A STUDY OF THE RELATIONSHIP OF TWO EXTREME PERCEPTUAL TYPES, THE VISUAL AND THE HAPTIC, WITH LEARNING A NOVEL GROSS MOTOR SKILL FOR FOURTH AND FIFTH GRADE ELEMENTARY SCHOOL STUDENTS

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CHAPTER I

INTRODUCTION

Large minorities of students are believed to be extreme perceptual types who are unable to perceive adequately through modalities other than their dominant sense systems or their perception seem to be modified to conform to the dominant system.[1] The senses of vision and touch, termed visual perception and haptic perception respectively, have been identified as dominant systems for many individuals.[2]

Visual perception is defined by Gibson[3] as the imput of images to an individual through the eye. Lowenfeld[4] indicated that an extremely visual-minded person is one who

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[1]Viktor Lowenfeld and W. Lambert Brittain, Creative and Mental Growth (New York: The Macmillian Co., 1964), p. 261.

[2]Ibid.

[3]James Gibson, "The Senses Considered as Perceptual Systems," (Boston: Houghton-Mifflin Company, 1966), p. 154-155.

[4]Viktor Lowenfeld, "Test for Visual and Haptic Aptitudes," American Journal of Psychology, LVIII (1945), pp. 100-111.

is entirely lost in the dark and depends solely upon his visual experiences of the outside world. Rock and Victor[1] believe that the impression one perceives is dominated by what one sees. Through visual perception an individual receives an impression of what an object is as well as where an object is. Fleishman and Rich[2] noted that in learning motor skills the visually oriented individual tended to have an advantage over others in the early stages of learning.

The haptic individual is primarily concerned with his own body sensations and the subjective experiences in which he feels emotionally involved.[3] Lowenfeld[4] stated that an extremely haptic type of individual is a normal-sighted person who uses his eyes only when compelled to do so. Gibson[5] noted that haptic perception can be obtained through actual touch, through sensations of the skeletal system, or

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[1]Irvin Rock and Jack Victor, "Vision and Touch: An Experimentally Created Conflict Between the Two Senses," Science, 143 (March, 1964), pp. 594-596.

[2]E. A. Fleishmann and Simon Rich, "Role of Kinesthetic Spatial-Visual Abilities in Perceptual-Motor Learning," Journal of Experimental Psychology, Vol. LXVI, No. 1 (July, 1963), p. 7.

[3]Gibson, p. 155.

[4]Lowenfeld, p. 262.

[5]Gibson, p. 154.

subjective feelings. Kinesthesia is considered a part of haptic perception and is believed to be a major factor in human movement, therefore, it would be important in motor learning.

Statement of the Problem

The present investigation entailed a study of the relationship of two extreme perceptual types, the visual and the haptic, as measured by the Visual Retention Test and the Quick Response Test, with learning a novel gross motor skill. The novel gross motor skill entailed using the paddleball apparatus. The subjects tested included the fourth and fifth grade students at North Euless Elementary School in Euless, Texas, during the academic year of 1970-1971.

Rationale for the Study

It has been hypothesized that many teachers tend to modulate their instruction to an "average" student. However, there may be large minorities of students that are extreme perceptual types who are unable to perceive sufficiently through modalities other than their dominant sense system. If extreme perceptual types can be identified, it would

follow that there is a need to determine if learning, and specifically motor skill learning, is favored by a perceptual type and/or if specific teaching methods are desirable for such types for the elementary school age child. The present study attempts to identify extreme visual and haptic perceptual types and determine if a significant relationship exists between such types and motor skill learning on a novel task.

Definition and/or Explanation of Terms

For the purpose of clarification, the following definition and/or terms have been established for use in this study.

Visual Type: This perceptual type is identified as a person who depends completely or primarily upon his visual experiences of the outside world.[1]

Haptic Type: A haptic individual is a normal-sighted person who is dependent upon touch and kinesthesis; using his eyes only when compelled to do so.[2]

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[1]Lowenfeld, p. 258.

[2]Ibid.

Novel: This term has been defined by Barnhart as follows: "of a new kind or nature; strange; new . . ."[1] In the present study, the novel gross motor skill referred to will be performance with the paddle ball apparatus.

Visual Retention Test: This test consisted of two slides with neutral connotations shown to the subjects for five seconds apiece. The subjects then list what they saw and the test is scored by the number of visualizable nouns written by the subject, divided by the number of words written. The procedure followed was used by Green.[2]

Quick Response Test: This test was developed by Flick[3] and involves the use of fifty words that are read aloud at ten second intervals. The subjects write down their original response to each word. The test is scored on the basis of the number of visualizable nouns written down by the subject.

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[1]Clarence L. Barnhart (ed.), Thorndike-Barnhart Comprehensive Desk Dictionary (New York: Doubleday and Company, Inc., 1958), p. 537.

[2]E. Ruth Green, "A Study of Two Perceptual Types, Haptic and Visual in Relation to Dance Movement," (unpublished study College of Health, Physical Education and Recreation, Texas Woman's University, February, 1969).

[3]Paul Flick, "An Intercorrelative Study of Two Creative Types: The Visual and the Haptic Type," (unpublished Doctoral dissertation, the Pennsylvania State University, 1960).

Paddle Ball Apparatus: The equipment designated to be used in the performance of the novel skill consists of a small, wooden paddle to which a ball is attached by a rubber string. The ball is hit upwards by manipulation of the paddle.

Gross Perceptual Motor Skill: "A gross perceptual motor skill is one in which neuromuscular co-ordination involves contractions of large muscles . . ."[1]

Deliminations of the Study

The present study was subject to the following delimitations: (1) Thirty fourth and fifth grade male and female students from North Euless Elementary School in Euless, Texas, during the academic year of 1970-1971, as being representative of extreme perceptual types. These students represent the upper and lower seven per cent of the 221 students tested, (2) the reliability, validity, and objectivity of the measures selected for the proposed study.

Purposes of the Study

The general purpose of the study was to determine the relationship of the haptic and the visual perceptual types

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[1]Harold Seashore, "Some Relationships of Fine and Gross Motor Abilities," Research Quarterly, XIII (1942), p. 259.

with learning a novel gross motor skill. The following null hypothesis was tested:

There is no significant difference between the students designated as haptic and the students designated as visual in terms of their ability to learn a novel gross motor skill.

Summary

Because of a desire and need to improve teaching methods and because of a belief that the individual relates to that which he perceives, not what may actually exist, the present study was undertaken. The problem for the present study was the relationship of two extreme perceptual types, the visual and the haptic, with learning a novel gross motor skill. The extreme perceptual types were determined by the administration of the Visual Retention Test and the Quick Response Test. The upper and lower seven per cent of the 221 subjects tested were selected to participate in the novel skill phase of the study. Performance in the paddle ball apparatus was used as the novel gross motor skill. The subjects completing the study were thirty fourth and fifth grade students at North Euless Elementary School in Euless, Texas, during the academic year of 1970-1971.

