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### EFFECTS OF VERBAL REINFORCEMENT ON CHILDREN'S RESPONSES TO THREE SUBTESTS OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

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*Kansas State College of Pittsburg*

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EFFECTS OF VERBAL REINFORCEMENT ON CHILDREN'S RESPONSES  
TO THREE SUBTESTS OF THE WECHSLER  
INTELLIGENCE SCALE FOR CHILDREN

A Thesis Submitted to the Graduate Division in Partial  
Fulfillment of the Requirements for the  
Degree of Master of Science

332-1-5386

by

James Thomas Russell, Jr.

KANSAS STATE COLLEGE OF PITTSBURG

Pittsburg, Kansas

December, 1970

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## ABSTRACT

The purpose of this study was to investigate the effects of positive verbal reinforcement on the responses to three subtests of the Wechsler Intelligence Scale for Children. The subtests were comprehension, similarities, and vocabulary. These three subtests were given to thirty children of the Geary County, Kansas, Unified School System, whose chronological age ranged from ten years, one month to ten years, eleven months. Their intelligence quotients ranged from ninety-five to one hundred and five.

The responses to the three subtests were analyzed statistically. The results indicated that positive verbal reinforcement did significantly change the amount of verbal production and the scaled scores to the three subtests of the Wechsler Intelligence Scale for Children at the .05 level of confidence.

Under the conditions of this experiment, positive verbal reinforcement did affect the responses on three subtests of the Wechsler Intelligence Scale for Children and resulted in changed scaled scores and the amount of verbal production.

## CHAPTER I

### INTRODUCTION TO THE PROBLEM

#### Statement of the Problem

The problem was to determine to what extent a difference of responses would occur in three sub-tests of the Wechsler Intelligence Scale for Children as the result of the application of positive verbal reinforcement. The study was to determine whether positive verbal reinforcement would result in increased verbal output by the subjects and increased individual scaled scores by the subjects at the conclusion of the positive verbal reinforcement with the experimental group. The three sub-tests used were comprehension, similarities, and vocabulary.

#### Need for the Study

A basic theory in testing has been that the test response is simply a sample of behavior at a given time and is a composite of the person and the stimuli present at the time of evaluation.<sup>1</sup> This study was concerned with the results of the stimulus presentation to determine if the

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<sup>1</sup>In. D. Sundberg and Leona Tyler, Clinical Psychology (New York: Appleton-Century-Crofts, 1962), p. 139.

positive verbal reinforcement would affect the results of the evaluation. The directions for administration of the Wechsler Intelligence Scale for Children designates the amount of explanation and verbalization that the examiner may exert at any given time as well as the basic procedure for administering the test.<sup>2</sup> It was the hypothesis of the experimenter that using verbal reinforcement would result in variation of verbal output and variation in the subjects' scaled scores.

Research articles have dealt with the problem of situational and interpersonal variables of stimuli on test results. In a review of the current research, Mansling<sup>3</sup> has discovered and reported a number of related facts about the problem of differentiation of stimuli. Mansling reported that factors determining test results included: (1) administrative influences, positive or negative impressions emphasizing particular features of test stimuli; (2) influence due to drugs or lack of sleep and special training; (3) influences

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<sup>2</sup>D. Wechsler, Manual for the Wechsler Intelligence Scale for Children (New York: The Psychological Corporation, 1949), pp. 61-89.

<sup>3</sup>J. Mansling, "The Effects of Warm and Cold Interaction on the Administration and Scoring of an Intelligence Test," Journal of Consulting Psychology, 23 (1957), pp. 336-341.

that were traceable to the examiner such as personal warmth and the sort of verbal behavior he exhibits; (4) influences in the subject himself such as his attitude toward the test and his previous experience with tests. Mansling reported that these factors do affect the results of tests, and in a further article he emphasizes the need for more research with the variables that affect the outcome of test performance.<sup>4</sup>

Up to this point, however, little research has been done to check the effects of verbal reinforcement on test results. A study of the effects of positive verbal reinforcement in a particular test situation may give valuable information concerning administrator influence on subjects' responses. A study of this kind, therefore, is of both scientific and practical value.

#### Limitations of the Study

In the facilities available to the experimenter, intensity of noise entering the testing booth could not at all times be controlled. Because of this lack of proper facilities, an extraneous variable in the experimental procedure could not be eliminated.

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<sup>4</sup>J. Mansling, "The Influence of Situational and Intrapersonal Variables in Projective Testing," Psychological Bulletin, 57 (1960), pp. 65-85.

The study indicates the effects of positive verbal reinforcement on three sub-tests of the Wechsler Intelligence Scale for Children. This does not intend to suggest the broader implication that positive verbal reinforcement will affect the full scale of the Wechsler Intelligence Scale for Children or will affect any other individual mental test.

### Hypotheses

The following hypotheses were made prior to the collection of data for this study.

Hypothesis I. The null hypothesis is stated as follows: There will be no significant differences between the number of verbal responses of the control and the experimental groups when positive verbal reinforcement is administered to the experimental group, using three subtests of the Wechsler Intelligence Scale for Children.

