research which deals with information processing is that of "cerebral symmetry", or the aptitude and ability of an individual to process information through one or both hemispheres of the brain. Rennels (1976) stresses the importance that educational institutions have put on linear thought processes which are considered the function of the left hemisphere. As a result of this emphasis,

Figure 11. The Haptic System



the right hemisphere, which deals with visual, intuitive, and sensory information, has been neglected.

Rennels (1976, p. 472) lists the functions of the left hemisphere as: verbal, numerical, linear, Euclidean, rational, logical, and geometric information; and the functions of the right hemisphere as: visual, spatial, perceptual, intuitive, imaginative, fantasy, imagery, metaphoric, and sensory information. Keeping in mind Lowenfeld's (1939, 1945) belief that the visually oriented individual functions from an analytical standpoint, this researcher believes a Visual may be better able to cross reference stimuli than a Haptic.

## CHAPTER IV

### METHODOLOGY

This chapter deals with the procedural steps involved in the design of this study.

#### Selection of Subjects

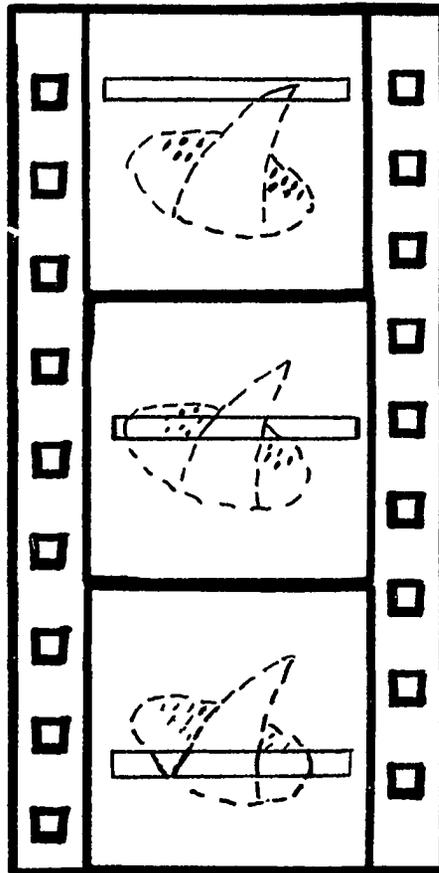
The data for this study were collected during the spring semester of 1976 at the University of Oklahoma. The subjects were students enrolled in Education 4160, Media and Technology in Teaching, a required course in the teacher preparation sequence for Education majors. Of the students enrolled in this course, 152 participated in the Successive Perception Test 1. Of this number, 64 students, 32 identifiable as visual and 32 identifiable as haptic, were selected to participate in the study. The selection was accomplished by use of a random number table. The 32 visual students were then randomly assigned to one of two groups, and the 32 haptic students were also assigned to one of two groups for the actual testing of the hypotheses.

#### Selection of Instruments

The data collection process for this study was conducted in two stages. The first stage required the identification of students as either visual or haptic. To accomplish this, the Successive Percep-

tion Test 1 (SPT-1) (Army Air Corps, 1944) was administered to 152 students. SPT-1 is in motion picture form and was designed by J. J. Gibson in 1944 at the suggestion of Viktor Lowenfeld (Erickson, 1969). This test was created for use in a World War II Aviation Psychology Program and is similar to Lowenfeld's (1945) Integration of Successive Impressions. For the purposes of this study, a videotaped reproduction of SPT-1 was utilized.

Figure 12. Stages in a sample item of Successive Perception Test 1. The dotted lines are hidden lines in an actual test item.