Visual perception was defined as the input of images through the eye. A visual-minded individual was defined as one who is entirely lost in the dark and depends solely upon his visual experiences of the outside world. A person with haptic perception was defined as one who is primarily concerned with his own body sensations and the subjective experiences in which he feels emotionally involved. Additional definitions were provided as well as the delimitations to the study indicated.

Chapter II will present a review of the related literature.

CHAPTER II

SURVEY OF RELATED LITERATURE

A review of previous research studies indicates that the present investigation does not duplicate any completed research. The following review of related studies is presented to provide a background to the investigation.

Visual Perception

One of the early studies purporting to illustrate the superiority of visual perception over non-visual guidance of movement when gaining accuracy in the performance of a finger-aiming task blind-folded was presented by Bowditch and Southard.[1] The results of their study indicated that the subjects were more accurate when given visual inspection of the target prior to attempting their task than when blindfolded and their fingers directed to the target. More recent and sophisticated studies have not altered this conclusion in general.

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[1]H. P. Bowditch and W. F. Southard, "A Comparison of Sight and Touch," Journal of Physiology (British), Vol. III (1882), p. 232, cited in Bryant J. Cratty, Movement Behavior and Motion Learning (Lea and Febiger: Philadelphia, 1964), p. 260.

An attempt to determine the roles of verbal, kinesthetic, and visual cues as they relate to learning a motor skill was devised by Battig.[1] Performance on a lever-positioning skill was compared following practice sessions in which the verbal, kinesthetic and visual cues were emphasized with different groups. The results indicated that the group which practiced with visual cues were significantly superior to verbal and kinesthetic groups.

A study which investigated the temporal relations between meaning and imagery was proposed by Moore.[2] The study sought to determine if there was a distinct interval of time between the perception of the meaning of a word or picture and any subsequent imagery. The subjects for the study consisted of ten students at the Catholic University in Washington, D. C.

In the findings of the study, Moore stated that when testing for consciousness of visual imagery the image is particular, schematic, partial and definite in character.

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[1]William F. Battig, "The Effect of Kinesthetic, Verbal, and Visual Cues on the Acquisition of Lever-positioning Skill," Journal of Experimental Psychology, Vol. XLVII (1954), pp. 371-380.

[2]Thomas Verner Moore, "The Temporal Relation of Meaning and Imagery," Psychological Monagraphys, XXVII (1919), pp. 128-183.

Moore also indicated that visual imagery is sometimes recognized as unnecessary and of secondary importance in perception. Moore noted that the kinesthetic image is not always pertinent to the purpose of the object. Kinesthetic imagery commonly concerns an act which is a means to the objects' end and is often superfluous to the understanding of the function of the object.

Haptic Perception

Fleishman[1] conducted a study to determine the particular combinations of abilities which could predict high levels of proficiency in perceptual-motor skill. The study included two hundred subjects, each receiving a battery of fifteen written and/or skill reference tests. The results revealed that no particular combinations of aptitudes predictive of higher levels of proficiency on complex psychomotor tasks had been isolated. It was determined, however, that kinesthetic abilities play an increasingly important function at higher skill levels.

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[1]Edwin Fleishman, "A Comparative Study of Aptitude Patterns in Unskilled and Skilled Psychomotor Performance," Journal of Applied Psychology, Vol. IXI (1967), pp. 263-272.

The relationships between kinesthetic sensitivity and the learning of selected motor skills in bowling, tennis, and volleyball, was studied by Roloff.[1] A four-item battery of tests recommended as a measure of kinesthesis in college women was devised and a significant correlation between kinesthesis and motor ability, as measured by the Scott Test was reported. This battery of tests was administered to 200 college women students at the State University of Iowa. Of the 200 subjects, 64 women were selected for the final testing. Roloff concluded that visual cues would first be used in the learning of a new perceptual-motor skill and that kinesthetic practice would be of little value in correcting mistakes at the beginning stages of learning a motor skill.

Start[2] conducted a study using twenty-one male college students as his subjects who attended the University of Western Australia, in Nedlands, Australia. The subjects mentally practiced a new gross motor skill, the kip on the horizontal bar, five minutes a day for six days. The first

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[1]Louise L. Roloff, "Kinesthesis in Relation to the Learning of Selected Motor Skills," Research Quarterly, Vol. XXIV (1953), p. 210.

[2]Kenneth B. Start, "Kinesthesis and Mental Practice," Research Quarterly, Vol XXXV (1964), p. 316.

attempt at performing the skill by each subject was rated by a panel of three experienced judges on the morning following the last mental practice session. The performance scores and those obtained on the Wiebe Test of Kinesthesis were not found to be significantly related. Awareness of position and movement in space was believed by Start to be comprised of many specific abilities.

The relationship of kinesthetic perception as measured by selected tests involving arm positioning and the ball rolling ability of elementary school children was studied by Witte.[1] Witte administered the tests to forty-seven boys and girls, ages seven to nine, who were enrolled in the first and second grades at Montecito Union School, Santa Barbara, California. Witte noted that the differences found between elementary school boys and girls in kinesthetic perceptivity for arm positioning measures were not significant and that boys were significantly superior to girls in their ability to roll balls accurately.

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[1]Fae Witte, "Relation of Kinesthetic Perception to a Selected Motor Skill for Elementary School Children," Research Quarterly, Vol. XXXIII (1962), p. 476.

Gibson and Backlund[1] studied the after-effect of haptic space perception. They conducted a series of experiments using identical apparatus. The apparatus was constructed of two palmboards, twelve centimeters wide and one centimeter long each having its own axis rotation. The subjects varied in number according to the experiment.

According to Gibson and Backlund's findings, the most essential single bases of haptic sensitivity lies in the joints. The sensory receptors located in receptive surfaces of the joints register the amount and direction of a rotation and the stationary angular position of a joint. After-effects seem to follow a period of non-rotation of the joints. The after-effects consist of a constant error in spatial perception based on joint position. Gibson and Backlund believe there must be an invarient relationship among such haptic perceptions.

Haptic and Visual Perception

A study completed in 1945 by Lowenfeld[2] sought to discriminate between two perceptual types, the haptic and

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[1]James J. Gibson and Fredrik A. Backlund, "An After-Effect in Haptic Space Perception," The Quarterly Journal of Experimental Psychology, XV, Part 3 (1963), pp. 145-154.