Hypothesis II. The null hypothesis is stated as follows: There will be no significant differences between the scaled scores of the control group and the experimental group when positive verbal reinforcement is administered to the experimental group for responses on three subtests of the Wechsler Intelligence Scale for Children.

### Definition of Terms

The following definitions are pertinent to this study:

Operant. A behavioral act that is emitted on a random basis until the act comes under the control of the environment, via reinforcement.<sup>5</sup>

Conditioning. The complex of organismic processes involved in the experimental procedure wherein a stimulus, having evoked a response that brings into view a rewarding stimulus, thereafter is more likely to evoke that response.<sup>6</sup>

Operant Conditioning. A response that is originally emitted is followed by an event. If, as a result of this event following the response the probability of the recurrence of the response has been changed, it is said that operant conditioning has occurred.

Stimulus. An external or internal object or event which occasions an alteration in the behavior of the organism.<sup>7</sup>

Response. A stimulus occasioned act or behavior under the control of the environment.<sup>8</sup>

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<sup>5</sup>G. Kimble, Conditioning and Learning (New York: Appleton-Century-Crofts, Inc., 1961), p. 482.

<sup>6</sup>H. English and A. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms (New York: David McKay Company, Inc., 1958), p. 107.

<sup>7</sup>Kimble, op. cit., p. 483.

<sup>8</sup>Ibid.

Acquisition. "An increase in the strength of the tendency to respond after the administration of a reward."<sup>9</sup> It is difficult to isolate the exact time when the actual increase or decrease of behavior begins and ends, so the data showing increase in verbal output and scaled score are the criteria for acquisition.

Positive Reinforcement. The strengthening of a response to a stimulus by the simultaneous activity of another excitatory process.<sup>10</sup>

Verbal Output, defined operationally, is the amount of words given in the test situation by the examinee.

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<sup>9</sup>H. B. English and A. C. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms (New York: Longmans, Green and Co., 1958), p. 451.

<sup>10</sup>H. English and A. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms (New York: David McKay Company, Inc., 1958), p. 451.



## CHAPTER II

### REVIEW OF THE LITERATURE

#### Theoretical Basis

Verbal behavior has long been recognized in psychology as a valuable clinical tool; however, until recently it has been used on a limited basis and generally on a symbolic level. The clinician has used this tool to interpret the verbal behavior of the subject. The psychoanalytic schools are the best example of this through their use of interpretation of verbal behavior. The use of verbal behavior in the clinical setting has not tended to conceptualize verbal behavior in the area of learning. This does not mean, however, that psychologists have not investigated verbal behavior in the laboratory. But then again, this research has done little in helping the clinician who was working with the patient's verbal behavior.<sup>11</sup> It was primarily through the efforts of B. F. Skinner<sup>12</sup> that verbal behavior came to

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<sup>11</sup>Greenspoon, "Verbal Conditioning and Clinical Psychology," Experimental Foundations of Clinical Psychology (New York: Basic Books, Inc., 1962), pp. 510-553.

<sup>12</sup>B. F. Skinner, Verbal Behavior (Cambridge: Harvard University Press, 1948).

be studied by the psychologist in order to help the clinician in his work with the verbal behavior of patients.

The basic theory expounded by Skinner<sup>13</sup> was that in any approach to verbal behavior the verbal behavior must be accepted as a response in and of itself. As in any kind of behavior, verbal behavior is divided into responses classes for clinical and investigative purposes. Skinner maintained that response classes occurred before the introduction of the variable produced by the experimenter. If this is so, then the experimenter can work with verbal behavior in the same operant conditioning framework as he has worked with pigeons and rats in the laboratory for many years. As in any operant behavior pattern, the experimenter can then keep a record of the responses emitted before and after the advent of the stimuli and see what effect the stimuli had.

### Acquisition

The first research to be done in the field to be called verbal conditioning was done by J. Greenspoon beginning in the 1950's.<sup>14</sup> His experimental procedure was to create an experimental situation to parallel the experimental operant

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<sup>13</sup>Skinner, op. cit.

<sup>14</sup>Greenspoon, op. cit., p. 511.

conditioning method used previously with infrahumans. In his initial study, Greenspoon used college students who were instructed to use words individually and not in sentences. The experimental session was fifty minutes long and was divided into two twenty-five minute periods. During the first twenty-five minutes, positive verbal reinforcement was introduced and in the following session it was omitted. The contingent stimuli were divided into four classes: (1) verbal stimulus, "mmm-hmm;" (2) verbal stimulus, "huh-uh;" (3) visual stimulus, a five-watt red light flash; and (4) auditory stimulus, a 190-cycle tone. A plural noun and all verbal responses except plural nouns were the two response classes used.