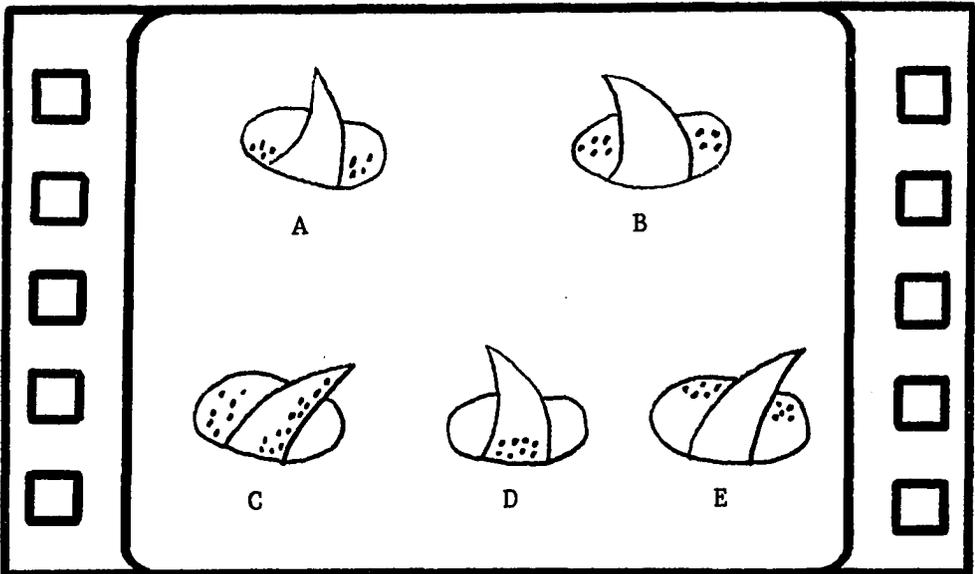


The basis on which this test classifies individuals as either the visual or haptic perceptual type is the Visual's ability to see first a whole without an awareness of details, then to analyze this whole

into partial impressions, and finally to build these partial impressions into a new synthesis of the whole. The haptic perceptual type does not possess this capability, and is content to internalize the separate segments in their partial forms. Ausburn (F. B., 1975) reports a test-retest reliability coefficient for this instrument of .68. Although this instrument was developed for military use, the precedent exists for its use in educational settings (Erickson, 1969; Ausburn, L. J., 1974; Bruning, 1974; Ausburn, F. B., 1975).

SPT-1 consists of 38 items, three of which function as practice items. This instrument uses a moving slot behind which a small portion of a figure is shown (Figure 12). The students are then shown five similar figures from which they are required to match the correct response with the figure already shown in partial form (Figure 13).

Figure 13. The Five Alternative Responses Corresponding to the Sample Item Shown in Figure 12.



Stage two of the data collection process consisted of the administration of the teacher made achievement test (See Appendix B). This test covered Units I and II of Educational Media: An Automated Course (Fulton, Ragan, and Paschall, 1973). Table 3 provides the title and playing time for these units. Content validity for this examination was established by a panel of four experts.

Table 3. Units I and II of Educational Media: An Automated Course

	Title	Playing Time
Unit I	Historical Perspective	17 minutes
Unit II	Educational Basis for the Use of Educational Media	32 minutes

#### Procedures

SPT-1 was administered to the five sections of Education 4160 after the permission of the instructors was obtained. The instructions for SPT-1 are included as a portion of the video tape, which results in all students having identical information regarding the instrument. After the directions were presented and the three examples completed, the video tape was stopped and any questions regarding the administration of the test were answered. With this accomplished, the video tape was started and continued running with no further interruptions throughout the remainder of the test.

Each of the five groups consisted of between 30 to 35 students, which allowed the researcher to arrange the room in such a way that no individual was more than 20 feet from the television monitor.

After all participants had been tested, students were identified as either the visual, indeterminate, or haptic perceptual type. Since

this study deals only with the extremes of the perceptual continuum previously described, those individuals identified as indeterminate were eliminated from further consideration. From the remaining students, visual and haptic, four groups were selected. Two of these groups consisted of visuals and two groups consisted of haptics. Each of the groups contained 16 individuals. The 64 students selected to participate in phase two of the data collection process were chosen by use of a random number table.

Phase two of the data collection process consisted of the presentation and testing of selected material (See Table 3). The students viewed the lesson segments individually in the Independent Study Laboratory in the College of Education. This laboratory consists of 24 study carrels which measure two feet four inches by two feet nine inches, and contain open reel tape recorders and individual filmstrip viewers. Two sides of the carrels are opaque, and headphones are required for the audio portion of the lesson segments. As a result of the automation involved, all students received identical information. In addition, the use of headphones and the fact that two of the carrel's three sides are blocked off, limits the amount of extraneous noise, both visual and verbal, which could distract a student.

The students were allowed up to two hours to view the two units. After all students had viewed the units, they were given the teacher made achievement test previously described.