[2]Lowenfeld, pp. 100-111.

visual. Lowenfeld administered a series of five original tests for perceptual aptitudes to 1128 subjects of different ages. The tests administered by Lowenfeld were: (a) Integration of Successive Impressions, (b) Drawing of Subjective Impressions, (c) Visual Word Association, (d) Visualization of Kinesthetic Experience, and (e) Tactile Impressions.

The results indicated that forty-seven per cent of the subjects were identified as primarily visual; thirty per cent were identified as visual-haptic; and the remaining twenty-three per cent were classified as haptic.

In 1963, Fleishman and Rich [1] studied the role of kinesthetic and spatial-visual abilities in perceptual-motor learning. Forty male under-graduates enrolled in a second semester psychology course at the Yale University in New Haven, Connecticut served as the subjects.

The authors administered two tests to all the subjects. The first test was a measure of individual difference in "kinesthetic sensitivity." The test was based upon the procedure of determining difference limens for discrimination of lifted weights. The second test was a measure of

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[1] Fleishman and Rich, p. 7.

spatial and visual ability as measured by the United States Air Force Aerial Orientation Test. This perceptual-motor task was performed on a two handed tracking apparatus.

The findings of the study by Fleishman and Rich revealed that there was no significant correlation between the Aerial Orientation Test and the kinesthetic sensitivity measure indicating that these two tests measure independent ability traits. They also concluded that subjects with high spatial ability have the advantage in early stages of learning only while the the kinesthetically oriented individual is favored during the later learning stages.

Green,[1] in 1969, completed a study concerned with the investigation of two perceptual types of individuals, the haptic and the visual in relation to dance movement. The purpose of the study was to administer and evaluate tests purported to discriminate between the haptic type and the visual type of person. The study was specifically concerned with the development of a test battery which could distinguish differences with respect to visual and haptic perception in relation to dance movements.

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[1]Green, "A Study of Two Perceptual Types."

The subjects in the study, fifty-six undergraduate students at the Texas Woman's University were administered four perception tests including: (1) a Tactile Test which was utilized to determine the ability to recognize through the sense of touch a form which was visually perceived; (2) a Movement Association Test which involved the subject's written response to two filmed dance sequences; (3) a Movement Preference Test which involved the subject's personal preference of thirteen filmed movements; (4) a Visual Retention Test which involved the subject's reactions to two color slides; and (5) a Sentence Gestalt Test which measured the subject's ability to perceive individual words in a ground of capital letters.

The investigator concluded that distinct perceptual types may be distinguished through a series of tests that utilize tactile recognition, and Gestalt word recognition. It was noted that three of the five tests used were adequate to distinguish between perceptual types.

A study completed by Green[1] in 1970 was concerned with the stability of perception for the haptic and visual

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[1]E. Ruth Green, "A Study of the Stability of Perception for Two Extreme Perceptual Types, the Visual and the Haptic, in Relation to Learning Dance Movements," (unpublished Doctor of Philosophy dissertation, College of Health, Physical Education and Recreation, Texas Woman's University, August, 1970).

perceptual types in relation to learning dance movements. The general purpose of the study was to determine if a significant difference existed between designed teaching methods and the selected perceptual types of individuals. The subjects were sixty-one undergraduate students enrolled in physical education activity classes at the Georgia Southern College in Statesboro, Georgia, during the spring quarter of the academic year 1968-1969, and the fall quarter of the academic year 1969-1970.

Four tests were administered to the subjects: (1) a Tactile Test to determine the per cent of haptic perception; (2) a Movement Preference Test to determine the degree of visual perception; (3) a Movement Association Test to determine the amount of visual perception held; and (4) a Participant Movement Analization to demonstrate the interpretation of a word by the subjects movement which was evaluated by judges in terms of perceptual type.

The conclusion of the study was that distinct methods of teaching designed for visual and/or haptic individuals seem to have no significant relationship to perceptual stability. The different methods of teaching designed and used in the study by Green did not significantly change an

individual's perceptual attitude as measured by the test-retest method, therefore it appeared that the extreme perceptual types remained stable although exposed to distinctly different teaching methods.

Kress[1] completed a study on the interaction in judgment of the vertical through visual and tactual perceptual modes. The purposes of the study were to determine the accuracy of visual and/or tactual modalities in making judgments of the true vertical, and also, to determine if field independence could be demonstrated in both visual and tactual tasks.

Sixty subjects were tested to determine their measure of field dependency using Witkin's Embedded Figures Test. Of the sixty tested, eight subjects were selected to participate in the experiment. The subjects represented the four highest scores (field independent) and the four lowest scores (field-dependent).

At the conclusion of the experiment, Kress noted that the visual settings were consistently better than the tactual settings. He also concluded that the visual modality was a dominant factor in vertical judgments.

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[1]Gary Kress, "Visual and Tactual Interaction in Judgments of the Vertical," Psychonomic Science, 14, No. 4 (February, 1969), pp. 165-166.

At Yeshiva University, New York, in the Department of Psychology, a study on an experimentally created conflict between the two senses of vision and touch was conducted by Rock and Victor.[1] The purpose of their study was to determine the reaction of the subjects when conflicting information is presented. Three experiments were designed using three conditions stressing first visual orientation, second tactile orientation, and third a combination of the perceptual modalities. Each experiment used ten subjects from psychology classes at the Yeshiva University.

The first experiment involved drawing an impression of a standard object. The standard object was a 25 mm white square of hard plastic, 1 mm thick, attached to a stem set in a box. The subject was asked to perceive the object and to draw his impression of it. The tactile group touched a standard object behind a shield. The visual group viewed a standard object through distorted lens. The visual control group performed in a superior manner in comparison to the tactile group. In the second experiment the subjects selected a comparison object from among a progressively

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[1] Rock and Victor, pp. 594-596.

increasing series of rectangular forms that was considered to be similar to the standard. In one condition the subject selected visually from the series of comparison forms after looking and grasping the standard. In the second condition the subjects utilized touching the standard only. The results of the experiment favored the visual controls. In the third and final experiment, the subject was asked to feel a number of rectangles on a rack and compare it to the standard which was in a box and not seen. The visual group could view the rack of rectangles and then make a comparison. The result of this test also favored the visual group. Rock and Victor concluded that the impression one perceives is dominated by what one sees. With few individual exceptions the visual impression was the dominant impression.

A study concerned with the effects of successive stimulation upon visual and haptic form discrimination was completed by Cashdan.[1] This study was conducted to determine if haptic form discrimination in adults is inferior to visual form discrimination or if the two modes of discrimination lead to equivalent performance. There were two replications

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[1]Sheldon Cashdan, "Visual and Haptic Form Discrimination Under Conditions of Successive Stimulation," Journal of Experimental Psychology, 76, No. 2, (1968), pp. 215-218.

of the experiment; each replication had twenty-eight subjects selected from among fifty-six college freshmen required to participate in the study at Indiana University, Bloomington, Indiana.