A different group of subjects served for each contingent stimulus and each response class; in addition, there was a control group that received no reinforcement for the entire fifty-minute period. At the end of the experiment all subjects were interviewed to determine if the subjects could verbalize the relationship between the contingent stimuli and the response class. There was a clear-cut significance in favor of the four experimental groups when compared to the control group. The "huh-uh" contingent stimuli decreased the contingent response in relationship to the other contingent

stimuli and to the control group.<sup>15</sup>

In a somewhat different experimental design, Cohen and Kalish instructed the subjects to select one of six pronouns. They were to form a sentence with a verb printed on the card which contained the printed pronoun. They obtained significant differences when the number of first person pronouns selected by the experimental group, which received the verbal reinforcement "good," was compared to the control group which received no verbal reinforcement.<sup>16</sup> Salzinger and Pisoni found similar results indicating the effects of positive verbal reinforcement using an affect response class.<sup>17</sup> Solley and Long also found significant increases in responses using a perceptual response class.<sup>18</sup>

The problem of the magnitude of response class has been dealt with by Prutsman who used varied response classes

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<sup>15</sup>J. Greenspoon, "The Reinforcing Effect of Two Spoken Sounds on the Frequency of Two Responses," American Journal of Psychology, 68 (1955), pp. 490-516.

<sup>16</sup>B.D. Cohen, H. I. Kalish, J. R. Thurston, and E. Cohen, "Experimental Manipulation of Verbal Behavior," Journal of Experimental Psychology, 47 (1954), pp. 106-110.

<sup>17</sup>K. Salzinger and S. Pisoni, "Reinforcement of Verbal Affect Responses of Normal Subjects During the Interview," Journal of Abnormal and Social Psychology, 60 (1960), pp. 127-130.

<sup>18</sup>C. M. Solley and J. Long, "When is "uh-huh" reinforcing?" Perceptual Motor Skills, 8 (1958), p. 227.

that differed in magnitude. He obtained results that indicated that a small response class, such as modifiers representing approximately four per cent of the total verbal output, was not as capable of being affected by reinforcement as a larger response class such as plural nouns which represent approximately twelve per cent of the total verbal output. He used a free responding situation in which the subject was instructed to say words individually. His contingent stimulus was "mmm-hmm."<sup>19</sup>

Another group of experimenters who dealt with this problem consisted of Matarazzo, Saslow, and Pareis. They discovered that in the case of the three experimenters employed, verbal conditioning of plural nouns was not successful but that two of the experimenters were successful in producing increases in the frequency of human responses. The same contingent stimuli, "good" or "that's good," were used for both response classes.<sup>20</sup>

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<sup>19</sup>T. Prutsman, "Magnitude of response class as a variable in verbal conditioning," (unpublished Doctoral Dissertation, Florida State University), Dissertation Abstracts.

<sup>20</sup>J. D. Matarazzo, G. Saslow, and E. N. Pareis, "Verbal Conditioning of Two Response Classes: Some Methodological Considerations," Journal of Abnormal and Social Psychology, 61 (1960), pp. 190-206.

### Preconditioned Conditions

In the same manner that preconditioning of rats in the laboratory will have an effect on their performance in the particular situation in which they are involved, it has been found that when a preconditioning (prior experimenter-subject interactions) takes place in verbal reinforcement experiments, it, in a like manner, will affect the performance of the subject in that he will be easier to condition to the stimulus.

An interesting study concerning this phenomenon was run by Solley and Long. They reported that when the experimenter engaged in small talk with the subject before the verbal conditioning began, there was a higher probability that the subject would become conditioned on the first trial. Moreover, it was also shown that each pre-trial interaction might reduce the number of trials required to show evidence of conditioning.<sup>21</sup>

Gewirtz and Baer investigated preconditioning by researching the relationship between effects of deprivation of social interaction and effects of sated social interaction on the reinforcing values of the verbal contingent stimulus. The task was to see if the children with more social inter-

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<sup>21</sup>Solley and Long, op. cit.

actions prior to the testing would be more responsive than those who were deprived of the social interaction stimulus. It was shown that the children who were satiated with interaction were less responsive to the dropping of a marble through a hole than were the children who were deprived of the interaction.<sup>22</sup> The results showed that the socially deprived subjects were more responsive to the contingent stimulus than the sated subjects.

#### Experimenter Characteristics

When dealing with verbal conditioning experiments the experimenter may sometimes enter into the experiment as a form of reinforcer to the subject. When using the operant technique with infrahumans, the experimenter plays no part as a reinforcer. The apparatus will serve in the same function as the experimenter; however, the apparatus is standard whereas the experimenter is not; yet, even in studies with infrahumans, the apparatus may, in some instances, have the effect of a reinforcer through sounds characteristic of the apparatus.

Verplanck reported that student experimenters who had

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<sup>22</sup>J. L. Gewirtz and D. M. Baer, "Deprivation and Satiation of Social Reinforcers as Drive Conditioners," Journal of Abnormal and Social Psychology, 57 (1958), pp. 165-172.

prestige were more successful in conditioning the verbal behavior of subjects than student experimenters who had little prestige.<sup>23</sup>

Binder, McConnell, and Sjöholm used two experimenters who differed markedly in their physical appearance. They found that a petite, dainty female examiner was able to produce verbal conditioning in male and female subjects alike, while a large, husky male was unable to condition male or female subjects in the same experimental design.<sup>24</sup>

#### Personality Characteristics of Subjects

Consistent in the research in verbal conditioning is the fact that not all subjects are able to be conditioned. One variable that occurs is the wide and varied amount of research that is conducted; another is that some subjects just do not seem to respond to the contingent stimuli.