In order to determine the effect of contextual stimuli on the two perceptual types, different testing locations were utilized. One of the visual groups ( $V_1$ ) and one of the haptic groups ( $H_1$ )

took the examination in the same location as the material was presented in, the Independent Study Laboratory. The other visual group ( $V_2$ ) and the other haptic group ( $H_2$ ) were given the examination in a location unfamiliar to them. A conference room in the Education Building was used for the unfamiliar location.

As can be seen from this description, the term contextual stimuli as used in this study has several variables associated with it. The contextual stimuli alterations in this research include: 1) a change in rooms, 2) a change from individual presentation to group testing, and 3) a change from mode of presentation (sound-filmstrip) to mode of testing (paper and pencil test).

#### Statistical Design and Treatment of the Data

A two by two analysis of variance (ANOVA) was utilized to test the hypotheses. This statistic allowed the researcher to determine whether visuals differ from haptics on the achievement test, whether the four groups differ on the achievement test, and finally if an interaction exists between levels of both factors. Figure 14 is a pictorial presentation of this research paradigm.

The two by two ANOVA will tell the researcher if an interaction exists between the two factors, but it will not identify the nature of the interaction. This will be accomplished by graphing the cell means.

If an interaction occurs, tests for simple main effects (Kirk, 1968) will be utilized. This will allow the researcher to examine differences for each factor at each level of the other factor.

Figure 14. Design of the Study

Factor A  
(Perceptual Type)

		Visual	Haptic
Factor B (Testing Location)	Same	$n_{11}=16$	$n_{21}=16$
	Different	$n_{12}=16$	$n_{22}=16$

## CHAPTER V

## STATISTICAL ANALYSIS OF DATA

A two by two factorial analysis of variance (ANOVA) was utilized to test the hypotheses of this study. This statistic allowed the researcher to test hypotheses one, two, and three simultaneously. The results of this analysis are presented below.

Test of Hypotheses

$H_1$  Scores are higher on a teacher made achievement test when subjects are tested in the same location in which the material was presented than when they are tested in a different location, irrespective of an individual's perceptual type.

$H_2$  Visual subjects obtain higher scores than haptic subjects on a teacher made achievement test, regardless of testing location.

$H_3$  There is an ordinal interaction of perceptual type and testing location on scores on a teacher made achievement test with visual subjects decreasing performance in changed location more than haptic subjects.

The confidence level,  $\alpha$ , adopted for the above hypotheses was .05. This confidence level was used to determine the critical region for this study, i.e., values of the ratio  $MS_A/MS_W$  that will lead this researcher to accept or reject each hypothesis. The values of  $F_A$ ,  $F_B$ , and  $F_{A \times B}$  will have to exceed the critical value,  $\alpha$ , in order to accept  $H_1$ ,  $H_2$ , or  $H_3$ .

The dependent variable utilized to test these hypotheses was the student's raw scores on the teacher made achievement test. Appendix D, Table 4 shows the raw data obtained for the four experimental groups. Table 5 provides the cell means of the raw scores for the four groups.

Table 5. Cell Means for Dependent Variable

		PERCEPTUAL TYPE	
		Visual	Haptic
TESTING LOCATION	Same	$\bar{X}=27.6$	$\bar{X}=22.4$
	Different	$\bar{X}=24.2$	$\bar{X}=19.6$

Figure 15 is a graphic representation of these cell means. This presentation makes the mean score differences between Factor I (perceptual type) and Factor II (testing location) readily apparent. As can be seen, the lines are almost parallel. This indicates a lack of interaction between the two factors.

The analysis of variance showed that these cell differences were significant at or beyond the .01 level of significance (F for Factor I = 18.94, df = 1,60,  $p < .01$ ; F for Factor II = 7.58, df = 1,60,  $p < .01$ ). These results led this researcher to accept hypotheses one and two. Hypothesis three, however, was rejected. The interaction of the two factors (F = .08, df = 1,60,  $p > .05$ ) was not significant.

Table 6 is a summary of the two by two ANOVA. As a result of the lack of interaction, tests for simple main effects were not performed.

When utilizing a 2 x 2 factorial ANOVA, there are four possible sources of variation: Factor A, factor B, the interaction of factors A and B, and the combination of levels of factors A and B or the within cells variance. Due to this fact, four mean squares (MS) are computed. These MS's are obtained by dividing the sums of squares (SS) for each source of variation by their corresponding degrees of freedom. The fact that the MS and SS were equal in Table 6 is explained by this formula.