Cashdan found indications that visual modes of discrimination may be more efficient than haptic modes of discrimination. He also found some discontinuity of results when comparing replication one to replication two. Cashdan noted that haptic exposure-haptic test performance was significantly better than haptic exposure-visual test performance in replication one. But it was found that haptic exposure-visual test performance was significantly better than haptic exposure-haptic test performance in replication two.

It was concluded that the stimuli used probably made a difference in proficient learning through use of one or another of the sensory modes. Cashdan believed that in adults the haptic mode form discrimination is inferior to the visual mode form discrimination.

A study to determine the presence of two personality types, visual and haptic, by means of observation of visual

and tactile perceptions was completed by Flick.[1] Data was collected from sixty-three college students randomly selected at Pennsylvania State University. Flick used ten tests in the study. The first of these tests was the Viktor Lowenfeld Gerund Test. The subjects were given twenty-five gerunds and they responded verbally to each gerund. The second test was the Drawing Test. The subjects were required to draw their impressions of two topics, "I am going for a walk," and "How I feel when I am sick." The third and fourth tests were both tactile. The first of these was the identification of an object through the tactile sensation. The second of these tactile tests was visual identification of various geometric objects. The subject selected two geometric objects which were thought to be alike. The fifth test was a Music Association Test designed to evoke haptic or visual responses. The subjects were instructed to write their reactions to two musical works. The Picture Preference test was the sixth test used. This test was used to determine the subject's preference for either visual or haptic art. The subjects were evaluated for their ability to

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[1]Paul B. Flick, "An Intercorrelative Study of Two Creative Types: The Visual Type and the Haptic Type," (unpublished Doctoral dissertation, Pennsylvania State, 1960).

select paintings classified as visual. The seventh test was the Sentence Gestalt Test. This test determined a person's ability to perceive individual words within a background of capital letters. The eighth test was the Visual Retention Test used to determine either the visual or the haptic reactions of students to a particular work of art. The ninth test was the Penetration of Camouflage. This test was used to determine the ability to observe or to perceive hidden figures in a large mass or ground. The tenth test was the Quick Response Test. This was used to obtain intuitive responses measured as either haptic or visual.

Flick's findings indicated that most individuals were neither extremely visual nor extremely haptic. Flick asserted that the discovering of an individual's psychological type was probably the first step necessary to understand the individual's motivations and would obviously contribute to one's self-development.

CHAPTER III

PROCEDURES FOLLOWED IN THE DEVELOPMENT OF THE STUDY

The study was conducted to determine if a significant difference exists between students designated as haptic and students designated as visual in their ability to learn a novel gross motor skill.

Preliminary Procedures

The literature related to perception, kinesthetic sensitivity, visual sensitivity, and particularly the relationship of these perceptive abilities to the learning of motor skills was reviewed. A Tentative Outline was prepared and presented during a Graduate Seminar of the College of Health, Physical Education and Recreation at the Texas Woman's University in Denton, Texas, on April 21, 1971. Permission was then secured from the Principal at North Euless Elementary School in Euless, Texas, to select the subjects and conduct the study.

Selection of Subjects

Two hundred and twenty-one students from North Euless Elementary School in Euless, Texas participated in the present study. These subjects were the students that comprised the entire fourth and fifth grade classes. Each student was administered the Visual Retention Test and the Quick Response Test. From the data collected the thirty extreme perceptual types were selected.

The subjects were ranked from 1 to 221 based upon their scores on each test. The two rankings were then added together to get their final ranking. From these rankings the upper and lower seven per cent of the students were selected to serve as the subjects in this study.

Description of Tests

The two tests used in the study were selected in accordance with the established criteria of reliability, validity, objectivity, and administrative feasibility. Involved in the criterion of administrative feasibility was the demand for a small amount of equipment and time.

1. Visual Retention Test

This test was used to measure visual or haptic reactions of the subjects to two colored slides. The procedures followed were those described by Green.[1]

Two thirty-five millimeter slides that were believed to have neutral perceptual connotations were shown to the subjects for five seconds each. The subjects were then given two minutes to list what they saw. The slides were believed to be good stimuli for either visual or haptic minded persons; there was visual detail for those who were visually-minded and the movement indicated by the running man and the swinging trapeze artist to attract those who were haptically-minded. The slides were composed of (a) a picture of a man running through a building and (b) a picture of a circus performer swinging on a trapeze.

The Visual Retention Test was scored by counting the number of visualizable nouns (those which can be seen) written and dividing that figure by the number of words written. The scores were then figured and recorded as whole numbers; a score of .57 was listed as 57. The highest

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[1]Green, "A Study of Two Perceptual Types," pp. 31-33, 1969.

possible score was 100 which indicated that all the words a subject wrote were visualizable nouns. The lowest possible score was zero.

Subjects with the highest scores, considered visually oriented, listed as many objects as they could remember, without additional descriptive words. Subjects with the lowest scores, or haptically oriented subjects, were more concerned with the intangible aspects of the slides. The reliability for the Visual Retention Test as utilized by Green[1] for college age students was .99.

Directions for Visual Retention Test

The instructions used for this test were those devised by Green.

You will be shown a picture on the screen. It is going to be flashed on the screen for a period of five seconds and will then be removed. After the picture is removed, the lights will be turned on and you will be asked to list what you saw as clearly as you can. You will have two minutes to write this. Do not write anything but your own impression. The lights will then be lowered and you will be shown a second picture for five seconds. Again, when the lights are turned on, write what you saw. Remember that the purpose is visual retention and visual description.

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[1]Green, p. 33.

2. Quick Response Test

This test, as adapted by Flick,[1] was modified and used to measure visual or haptic reactions of the subjects to a list of fifty words. Each of the words was read aloud at ten second intervals. The subjects wrote down their initial response to each word on a sheet of paper numbered from one to fifty. Due to the age and maturity level of the subjects it was deemed necessary to modify the time from five second intervals to ten second intervals. Preliminary testing determined the need and substantiated this modification.

The Quick Response Test was scored on the basis of the number of visualizable nouns written by the subject. The scores could range from zero to fifty, with fifty being the highest possible visual score and zero being the lowest possible score or decidedly haptic. The test-retest reliability coefficient for this test was found to be .69 by Flick.

Directions for Quick Response Test

The instructions given the participants of the present study were the same as those devised by Flick.

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[1]Flick, "Creative Types," pp. 82-84.

This is a speed test. It is necessary for you to put down the first impression you get after hearing me read the word. Do not worry if it does not sound correct to you. Put down anything that comes to mind. There are fifty words and I will read one every ten seconds. If nothing comes to mind leave the space blank and continue with the next word.