Weiss, Ullman, and Krasner showed in their experiment that people who are susceptible to being hypnotized

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<sup>23</sup>W. S. Verplanck, "The Control of Content of Conversation: Reinforcement of Statement of Opinion," Journal of Abnormal and Social Psychology, 51 (1955), pp. 667-668.

<sup>24</sup>A. Binder, D. McConnell, and N. Sjöholm, "Verbal Conditioning as a Function of Experimenter Characteristics," Journal of Abnormal and Social Psychology, 55 (1957), pp. 309-314.



correlate .35 with those who are able to be conditioned verbally.<sup>25</sup> This, however, accounts for only a small part of the problem. Another hypothesis that has been tested is that those persons who show the need for approval would be more susceptible to verbal conditioning than those who did not show a similar need. Reidy investigated this aspect of conditioning verbal behavior and found that those who scored high on the Need for Approval Scale did not respond significantly better in verbal conditioning than those who scored low on the Scale.<sup>26</sup>

Need for approval, aggressiveness, and fear of punishment were studied by Anderson. Subjects high in need for approval showed no significant increase in verbal conditioning in his study; however, the highly aggressive subjects showed more evidence of verbal conditioning than did the less aggressive subjects in a situation where the formation

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<sup>25</sup>A. L. Weiss, L. Ullman, and L. Krasner, "On the Relationship between Hypnotizability and Response to Verbal Operant Conditioning," Psychological Reports, 6 (1960), pp. 59-60.

<sup>26</sup>M. E. Reidy, "A Study of the Unconscious Effects of Approval and Disapproval on Verbal Behavior," (unpublished Doctoral Dissertation, Catholic University), Dissertation Abstracts, Vol. XVIII, 1263.

of a sentence using the aggressive verb was reinforced.<sup>27</sup>

### Schedules of Reinforcement and Acquisition

Several experimenters have studied the effect of schedules of reinforcement on the acquisition of verbal conditioning. Kanfer found that the schedule of reinforcement was a critical variable in the acquisition of a verbal response in a study performed in 1954.<sup>28</sup> Kanfer, in 1958, manipulated the reinforcement schedule and found that the groups receiving different types of schedules of reinforcement did not differ in acquisition. He varied the reinforcement on a 100 per cent basis to a 67 per cent basis and a 50 per cent basis. He found that there was no significant difference between the groups receiving the different reinforcement schedule.<sup>29</sup>

On the question of the scheduling of reinforcement, Timmons reported that the continuous reinforcement schedule

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<sup>27</sup>D. E. Anderson, "Personality Variables and Verbal Conditioning," (unpublished Doctoral Dissertation, The University of Nebraska), Dissertation Abstracts, Vol. XIX, 1811.

<sup>28</sup>F. Kanfer, "The Effect of Partial Reinforcement on Acquisition and Extinction of a Class of Verbal Responses," Journal of Experimental Psychology, 48 (1954), pp. 424-432.

<sup>29</sup>F. Kanfer, "Verbal Conditioning: Reinforcement Schedules and Experimenter Influence," Psychological Reports, 4 (1958), pp. 443-452.

results in faster verbal conditioning. McNair<sup>30</sup> also confirmed the study of Timmons when he reported that the higher the rate of reinforcement the higher the rate of verbalizations.

### Verbal Conditioning and Testing Procedures

The responses to many test items used today are of a verbal nature and are therefore of interest to the clinician involved in verbal behavior work. One of the first and most significant studies was performed by Fahmy. She investigated the effects of three different contingencies on the frequency of human responses on ink blots constructed by the experimenter. Thirty ink blot cards were used, the first eight of which were more likely to elicit human responses. The three contingent stimuli used were "that's a good one," "give another one please," and repeating the response. The group that received "that's a good one," gave a significantly larger number of human responses than any of the other experimental groups or the control group which received no reinforcement. The other two experimental groups and the control group did not significantly differ among the

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<sup>30</sup>D. M. McNair, "Reinforcement of Verbal Behavior," Journal of Experimental Psychology, 53 (1957), pp. 40-46.

rates of human responses emitted by themselves.<sup>31</sup>

Essman conducted a study to show the results of verbal reinforcement on acquisition and extinction with the use of nonsense ink blots. There were four categories and the subjects were to place the card with the ink blot into one of the predetermined slots. If the subject responded by placing the card in one of two slots they were reinforced with "good." One group of subjects were reinforced on a 100 per cent schedule for the correct response and another group was reinforced on a 50 per cent schedule of reinforcement. Both experimental groups were superior in acquisition to the control group but were different significantly from the control group. Neither of the reinforced groups showed significant change in response when the reinforcement was withdrawn, but the 50 per cent level showed less decrement than the 100 per cent group.<sup>32</sup>

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<sup>31</sup>S. A. Fahmy, "Conditioning and Extinction of a Referential Verbal Response Class in a Situation Resembling a Clinical Diagnostic Interview," (unpublished Doctoral Dissertation, Indiana University) Dissertation Abstracts, 1953, Vol. XIII, 873.