The levels of significance obtained for  $H_1$  and  $H_2$  deserve mention. The probability of rejecting the hypothesis when it should be accepted was between .01 and .001. These high significance levels suggest strong support for these two hypotheses.  $H_3$ , however, would appear to be erroneous. With a probability level larger than .25, it appears that no interaction between factor A and factor B exists. This indicates that the effect is the same for the two levels of the two independent variables on the dependent variable.

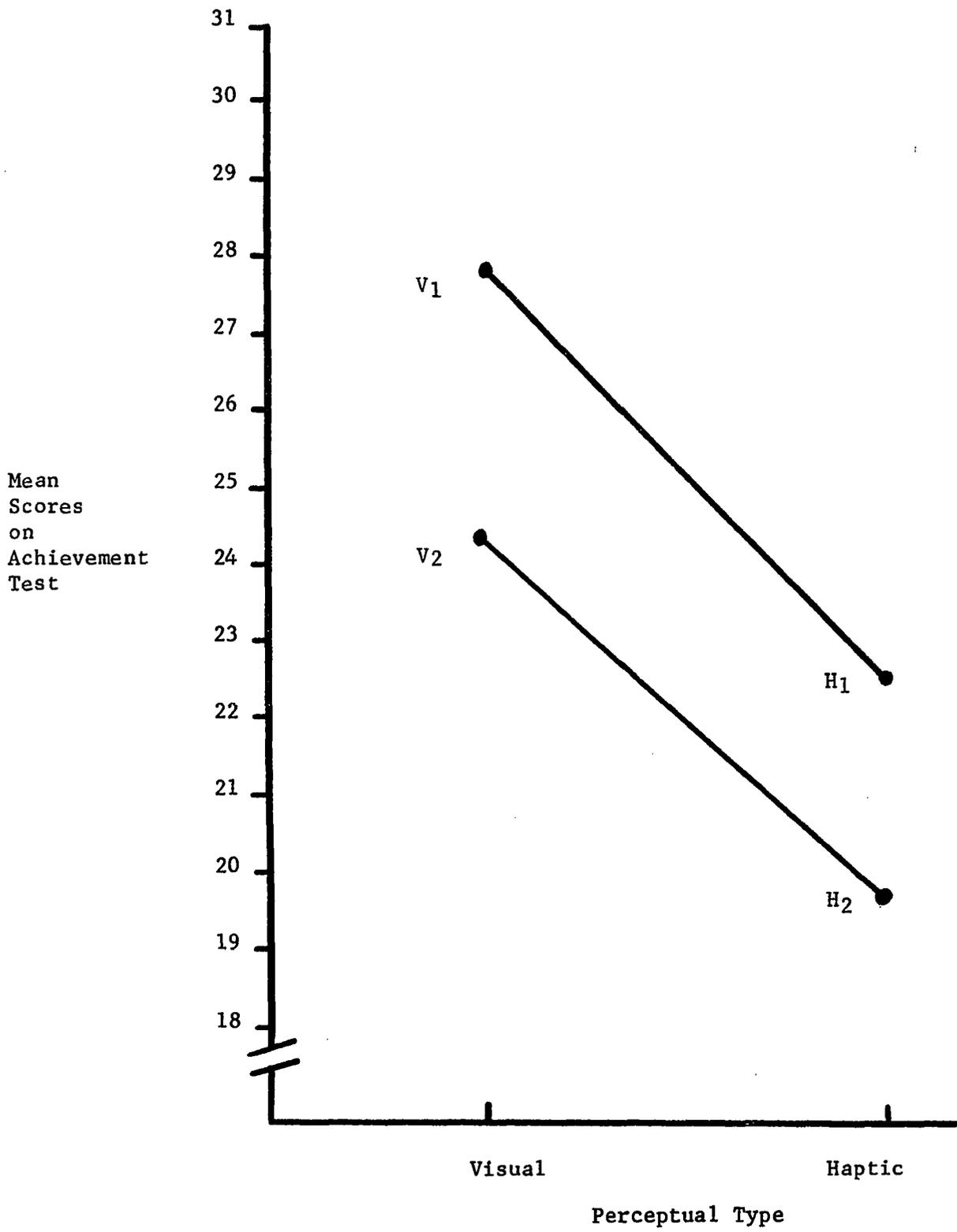
Table 6. Analysis of Variance of Score Varied by  
Perceptual Type and Testing Location