The following words were utilized in the Quick Response Test:

1. Soft
2. Black
3. Man
4. Short
5. Music
6. Deep
7. House
8. Fruit
9. Command
10. Whistle
11. Wish
12. Beautiful
13. Butterfly
14. Sleep
15. Anger
16. Spider
17. Earth
18. Working
19. Trouble
20. Stomach
21. Yellow
22. Sweet
23. Sickness
24. Memory
25. Sheep
26. Comfort
27. Hungry
28. Priest
29. Moon
30. Whiskey
31. Child
32. Butter
33. Doctor
34. Street
35. Eating
36. Joy
37. Baby
38. Sex
39. Quiet
40. Green
41. Salt
42. Thief
43. Cheese
44. Afraid
45. Window
46. Foot
47. Sin
48. Dance
49. Heavy
50. Custom

Selection of Novel Gross Motor Skill

The novel gross motor skill was selected in accordance with the established criteria of administrative feasibility, true novel skill, educational applicability, previous research studies, and a preliminary investigation. The instrument used was the Fly-Back or Paddle Ball, a small wooden paddle to which a ball is attached by a rubber string. The ball is hit upwards by manipulation of the paddle. The object was to hit the ball with the paddle as many times as possible in succession.

A two week preliminary investigation was held at Midway Park Elementary School in Euless, Texas to determine the length of time elementary students could practice before apparently becoming fatigued. Based upon this study and upon previous similar studies, a time of one minute and forty-five seconds was deemed appropriate. The subjects were allowed ten such practice sessions.

Procedures for the Administration of the Novel Gross Motor Skill

Before the first practice session began, the subjects were asked if there was anyone who already knew how to perform the novel skill. The importance of not practicing

outside the practice sessions was stressed. A session consisted of recording the number of successful hits for each trial. Each trial ended as soon as the subject committed an error. Errors were determined and counted by a second student. The following were considered errors: failure to hit the ball in an upward direction; failure to hit the ball with enough force to cause the rubber string to stretch; failure to contact the ball with the correct side of the paddle. The score of the trial was the number of consecutive hits until an error was committed. Score sheets were issued and the following information recorded: 1. Name; 2. Teacher; 3. Date; 4. Paddle Number; 5. Number of hits for each trial during the 1:45. A copy of the score sheet may be found in the appendix.

Analysis of Data

To determine if a significant difference existed between the novel skill scores of the haptic and visual groups, an analysis of variance was computed. The Pearson Product-Moment coefficient of correlation between the Visual Retention Test and the Quick Response Test was computed to determine the relationship between the two tests. Final

evaluation consisted of inspection, analysis and interpretation of these scores.

Final Procedures

Final procedures included summarizing the investigation, the formation of a conclusion to the study upon the basis of the analyzed data, making recommendations for further studies, preparation of a written report, and the compilation of a bibliography.

Summary

The present investigation was a study of the relationship of two extreme perceptual types of individuals, the visual and the haptic, to learning a novel gross motor skill. The novel gross motor skill entailed using the paddle ball apparatus. Literature was reviewed in order to establish criteria for selection of testing instruments, administration of the tests, selection of the novel gross motor skill, selection of subjects, administration of practice sessions, and analysis of data. The perceptual tests administered were the Quick Response Test and the Visual Retention Test.

Upon the basis of criteria established, thirty fourth and fifth grade students out of the 221 originally tested

for visual and haptic tendencies at North Euless Elementary School in Euless, Texas, during the academic year of 1970-1971, attempted to master the paddle ball novel skill during the ten daily practice sessions.

Analysis of variance and the Pearson Product-Moment coefficient of correlation was computed to determine if significant differences existed. In the following chapter the investigation will discuss the analysis and interpretation of the collected data from the tests.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

The purpose of the study was to determine the relationship of two perceptual types, the haptic and the visual, with learning a novel gross motor skill. This chapter presents an analyses of the data. The interpretation of the data is presented in relation to the hypothesis that guided the development of the investigation. The hypothesis stated that there would be no significant difference between the students designated as haptic and the students designated as visual in terms of their ability to learn a novel gross motor skill.

Distribution of Test Scores

The means and standard deviations for the two tests are given in Table 1. The means on the Visual Retention Test for the Haptic and the Visual groups were 18.20 and 73.53 respectively. The means on the Quick Response Test for the groups were 8.20 for Haptic and 20.20 for Visual types respectively. The standard deviation for both groups for

the two tests were: Visual Retention Test, haptic 8.60, visual 20.36; Quick Response Test, haptic 1.80, visual 1.51.

TABLE 1

MEAN AND STANDARD DEVIATION OF THE VISUAL RETENTION TEST AND THE QUICK RESPONSE TEST (N=30)

Test	Number of Subjects	Mean	Standard Deviation
Visual Retention Test	15		
Haptic		18.20	8.60
Visual		73.53	20.36
Quick Response Test	15		
Haptic		8.20	1.80
Visual		20.20	1.51

Data Analysis

A Pearson Product-Moment coefficient of correlation was made between the scores on the Visual Retention Test and the Quick Response Test. A negative correlation was obtained for the visual group upon the two tests (r=-.48). This coefficient of correlation approaches the .05 level of significance (P .05=.51). The negative correlation indicated that those subjects who scored high on one test, scored low on the other test. Both tests purported to measure the same thing,

therefore, it would appear that either one or both of the tests were not valid measures of the subjects perceptual tendencies.

Practice Sessions

Data concerning the subjects ability to learn the paddle ball apparatus were collected. An analysis of variance was determined in order to compare the perception ability groups to see if a significant difference occurred in their learning. The F ratio indicated there was no significant difference between the haptic group and the visual group. Table 2 presents the results of the analysis of variance.

TABLE 2

ANALYSIS OF VARIANCE FOR PERFORMANCE LEVELS OF THE HAPTIC GROUP AND THE VISUAL GROUP ON THE PADDLE BALL APPARATUS

Source	SS	df	ms	F
Total	119754.92	299		
Between subjects	65401.62	29		
Groups	613.47	1	613.47	0.27
$Error_b$	64788.19	28	2313.86	
Within subjects	54353.26	270		
Trials	16212.95	9	1801.44	12.12*
Trials x Groups	681.30	9	75.70	0.51
$Error_w$	37457.01	252	148.64	

*significant at .001 level

These data indicated that the visual group was not significantly superior to the haptic group. The F ratio of 12.12 for within the subjects trials was significant beyond the .001 level. The consistent acquisition of skill by all subjects is illustrated by the learning curve in Figure 1.