<sup>32</sup>W. B. Essman, "Effect of Reinforcement Schedule on Perceptual Learning without Awareness," Perceptual Motor Skills, 6 (1956), p. 168.

Wickes used verbal and non-verbal stimuli contingent upon human movement responses on an ink blot test. The verbal stimuli were "fine," "good," and "all right;" the non-verbal stimuli were nodding the head three times, a smile, and leaning forward in the chair and returning to the original position. The stimuli, whether verbal or non-verbal, were used in sequence for successful critical responses. He reported that both kinds of stimuli were effective but that the verbal stimuli were more effective than the nonverbal.<sup>33</sup>

Nuthmann matched three groups of subjects on a self-acceptance level by giving them a personality test. For one group of subjects the contingent stimulus was "good," for another it was a light, and for the third, no contingent stimulus was used. This last group was designated the control group. The frequency of self-acceptance responses was increased by the use of "good," but not by the use of the light. He also reported that there were no differences in performance with subjects who were aware or not aware of the contingent stimuli.<sup>34</sup>

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<sup>33</sup>T. A. Wickes, "Examiner Influence in a Testing Situation," Journal of Consulting Psychology, 20 (1956), pp. 23-25.

<sup>34</sup>A. M. Nuthmann, "Conditioning of a Response Class on a Personality Test," Journal of Abnormal and Social Psychology, 54 (1957), pp. 12-23.

The most comprehensive and extensive study of verbal conditioning and testing procedures was conducted by Simkins. He investigated the effects of two contingent stimuli on three different response categories of the Holtzman Inkblot Test. The response categories were a content category, a determinant category and a location category. The contingent stimuli used were "good," or "that's fine" with a smile, and "mmm-hmm" with a nod of the head. The former stimulus was designated as a strong stimulus while the latter was designated as weaker. Each subject received a total of 75 cards with fifteen cards being presented every day. No reinforcement was administered to the experimental groups on the first or last day of the experiment and the control group received no reinforcement throughout the experiment.

The experimental groups showed significant differences over the control group on the determinant and content classes, but not on the location class. Though there seemed to be little difference between the two reinforcers, the weak tended to be more effective on the location class while the strong was more effective with the determinant class.<sup>35</sup>

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<sup>35</sup>L. D. Simkins, "Behavioral Modification as a Function of Examiner Reinforcement and Situational Variables on a Projective Testing Situation," (unpublished Doctoral Dissertation, The University of Houston, 1959), Dissertation Abstracts, Vol. XX, 1171.

In an experiment by Dinoff, subject awareness of examiner influence in a testing situation was studied. The contingent stimuli used were "mmm-hmm" and a nod of the head. The experiment used four groups: the first was the control; the second was reinforced for human movement; the third was reinforced for animal responses; and the fourth was reinforced for all responses. The test used was the Rorschach. The results showed that the reinforcers had significant effects on all response classes. A one-tailed analysis was run on the data and it was found that it was significant at the .05 level of significance. All subjects were unaware of the reinforcers except for two of the 28 subjects.<sup>36</sup>

One of the few studies which has dealt with the Wechsler Intelligence Scale for Children and verbal conditioning was done by Mansling. He hypothesized that the effects of friendly and unfriendly interaction on the administration and scoring of an intelligence test would alter the score on the test. Mansling stated that the administrator of the test would be more lenient to a warm subject than to a cold subject and would, therefore, increase

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<sup>36</sup>M. Dinoff, "Subject Awareness of Examiner Influence in a Testing Situation," Journal of Consulting Psychology, 24 (1960), pp. 465-470.

the score of the test for the warm subject. Eleven graduate students were used to administer the test. All were experienced in testing with the Wechsler Intelligence Scale for Children, having administered eighteen to two hundred tests with a mean of twenty-one administrations. Each person to be tested had memorized the answers to the test and gave only the memorized response to the administrator of the test. The results showed that the warm subjects received higher scores than their counterparts who were actually the same subjects reacting in a cold, stiff manner. One of the original administrators was dropped from the experiment because he figured out the design of the experiment after the initial administrations. All sessions were taped, unknown to the administrator and were checked at the end of the experiment. The results clearly showed that the administrators were more lenient in their classification of answers with the warm subjects with whom there had been much verbal interaction before, during, and after the test.<sup>37</sup>

It was concluded from the literature in the field that contingent stimuli in one form or another have been found to be effective in changing the frequency of a response in a testing situation.

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<sup>37</sup>Mansling, op. cit.



## CHAPTER III

### EXPERIMENTAL DESIGN AND PROCEDURE

#### General Method

This research was designed to investigate the results of positive verbal reinforcement on the results of three subtests of the Wechsler Intelligence Scale for Children. The subtests used were (1) comprehension, (2) similarities, and (3) vocabulary. The subjects of the experimental group received the three subtests of the Wechsler Intelligence Scale for Children with the use of positive verbal reinforcement for correct and partially correct items. Partially correct answers were those that were designated by the Wechsler manual as receiving one point instead of the two points. Correct answers were those that were scoreable with the full two points. The subjects of the control group were administered the three subtests of the Wechsler Intelligence Scale for Children, using the standardized procedures of the Wechsler manual. The control group received no positive verbal reinforcement.