SOURCE	DF	SS	MS	F
Perceptual Type	1	390.06	390.06	*18.94
Testing Location	1	156.25	156.25	* 7.58
Type x Location	1	1.56	1.56	** .08
Within Replicates	60	1235.86	20.60	
TOTAL	63	1738.75		

\*  $p < .01, > .001$

\*\*  $p > .25$

Figure 15. Graph of Cell Means



## CHAPTER VI

## DISCUSSION

Summary

The research reported here was undertaken to answer questions dealing with contextual stimuli, perceptual type, and the possible interaction of these two variables. As with other aptitude-by-treatment interaction (ATI) studies, a treatment variable was varied in conjunction with an individual difference variable. In this study the treatment variable was the location for presentation and evaluation of material. The individual difference variable was a person's perceptual type as identified by the Successive Perception Test 1 (Army Air Corps, 1944).

Previous research dealing with contextual stimuli had not taken into account the possible impact of automated independent study materials presented via sound-filmstrip lesson segments. Would this type presentation aid in the control of extraneous variables (e.g., noise, visual distractions, etc.) or increase the differences between locations (e.g., from independent study to group testing, from automated presentation to paper and pencil test, etc.)? In addition, the question of whether the visual type or haptic type would score higher when evaluated on material presented via sound-filmstrip had

never been addressed. This study attempted to answer both these questions, in addition to determining if an interaction existed between these two dimensions of the instructional process.

The design for this study was the completely randomized factorial design (Kirk, 1968), and a two-by-two factorial analysis of variance was the statistic utilized to analyze the results. Students enrolled in Education 4160, Media and Technology in Teaching, were administered the Successive Perception Test 1. This test identified an individual as either the visual perceptual type or the haptic perceptual type. Of these students, 64 were selected to participate in this study, 32 identifiable as the visual perceptual type and 32 identifiable as the haptic perceptual type. Subsequent placement of subjects was accomplished by the use of a random number table. The 32 visuals were then randomly assigned to one of two groups and the 32 haptics were also assigned to one of two groups. This resulted in four groups.

Next, these 64 students were presented information via sound-filmstrip lesson segments. The students viewed and listened to the information in independent study carrels. After the material had been presented to all participating students, a teacher made achievement test was administered to the four groups. To determine the effect of contextual stimuli on the two perceptual types, visual and haptic, different testing locations were utilized. One of the visual groups ( $V_1$ ) and one of the haptic groups ( $H_1$ ) took the examination in the same location in which the material was presented, the Independent Study Laboratory. The other visual group ( $V_2$ ) and the other haptic group ( $H_2$ ) were given the examination in a location unfamiliar to them.

The following findings were obtained through the tests of hypotheses one, two, and three:

1. Group mean scores on the teacher made achievement test were higher for those groups tested in the same location in which the material was presented ( $p < .01$ ). This led the researcher to accept hypothesis one.

2. Group mean scores on the teacher made achievement test were higher for the two groups comprised of the students identified as the visual perceptual type ( $p < .01$ ). This led the researcher to accept hypothesis two.

3. There was no apparent interaction between an individual's perceptual type and the location in which the teacher made achievement test was presented. This led the researcher to reject hypothesis three.

### Conclusions and Implications

Several conclusions can be drawn from this research; however, caution should be exercised when making any generalizations due to the limitations present in this study.

The results of the earlier studies and analysis of the present data provide the basis for this researcher's belief that locational contextual stimuli have an important impact on scores made by college students on teacher made achievement tests. At the college level material is often presented in one setting while testing is administered in another setting. With this change in location from presentation of material to testing of material resulting in poorer recall, the adap-

tation-level theory of contextual stimuli appears to be supported. It is this researcher's belief that concern for the effect of contextual stimuli will become more prominent with the increased usage of individualized automated instruction.

If through individualized instructional methods educators produce situations similar to the environment in which the learner must inevitably function, it appears that meaningful transfer may result. If, however, artificial environments are produced with little or no resemblance to the world in which the learner will be required to function, these individualized and self-paced methodologies may be working against instructional purposes.