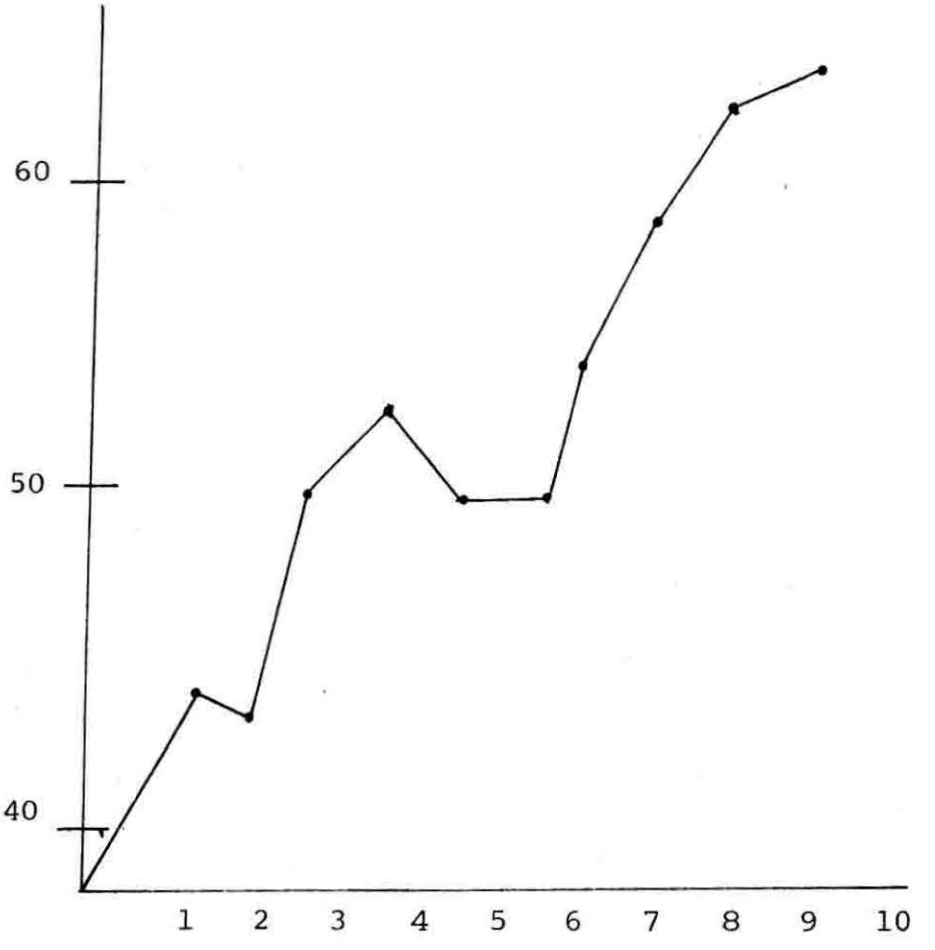

Figure 1. Learning Curve

To determine more specifically where the significant difference occurred, a subsequent test, the Duncan's New Multiple Range Test was utilized to test the difference between the ten means yielded by the two groups combined upon each of the ten trials. The point .01 level of significance was accepted by the investigator as requisite for significant differences. The results of the Duncan's New Multiple Range Test are presented in Table 3. This table illustrates that significant increases in performance scores on the paddle ball task occurred during the ten days of practice. Trial two was very significantly poorer than trials four, seven, eight, nine, and ten. Trials one, two, three, four, five, six and seven all showed a significant difference from trials nine, and ten.

Summary

The Pearson Product-Moment coefficient of correlation was computed between the scores of the Quick Response Test and the Visual Retention Test. The means and standard deviation for the two tests were also computed. A negative correlation approaching the .05 level of significance was revealed. An analysis of variance indicated no significant increase between the groups in learning the novel skill.

TABLE 3

DUNCAN'S RANGE TEST FOR THE MEAN DIFFERENCES BASED UPON TEN TRIALS

Trial		2	1	5	6	3	4	7	8	9	10
Mean		42.60	43.53	47.57	47.57	48.23	51.97	53.43	58.50	63.50	64.27
42.60	2		0.93	4.97	4.97	5.63	9.37*	10.83*	15.90*	20.90*	21.67*
43.53	1			4.04	4.04	4.50	8.44	9.90*	14.97*	19.97*	20.74*
47.57	5					0.66	4.40	5.86	10.93*	15.93*	16.70*
47.57	6					0.66	4.40	5.86	10.93*	15.93*	16.70*
48.23	3						3.74	5.20	10.27*	15.27*	16.04*
51.97	4							1.46	6.53	11.53*	12.30*
53.43	7								5.07	10.07*	10.81*
58.50	8									5.00	5.77
63.50	9										0.77

*significant at .01 level

Duncan's Range Test was utilized to determine where the significance occurred during the practice days.

In the following chapter the investigator will summarize the study, determine a conclusion, and recommend areas of needed research.

CHAPTER V

SUMMARY, FINDINGS, AND CONCLUSIONS OF THE STUDY

It has been hypothesized that many teachers tend to modulate their instructions to an "average" student. However, there may be large minorities of students that are extreme perceptual types who are unable to perceive sufficiently through modalities other than their dominant sense systems. The individual is thought to relate to what he perceives, not what actually is, and may require distinct teaching methods relating to this distinct perceptual type. The present study attempts to identify the extreme perceptual types of visual and haptic and determine if significant relationships exist between such types and motor skill learning on a novel task. Thirty fourth and fifth grade students at North Euless Elementary School, in Euless, Texas were used as subjects.

The Haptic individual can be described as a normal-sighted person who is dependent upon touch and kinesthesis; using his eyes only when compelled to do so. Haptic

individuals are primarily concerned with their own body sensations and the subjective experiences in which they feel emotionally involved. Haptic perception can be obtained through actual touch, through sensations of the skeletal system, or subjective feelings.

The visual individual can be described as a person who depends completely or primarily upon his visual experiences of the outside world. Visual perception is defined as the imput of images through the eye. Through visual perception an individual obtains an impression of where an object is as well as what an object is. An extreme visually-minded person is one who is entirely lost in the dark and depends solely upon his visual experiences of the outside world.

Review and analysis of previous investigations disclosed that the present study did not duplicate any others. It was also revealed that there are indications of a consistency in the dominance of the visual perceptual mode when compared to the haptic mode. Studies by Cashdan, Kress, and Rock and Victor, indicated that the visual perceptual mode is dominant in adults. Investigation also suggested that the haptic individual tended to be more subjective and expressive in the interpretative mode of artistic production;

and the visual type tended to be more objective and expressive in the representational mode of artistic production.