The three subtests of the Wechsler Intelligence Scale

were used because these three tests are the only ones in which the subject is given a chance to express himself freely. By reinforcing verbalization it was expected that the subject would express himself more adequately, resulting in the examiner being able to determine more accurately which was a correct, partially correct, or incorrect answer.

### Materials and Equipment

Experimental Room. All subjects were tested in a testing booth in the Administration Building of the Geary County Unified School District, No. 475. The room was equipped with a two-way mirror as well as facilities for an external tape recorder. The room was furnished with two chairs and a table.

Tape Recorder. All of the testing situations were taped with the use of an outside recorder. The recorder was connected to an intercom that was standard equipment in the room, and none of the subjects were aware that their responses were being recorded.

Test and Materials. All subjects were given three subtests from the scale of Wechsler Intelligence Scale for Children. The three subtests were (1) comprehension, (2) similarities, and (3) vocabulary of the verbal scale. Other materials used were paper and pencils.

### The Subjects

Sample. During the fall semester of 1967, the records of all students enrolled in the fifth grade in the Geary County Unified School District, No. 475, were screened. One hundred thirty-eight students of the 754 students enrolled were selected on the basis of their scores on the Kuhlmann-Finch Intelligence Test. This is a group test taking thirty to forty-five minutes to administer and published by Personnel Press. Of the original 754 students, 138 had a reported Intelligence Quotient between 95 and 105. All students had taken the test during the last two months of their fourth grade year in the Geary County Unified School District, No. 475, or in their respective districts. Of the 138 students who had Intelligence Quotients of 95 to 105, 118 students were screened on the basis of age. Only students between the ages of ten years, zero months and ten years, eleven months were selected.

Of the 118 students who remained, 100 students were chosen randomly by their tests. The final population figure of thirty was reached by using the Rand table of random numbers.<sup>38</sup> These thirty students were then divided into

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<sup>38</sup>Rand Corporation, A Million Random Digits with 100,000 Normal Deviates (Glenco, Illinois: Free Press, 1955).

experimental and control groups using the same table. A coin was flipped to designate which were the control and experimental groups.

Description. A complete description of the subjects is presented in Table I on the following page.

### Research Design

A two-randomized-groups design was used for the experiment. The subjects were divided into the control and experimental groups by using the Rand Corporation table of random numbers. All subjects were administered the comprehension, similarities, and vocabulary subtests of the Wechsler Intelligence Scale for Children. The experimental group received positive verbal reinforcement for correct answers. The control group received no verbal reinforcement.

### Research Procedure

All students were bussed to the administration center of the Geary County Unified School District and directed to the testing room of Special School Services. Students designated as experimental subjects were then given three subtests--comprehension, similarities, and vocabulary--of the Wechsler Intelligence Scale for Children, using standard Wechsler manual procedure but with the addition of positive

TABLE I

MEASURED INTELLIGENCE, AGE LEVELS, AND SEX OF THE  
SUBJECTS IN THE SAMPLE

Experimental Group				Control Group			
Subjects	Sex	Age	I. Q.	Subjects	Sex	Age	I. Q.
1	M	10-2	96	1	F	10-6	103
2	M	10-10	101	2	M	10-10	97
3	M	10-11	98	3	F	10-0	100
4	F	10-7	100	4	F	10-1	101
5	M	10-1	105	5	M	10-0	104
6	F	10-6	103	6	M	10-9	105
7	F	10-8	95	7	F	10-8	95
8	M	10-4	101	8	F	10-2	97
9	F	10-6	97	9	M	10-5	100
10	F	10-5	96	10	F	10-5	99
11	F	10-1	105	11	F	10-2	99
12	M	10-1	102	12	M	10-0	98
13	M	10-6	100	13	M	10-4	103
14	M	10-9	99	14	M	10-3	105
15	M	10-7	96	15	M	10-10	95
Mean Chronological Age = 10-5.6				Mean Chronological Age = 10-4			
Mean Intelligence Quotient = 99.6				Mean Intelligence Quotient = 100.1			
Sex: 9 male, 6 female				Sex: 8 male, 7 female			

verbal reinforcement given immediately after each correct answer. The reinforcement was administered if the answer was scoreable as completely or partially correct according to the Wechsler manual.

Students designated as control subjects were also given the three subtests--comprehension, similarities, and vocabulary--of the Wechsler Intelligence Scale for Children, using standard Wechsler manual procedure but with no verbal reinforcement. All students were then bussed back to their respective schools.

#### Verbalization Output

To compute verbal output between the experimental and the control group, all testing sessions were recorded. Verbalization output was computed by actually counting the number of words spoken during the testing situation by the subject. The use of a tape recorder made it possible for the experimenter to record the number of words spoken by the subject during the test at a later date.

The method used to count the verbal output follows:

1. All tapes were jacked into a Stenorette dictating machine and the verbalizations were transferred to dictatape.
2. A typewriter space bar was depressed for each word recorded, using an eighty-space line.