Certain training programs already attempt to make the training situation simulate the environment in which material learned must be applied. The military has used simulators to train pilots for several decades. In as many respects as possible, these simulators are exact duplicates of actual airplanes and are capable of producing similar sensory stimuli. Drivers' training courses often use generalized simulators for students; these produce an environment close to that in which the student will have to function. Also, scale models of tankers and barges are used for training officers for duty in the Navy and Coast Guard.

What can educators do to simulate the environment in which a prospective teacher will have to function? Aside from the logical answer of increasing the amount of time prospective teachers spend in the field, the advanced technology available at present may possibly hold a portion of the answer. As more programs are developed that

incorporate individualized, self-paced instruction, educators must strive for programs which simulate environmental conditions as close as possible to actual classrooms.

The researcher also believes that the concept of perceptual type should be given careful consideration when designing automated instructional programs. The present results indicate that the visual type may be better able to deal with sound-filmstrip, and possibly other visually oriented presentations, than the haptic perceptual type. This would lend support to Walter's (1966) belief that the Visual is better able to retain mental images of the environment. Given this concept, it would appear that the designer of instructional programs will be better able to identify his/her target population, in addition to planning for more effective and efficient instructional sequences.

Examples of methods a designer of automated instructional materials might utilize in his/her approach to the design of lesson segments include:

1. Sequences designed specifically for individuals of the visual perceptual type. These sequences would relate directly to the Visual's aptitude to observe and approach the environment in an analytical fashion.

2. Sequences designed specifically for individuals of the haptic perceptual type. These sequences would relate directly to the Haptic's dependence upon subjective experiences and value relationships.

It must be pointed out at this time that there was no interaction between the contextual stimuli component and the perceptual type component of this study. To address the lack of interaction which led

this researcher to reject hypothesis three, it would appear that the designer of automated instructional programs has one less variable to consider. With the two dimensions having no greater impact on the visual type than the haptic type, the user of visual information has more freedom in the design of his/her instructional programs.

The lack of interaction could be a result of one or several factors. Among the factors considered, this researcher believes the lack of interaction was a result of the Visual's ability to retain mental pictures of the learning situation. Instead of the negative influence this was thought to produce, a positive influence appears to have been the result. If this positive influence was not of a large magnitude, the lack of interaction could have been the result.

#### Suggestions for Further Research

As with most research, this study has raised more questions than it has answered. As a result of this study, the researcher had identified several areas of interest. The following questions are raised as suggestions for further research:

1. Would the findings of the present study remain the same if the study was replicated using students selected from a broader population? Studies related to this question would include age differences, sex differences, racial differences, and cultural differences.

2. Would the findings of the present study remain the same if a standardized achievement test was used in lieu of the teacher made achievement test? This study might answer questions related to the limitations of teacher made achievement tests.

3. Would a factor analysis using several perceptual typologies provide useful information related to individual perceptual types? Studies related to this question might answer questions related to typological similarities and could take into account several levels of the different typologies.

4. If approximately 50 percent of the population are of the visual perceptual type; is this enough to influence the results of the research conducted which dealt with perceptual development? Studies related to this question might explain the emergence of visual form dominance at an early age.

5. If the mode of presentation and testing is held constant, does a contextual stimuli difference still exist? This question relates to differences in presentation and testing modalities, and their possible impact on student performance on teacher made achievement tests.

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**APPENDIX A**

NAME \_\_\_\_\_

## ANSWER SHEET I

Circle the letter of the correct answer. ANSWER ALL ITEMS!!

- |               |               |
|---------------|---------------|
| 1. A B C D E  | 20. A B C D E |
| 2. A B C D E  | 21. A B C D E |
| 3. A B C D E  | 22. A B C D E |
| 4. A B C D E  | 23. A B C D E |
| 5. A B C D E  | 24. A B C D E |
| 6. A B C D E  | 25. A B C D E |
| 7. A B C D E  | 26. A B C D E |
| 8. A B C D E  | 27. A B C D E |
| 9. A B C D E  | 28. A B C D E |
| 10. A B C D E | 29. A B C D E |
| 11. A B C D E | 30. A B C D E |
| 12. A B C D E | 31. A B C D E |
| 13. A B C D E | 32. A B C D E |
| 14. A B C D E | 33. A B C D E |
| 15. A B C D E | 34. A B C D E |
| 16. A B C D E | 35. A B C D E |
| 17. A B C D E | 36. A B C D E |
| 18. A B C D E | 37. A B C D E |
| 19. A B C D E | 38. A B C D E |

**APPENDIX B**

**INSTRUCTIONS:** Select the single best response for multiple choice questions and fill in blanks or make lists as requested. Answer all questions from information provided by units 1 and 2.