Two tests developed by Flick were used in the present study; they were the Visual Retention Test and the Quick Response Test. The present investigator modified the Quick Response Test in order to allow the elementary students sufficient time to write their responses. The Visual Retention Test consisted of two color slides shown to the subjects who in turn listed what they saw. The test was scored by the number of visualizable nouns written which were divided by the number of words written. The Quick Response Test consisted of the reading of fifty words to the subjects. The test was scored upon the basis of the number of visualizable nouns written by the subject. The tests were designed to measure tendencies toward either visual or haptic aptitudes.

Two hundred and twenty-one (221) students from North Euless Elementary School in Euless, Texas, during the academic year 1970-1971, participated in this study. These subjects were the entire fourth and fifth grade classes. The upper and lower seven per cent of the two hundred and

twenty-one students tested were used as the subjects in the present study.

The novel gross motor skill performed in this study was executed with the Fly-Back or Paddle Ball, a small wooden paddle to which a ball is attached by a rubber string. The object was to hit the ball upwards with the paddle as many times as possible in succession. All subjects participated in ten daily practice sessions for one minute forty-five seconds during which they attempted to master the novel skill.

Findings of the Study

The hypothesis that guided the present investigation stated that there would be no significant difference between the students designated as haptic and the students designated as visual in terms of their ability to learn a novel gross motor skill. The tests used in the study were found to be inadequate to differentiate between perceptual types. A significant increase in learning the novel gross motor skill among both groups was revealed but the F ratio indicated there was no significant difference in learning between the haptic and visual group. As a result of the statistical

findings of this investigation it was determined that distinct perceptual types may not be distinguished through the two tests utilized in the present study.

Conclusion of the Study

Because of the probable lack of validity of the two perceptual tests, no conclusion can be drawn concerning the relationship of perceptual types with learning a novel gross motor skill.

Limitations of the Study

The following limitations were established with regard to the present investigation:

1. The two perceptual tests given were not adequate to distinguish between perceptual types for elementary age school children.
2. The ten practice sessions were not continuous in that they were interrupted by a Saturday and Sunday of no practice.

Suggestions for Future Studies

The following suggestions have been recommended for future investigations:

1. The development of tests for visual and/or haptic aptitudes by age levels.
2. The relationship of the student's skill in a specific sport to his dominant perceptual type.
3. The relationship of the student's academic level to his dominant perceptual type.
4. A battery of tests which included more variety and were deemed more suitable for elementary school age subjects might yield information to enable more adequate differentiation of perceptual types.

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APPENDIX

RAW DATA

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
1	0	2.5	17	139.5
2	0	2.5	10	47.5
3	0	2.5	9	35.0
4	0	2.5	7	12.5
5	10	5.5	19	172.0
6	10	5.5	15	115.0
7	11	7.0	8	23.0
8	12	8.5	11	60.5
9	12	8.5	18	154.5
10	14	10.0	14	100.0
11	15	11.0	9	35.0
12	16	12.0	15	115.0
13	18	13.5	3	2.0
14	18	13.5	13	85.0
15	20	17.0	7	12.5
16	20	17.0	13	85.0
17	20	17.0	15	115.0
18	20	17.0	16	127.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
19	20	17.0	18	154.5
20	21	21.5	14	100.0
21	21	21.5	15	115.0
22	21	21.5	19	172.0
23	21	21.5	20	186.5
24	22	28.5	8	23.0
25	22	28.5	8	53.0
26	22	28.5	9	35.0
27	22	28.5	10	47.5
28	22	28.5	11	60.5
29	22	38.5	13	85.0
30	22	28.5	14	100.0
31	22	28.5	17	139.5
32	22	28.5	17	139.5
33	22	28.5	20	186.5
34	23	37.0	7	12.5
35	23	37.0	12	72.5
36	23	37.0	13	85.0
37	23	37.0	14	100.0

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
38	23	37.0	15	115.0
39	23	37.0	19	172.0
40	23	37.0	19	172.0
41	24	42.5	18	154.5
42	23	42.5	11	60.5
43	24	42.5	10	47.5
44	24	42.5	9	35.0
45	25	50.0	21	197.0
46	25	50.0	20	186.5
47	25	50.0	19	172.0
48	25	50.0	12	139.5
49	25	50.0	13	85.0
50	25	50.0	11	60.5
51	25	50.0	10	47.5
52	25	50.0	9	35.0
53	25	50.0	9	35.0
54	25	50.0	9	35.0
55	25	50.0	8	23.0
56	26	57.0	20	186.5
57	26	57.0	20	186.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
58	26	57.0	18	154.5
59	27	62.5	25	215.5
60	27	62.5	20	186.5
61	27	62.5	18	154.5
62	27	62.5	16	127.5
63	27	62.5	16	127.5
64	27	62.5	11	60.5
65	27	62.5	8	23.0
66	27	62.5	7	12.5
67	28	74.5	7	12.5
68	28	74.5	7	12.5
69	28	74.5	7	12.5
70	28	74.5	9	35.0
71	28	74.5	12	72.5
72	28	74.5	12	72.5
73	28	74.5	13	85.0
74	28	74.5	14	100.0
75	28	74.5	14	100.0
76	28	74.5	16	127.5
77	28	74.5	17	139.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
78	28	74.5	17	139.5
79	28	74.5	19	172.0
80	28	74.5	21	197.0
81	28	74.5	21	197.0
82	28	74.5	21	197.0
83	29	83.5	22	204.5
84	29	83.5	18	154.5
85	30	92.0	28	219.0
86	30	92.0	26	217.5
87	30	92.0	23	209.0
88	30	92.0	22	204.5
89	30	92.0	20	186.5
90	30	92.0	19	172.0
91	30	92.0	18	154.5
92	30	92.0	18	154.5
93	30	92.0	16	127.5
94	30	92.0	13	85.0
95	30	92.0	11	60.5
96	30	92.0	9	35.0
97	30	92.0	9	35.0

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
98	31	99.5	19	172.0
99	31	99.5	19	172.0
100	31	99.5	12	72.5
101	31	99.5	11	60.5
102	31	99.5	6	6.5
103	33	118.5	21	197.0
104	33	118.5	2	1.0
105	33	118.5	5	5.0
106	33	118.5	8	23.0
107	33	118.5	10	47.5
108	33	118.5	12	72.5
109	33	118.5	13	85.0
110	33	118.5	13	85.0
111	33	118.5	13	85.0
112	33	118.5	13	85.0
113	33	118.5	14	100.0
114	33	118.5	15	115.0
115	33	118.5	15	115.0
116	33	118.5	15	115.0
117	33	118.5	15	115.0