3. Each tape was computed until two people who computed the tapes had matching numbers.

4. The actual number of words spoken were then recorded.

### Reinforcing Stimuli

The subjects in the experimental group were reinforced after every correct answer by the experimenter saying "good, very good," or "very good, you're doing well," immediately after the answer was given by the subject.

The subjects in the experimental group were also reinforced for answers which are designated by the Wechsler manual as partially correct answers. These are answers which receive a credit of one point instead of the full two points. When a partially correct answer was given, the experimenter responded with the reinforcing stimulus, "uh-hum, fine."

## CHAPTER IV

### RESULTS OF THE EXPERIMENT

The basic design for the experiment concerning both of the hypotheses was a two-randomized-group design. A t-test was chosen as the appropriate statistical analysis of these data. In order to justify the use of a t-test in problems involving difference between means, two assumptions must be met: the populations sampled are normal, and the population variances are homogeneous.<sup>39</sup>

Concerning the first assumption, Hays<sup>40</sup> reports that as long as the sample size is moderate for each group, quite severe departures from normality seem to make little practical differences in the conclusions reached. Since the subjects were randomly assigned to treatment groups it was decided that the assumption was met.

Concerning the second assumption, Hays<sup>41</sup> reports for for samples of equal size relatively big differences in the

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<sup>39</sup>W. L. Hays, Statistics for Psychologists (New York: Holt, Rinehart, and Winston, 1965), pp. 321-322.

<sup>40</sup>Ibid., p. 322.

<sup>41</sup>Ibid.



population variances seem to have relatively small consequences for the conclusions derived from a t-test. Hays reports, "the moral to be plain, when in doubt use samples of the same size."<sup>42</sup> Hays also reports that where tests of population variance are needed most (small samples) the test for homogeneity are poorest. Since both the control and the experimental groups were the same size, fifteen in each group, and were randomly selected from the same population, it was decided that the second assumption was also met. A level of confidence of .05 was set as a criteria for evaluating the results of the analysis.

For the statistical analysis of the two-randomized-group design a one-tailed t-test was used. The formula for the  $t$  as reported by F. J. McGuigan is as follows:<sup>43</sup>

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(\sum x_1^2/n_1) - (\bar{X}_1)^2}{n_1 - 1} + \frac{(\sum x_2^2/n_2) - (\bar{X}_2)^2}{n_2 - 1}}}$$

where  $\bar{X}_1$  = Mean of the experimental group

$\bar{X}_2$  = Mean of the control group

$n_1$  = Number of subjects in experimental group

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<sup>42</sup>Ibid.

<sup>43</sup>F. J. McGuigan, A Methodological Approach--Experimental Psychology (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961), p. 85.

$n_2$  = Number of subjects in control group

$X_1$  = Sum of the scores for experimental group

$X_2$  = Sum of the scores for control group

The formula above is to determine if the difference between the means of the experimental and control groups are sufficiently large enough not to be attributed to chance. It will also determine how large the  $t$  must be in order to be significant.

The degrees of freedom (df) available for the application of the McGuigan t-test are a function of the number of subjects in the experiment. More specifically,  $df = N - 2$ .<sup>44</sup> N is the number of subjects in one group ( $n^1$ ) plus the number of subjects in the second group ( $n^2$ ), where

$$df = N - 2$$

$$N = n^1 + n^2$$

$$\text{i.e., } N = 15 + 15 = 30$$

$$df = 30 - 2 = 28$$

If the .05 is set as the probability level, then the  $t$  with twenty-eight degrees of freedom ( $df = N - 2$ ) must equal or surpass 2.048.<sup>45</sup>

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<sup>44</sup>Ibid., p. 89.

<sup>45</sup>Ibid., p. 90.

TABLE III

THE VALUES FOR DETERMINATION OF  $t$   
FOR VERBAL OUTPUT

Experimental Group				Control Group			
Ss	X <sub>1</sub>	X <sub>1</sub> <sup>2</sup>	Ss	X <sub>2</sub>	X <sub>2</sub> <sup>2</sup>		
1	382	145924	1	302	91204		
2	295	87025	2	289	83521		
3	405	164025	3	287	82369		
4	360	129600	4	207	42849		
5	401	160801	5	326	106276		
6	299	89401	6	225	50625		
7	307	94249	7	315	99225		
8	326	106276	8	300	90000		
9	322	103684	9	240	57600		
10	386	148996	10	264	69696		
11	371	137641	11	239	57121		
12	350	122500	12	244	59536		
13	345	119025	13	245	60025		
14	376	141376	14	260	67600		
15	364	132496	15	317	100489		
N=15	ΣX <sub>1</sub> 5289	ΣX <sub>1</sub> <sup>2</sup> 1883019	ΣX <sub>2</sub> 4060	ΣX <sub>2</sub> <sup>2</sup> 1118136	ΣX <sub>2</sub> = 270.66		

$N_1$  = No. of students, experimental group  $N_2$  = No. of students, control group  
 $\Sigma X_1$  = Sum of scores, experimental group  $\Sigma X_2$  = Sum of scores, control group  
 $\bar{X}_1$  = Mean, experimental group  $\bar{X}_2$  = Mean, control group

### Test for Change in Verbal Output

To test for a significant difference between the number of verbal responses of the control and the experimental groups when positive verbal reinforcement is administered to the experimental group, using three subtests of the Wechsler Intelligence Scale for Children, a one-tailed t-test was used.