1. Memorization and drill is most characteristic of which of the following learning theories? 1. mental discipline 2. associationistic 3. experimental 4. Gestalt
2. What practice or practices implies a scientific approach to instruction? 1. Exploration 2. problem identification 3. problem solving 4. all of the above
3. Which part of the communication model is most closely associated with encoding messages? 1. sender 2. channel 3. noise 4. none of these
4. When the receiver gives the sender an indication of the success of the communication, this response is called: 1. symbols 2. channels 3. reinforcement 4. feedback
5. If the word "seahorse" causes a child to visualize a horse, he is experiencing: 1. daydreaming 2. feedback 3. referent confusion 4. imperception
6. Which of Piaget's learning stages is characterized by individuals who are able to visualize highly abstract concepts? 1. pre-operational 2. post-operational 3. formal operational 4. concrete operational
7. Two of the primary channels of communication are: 1. Hearing and Touching 2. Hearing and Tasting 3. Hearing and Vision 4. Vision and Touching
8. Of the following curriculum approaches, which one is most closely related to the "association" theory of learning? 1. Core curriculum 2. The Carnegie System 3. Fusion of subjects 4. Experience-centered
9. Which part of the communication model is most closely associated with the process of decoding messages? 1. sender 2. channel 3. receiver 4. none of these
10. "The sender can then give approval or corrections." This is called: 1. symbols 2. channels 3. reinforcement 4. noise
11. Which of Piaget's learning stages is characterized by individuals who can understand observed processes yet lack ability to understand the same processes when related through more abstract symbols? 1. pre-operational 2. concrete operational 3. formal operational 4. post-formal operational

12. Which historical event was most responsible for creating an interest in research and development of instructional aids? 1. World War I 2. World War II 3. The 1929 depression 4. Modular scheduling
13. The historical event primarily responsible for the establishment of the National Defense Education Act in 1958 was: 1. Korean War 2. The economic recession of the 1950's 3. Placement of Sputnik in orbit 4. Nuclear training
14. A post-war technological development that originated from military instructional practices was: 1. the diorama 2. sound filmstrips 3. electronic language laboratories 4. the educational museum
15. A modern instructional device which has evolved and greatly improved in the years since World War II is the: 1. Model 2. 16mm film projector 3. graph 4. overhead projector
16. What format made it possible for mass education to reach much larger groups of students? 1. chalkboard 2. hornbook 3. textbooks 4. two or more families using the same tutor simultaneously
17. Which time period can be considered as the infancy of audio visual instruction? 1. 1860-1900 2. 1880-1920 3. 1900-1940 4. 1920-1960
18. The first films used in education were adaptations of films used for other purposes. List three of these purposes. 1. \_\_\_\_\_  
2. \_\_\_\_\_ 3. \_\_\_\_\_
19. Which company is almost solely responsible for the introduction of the filmstrip as a teaching tool? 1. Kodak 2. Society for Visual Education, Inc. 3. Bell & Howell Associates 4. Educational Systems Unlimited
20. List the three domains of human learning. 1. \_\_\_\_\_  
2. \_\_\_\_\_ 3. \_\_\_\_\_
21. The most significant audio visual materials produced during World War II were used to teach: 1. pilots to read instruments 2. naval officers to navigate 3. clerks to type 4. foreign language
22. Meaningful concepts are more likely to occur if \_\_\_\_\_  
and \_\_\_\_\_ are properly manipulated.
23. The process described in question 22 is referred to as the \_\_\_\_\_  
\_\_\_\_\_ of learning.
24. List the three essential prerequisites of the education process described in the two questions above. 1. \_\_\_\_\_  
2. \_\_\_\_\_ 3. \_\_\_\_\_