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
118	33	118.5	15	115.0
119	33	118.5	16	127.5
120	33	118.5	17	139.5
121	33	118.5	17	139.5
122	33	118.5	17	139.5
123	33	118.5	18	154.5
124	33	118.5	19	172.0
125	33	118.5	19	172.0
126	33	118.5	21	197.0
127	33	118.5	21	197.0
128	33	118.5	23	209.0
129	33	118.5	24	213.0
130	33	118.5	24	213.0
131	33	118.5	24	213.0
132	33	118.5	25	215.5
133	33	118.5	26	217.5
134	34	134.5	14	100.0
135	34	134.5	15	115.0
136	35	140.0	32	220.5
137	35	140.0	19	172.0

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
138	35	140.0	17	139.5
139	35	140.0	14	100.0
140	35	140.0	11	60.5
141	35	140.0	12	47.5
142	35	140.0	10	47.5
143	35	140.0	9	35.0
144	35	140.0	9	35.0
145	36	148.0	18	154.5
146	36	148.0	18	154.5
147	36	148.0	16	127.5
148	36	148.0	9	35.0
149	36	148.0	4	3.5
150	36	148.0	22	204.5
151	36	148.0	19	172.0
152	37	155.0	12	72.5
153	37	155.0	16	127.5
154	37	155.0	23	209.0
155	37	155.0	12	72.5
156	37	155.0	11	60.5
157	37	155.0	10	47.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
158	37	155.0	4	3.5
159	38	160.5	11	60.5
160	38	160.5	12	72.5
161	38	160.5	21	197.0
162	38	160.5	18	154.5
163	40	167.0	20	186.5
164	40	167.0	18	154.5
165	40	167.0	17	139.5
166	40	167.0	17	139.5
167	40	167.0	15	115.0
168	40	169.0	13	85.0
169	40	169.0	12	72.5
170	40	167.0	10	47.5
171	40	167.0	8	23.0
172	41	173.5	14	100.0
173	41	173.5	14	100.0
174	41	173.5	15	115.0
175	41	173.5	16	127.5
176	42	178.0	11	60.5
177	42	178.0	13	85.0

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
178	42	178.0	14	100.0
179	42	178.0	15	115.0
180	42	178.0	22	204.5
181	43	181.0	19	172.0
182	44	182.5	8	23.0
183	44	182.5	7	12.5
184	50	191.0	7	12.5
185	50	191.0	7	12.5
186	50	191.0	8	23.0
187	50	191.0	11	60.5
188	50	191.0	11	60.5
189	50	191.0	12	72.5
190	50	191.0	13	85.0
191	50	191.0	13	85.0
192	50	191.0	14	100.0
193	50	191.0	15	115.0
194	50	191.0	17	139.5
195	50	191.0	17	139.5
196	50	191.0	19	172 0
197	50	191.0	21	186.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
198	50	191.0	21	197.0
199	54	199.5	23	209.0
200	54	199.5	14	100.0
201	55	201.0	18	154.5
202	58	202.0	21	197.0
203	60	203.0	10	47.5
204	62	204.5	8	23.0
205	62	204.5	6	6.5
206	68	206.0	32	225.0
207	75	208.5	20	192.0
208	75	208.5	21	186.5
209	75	208.5	10	47.5
210	75	208.5	10	47.5
211	77	211.0	18	154.5
212	80	212.0	19	172.0
213	84	213.0	14	100.0
214	87	214.0	19	172.0
215	90	215.0	19	172.0
216	92	216.0	23	209.0
217	100	219.0	11	60.5

Subject	Visual Retention Test	Rank	Quick Response Test	Rank
218	100	219.0	16	127.5
219	100	219.0	18	154.5
220	100	219.0	19	172.0
221	100	219.0	19	172.0

DAILY MOTOR PERFORMANCE SCORES

Subject	1	2	3	4	5	6	7	8	9	10
1	32	37	44	54	30	26	36	51	58	47
2	52	66	65	88	31	48	66	42	75	59
3	48	41	48	46	56	55	53	50	43	47
4	18	35	36	49	41	47	53	79	60	83
5	65	61	56	62	60	50	66	61	47	64
6	58	71	57	62	69	54	39	48	60	52
7	72	62	78	86	85	64	84	92	122	145
8	21	29	30	37	31	31	30	32	31	40
9	40	43	41	43	48	37	47	47	46	46
10	39	34	32	37	44	48	60	72	85	79
11	30	31	31	47	33	41	60	62	65	58
12	114	57	66	23	54	57	66	74	80	70
13	25	36	58	57	53	48	46	30	56	57
14	48	46	42	45	38	44	53	79	57	65
15	60	50	42	61	47	63	66	80	67	67
16	26	22	33	26	45	39	34	48	38	48
17	25	35	34	80	51	57	63	61	72	56
18	43	31	33	30	35	42	47	42	52	50
19	52	37	59	69	64	44	57	70	98	102
20	28	19	30	31	24	25	28	41	44	47

21	34	35	41	38	48	56	67	62	79	61
22	52	61	66	64	63	96	87	93	120	114
23	49	58	62	42	59	46	53	61	63	48
24	44	36	55	56	72	50	60	66	68	83
25	57	70	92	78	77	80	85	89	81	88
26	46	39	44	46	35	59	72	58	57	78
27	12	21	24	45	28	30	36	33	44	33
28	59	49	59	81	48	55	38	51	54	70
29	44	46	56	53	31	25	32	30	24	44
30	14	20	25	29	25	30	35	46	45	44

SCORE SHEET

Name _____ Teacher _____

May 18 Trial	Hits	May 19 Trial	Hits	May 20 Trial	Hits	May 21 Trial	Hits	May 22 Trial	Hits
1	____	1	____	1	____	1	____	1	____
2	____	2	____	2	____	2	____	2	____
3	____	3	____	3	____	3	____	3	____
4	____	4	____	4	____	4	____	4	____
5	____	5	____	5	____	5	____	5	____
6	____	6	____	6	____	6	____	6	____
7	____	7	____	7	____	7	____	7	____
8	____	8	____	8	____	8	____	8	____
9	____	9	____	9	____	9	____	9	____
10	____	10	____	10	____	10	____	10	____
11	____	11	____	11	____	11	____	11	____
12	____	12	____	12	____	12	____	12	____
13	____	13	____	13	____	13	____	13	____
14	____	14	____	14	____	14	____	14	____
15	____	15	____	15	____	15	____	15	____
16	____	16	____	16	____	16	____	16	____
17	____	17	____	17	____	17	____	17	____
18	____	18	____	18	____	18	____	18	____
19	____	19	____	19	____	19	____	19	____
20	____	20	____	20	____	20	____	20	____
21	____	21	____	21	____	21	____	21	____
22	____	22	____	22	____	22	____	22	____
23	____	23	____	23	____	23	____	23	____
24	____	24	____	24	____	24	____	24	____
25	____	25	____	25	____	25	____	25	____