25. A teachers concern today is to provide needed experiences for students. These experiences are a blend of which elements? 1. content, media and method 2. content, method, and showmanship 3. content and media 4. content and method
26. Written words only have meaning in terms of a student's \_\_\_\_\_
27. The distracting factors in the communication model used are referred to as: 1. sender 2. decoding 3. noise 4. none of these
28. Media materials are useful: 1. all of the time 2. when they provide necessary information 3. approximately 40 percent of the time 4. approximately 70 percent of the time
29. The first professional organizations for the use of audio visual materials were formed: 1. prior to World War II 2. during World War II 3. after World War II 4. during the last 13 years
30. The inventor of the flexible film base was: 1. James Polaroid 2. Arnold Arnsperger 3. George Eastman 4. Frederick Kodak

**APPENDIX C**

Figure 3. "A Scene at the Police Station," drawn by a visually minded adolescent. Correct proportions, lights, shadows, and three dimensional quality are important to the artist (Lowenfeld, 1970, p. 241).



Figure 4. "A Scene at the Police Station," drawn by a haptically minded adolescent. The elements of this composition are determined subjectively; proportions, lights, and space are of emotional importance (Lowenfeld, 1970, p. 241).



Figure 7. "Pain," sculpture by a sixteen year old blind boy who is haptically minded. All features remain isolated as partial impressions (Lowenfeld, 1970, p. 329).



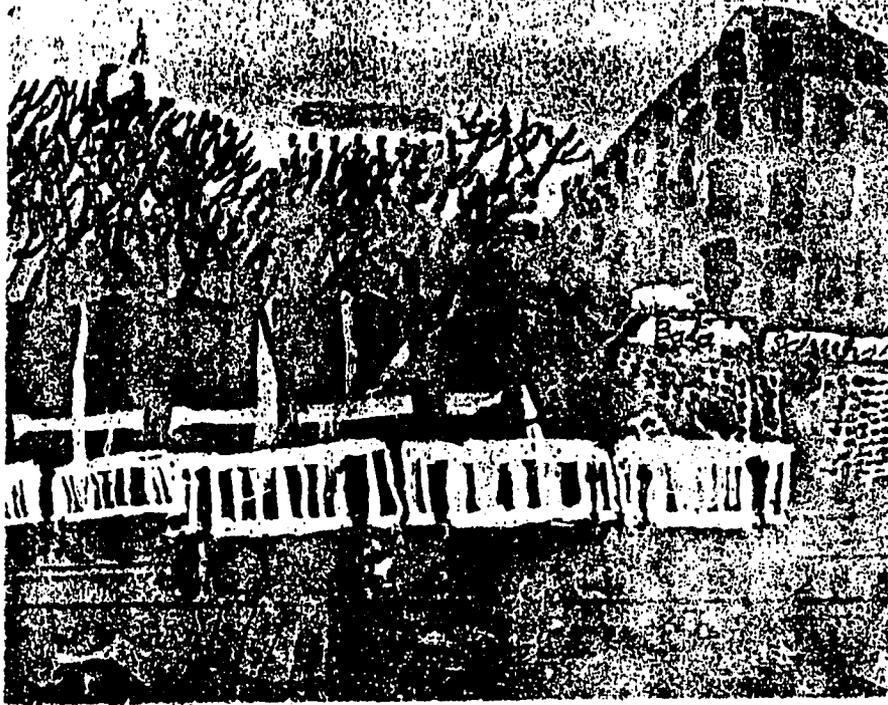
Figure 8. "Pain," sculpture by a sixteen year old blind girl who is visually minded. All features are incorporated into a unified surface (Lowenfeld, 1970, p. 237).



Figure 9. "The Cry for Help," painted by a sixteen year old partially blind youth haptically minded (Lowenfeld, 1957, p. 371).



Figure 10. "Street Scene," painted by a fourteen year old partially blind youth visually minded (Lowenfeld, 1957, p. 370).



**APPENDIX D**

Table 4. Raw Scores on Teacher Made Achievement Test

		PERCEPTUAL TYPE	
		Visual	Haptic
TESTING LOCATION	Same	30	15
		24	19
		23	19
		29	16
		24	17
		29	15
		29	26
		32	22
		32	28
		25	27
		30	22
		26	28
		28	24
		24	25
		30	20
27	35		
	Differ-ent	14	24
		20	15
		16	21
		20	15
		30	20
		23	27
		29	22
		27	18
		33	21
		27	23
		27	21
		30	18
		22	23
		22	15
		23	15
24	15		