The results show that the obtained  $t$  of 2.916 was significant at the .05 level of confidence. The level of probability that had to be reached was 2.048.<sup>46</sup> Therefore, the null hypothesis was rejected.

The results follow in Table II. The values follow in Table III on the following page.

TABLE II

#### SUMMARY TABLE AND RESULTS OF THE t-TEST FOR VERBAL OUTPUT

Group	N	Mean	X	X <sup>2</sup>	df*
Experimental	15	352.200	5289	1883019	14
Control	15	270.666	4589	1118136	14
$t = 2.916^{**}$					

\* Degrees of freedom using the McGuigan  $t$  are  $df = N - 2$ . The  $df$  was then 28.

\*\*  $t$  had to be greater than 2.048 to reach the .05 level of confidence.

<sup>46</sup> Ibid.

### Test for Changes in Scaled Scores

To test that there will be no significant difference of scaled scores between the control and the experimental groups when positive verbal reinforcement is administered to the experimental group using three subtests of the Wechsler Intelligence Scale for Children, a one-tailed  $t$ -test was used. The results show that the obtained  $t$  of 2.614 was significant at the .05 level of confidence. The level of probability that had to be reached was 2.048.<sup>47</sup> The null hypothesis was therefore rejected.

The results follow in Table IV. The values follow in Table V on the following page.

TABLE IV

SUMMARY TABLE AND RESULTS OF THE  $t$  TEST  
FOR SCALED SCORE PRODUCTION

Control	N	Mean	X	X <sup>2</sup>	df*
Experimental	15	32.933	494	16410	14
Control	15	30.266	454	13822	14
$t = 2.614^{**}$					

\* Degrees of freedom using the McGuigan  $t$  are  
 $df = N - 2$ . The  $df$  was then 28.

\*\*  $t$  had to be greater than 2.048 to reach  
.05 level of confidence.

<sup>47</sup>Ibid.

TABLE V

THE VALUES FOR DETERMINATION OF  $t$   
FOR SCALED SCORES PRODUCTION

Experimental Group			Control Group		
Ss	$X_1$	$X_1^2$	Ss	$X_2$	$X_2^2$
1	27	729	1	33	1089
2	31	961	2	28	784
3	34	1156	3	31	961
4	37	1396	4	27	729
5	36	1296	5	29	841
6	35	1225	6	30	900
7	31	961	7	28	784
8	30	900	8	32	1024
9	29	841	9	29	841
10	33	1089	10	32	1024
11	39	1521	11	29	841
12	33	1089	12	31	961
13	34	1156	13	33	1089
14	31	961	14	35	1225
15	34	1156	15	27	729
N=15	$\sum X_1$ 494	$\sum X_1^2$ 16410	N=15	$\sum X_2$ 454	$\sum X_2^2$ 13822
	$\bar{X}_1 = 32.933$			$\bar{X} = 30.266$	

$N_1$  = No. of students, experimental group     $N_2$  = No. of students, control group  
 $\sum X_1$  = Sum of scores, experimental group     $\sum X_2$  = Sum of scores, control group  
 $\bar{X}_1$  = Mean, experimental group     $\bar{X}_2$  = Mean, control group

## CHAPTER V

### DISCUSSION, SUMMARY, AND RECOMMENDATIONS

The purpose of the present study was to determine if positive verbal reinforcement used with three subtests of the Wechsler Intelligence Scale for Children would be responsible for a change in the subjects' scaled scores and verbal output. The review of the literature reported several studies demonstrating the effects of positive verbal reinforcement on tests. They indicated that positive verbal reinforcement did in some cases change the results of scores when used with tests. The present study attempted to demonstrate that positive verbal reinforcement, when used with the subtests of comprehension, similarities, and vocabulary of the Wechsler Intelligence Scale for Children, would change those subjects' subtest scaled scores and the subjects' verbal output.

#### Discussion and Conclusions

The hypotheses presented in Chapter I proposed that no change in scaled scores or verbal output would occur due to the effects of positive verbal reinforcement on three

subtests of the Wechsler Intelligence Scale for Children.

In the case of the first null hypothesis, the null hypothesis was rejected. The null hypothesis as stated was, "There will be no significant differences between the number of verbal responses of the control and the experimental groups when positive verbal reinforcement is administered to the experimental group using three subtests of the Wechsler Intelligence Scale for Children."

The null hypothesis was rejected because the reported t reached the .05 level of confidence. This indicated that positive verbal reinforcement did affect the amount of verbalization when the subjects were administered the three subtests of the Wechsler Intelligence Scale for Children.

Many studies have indicated that examiner influences play an important part in testing.<sup>48, 49, 50, 51, 52</sup> When an examiner is testing a child with the Wechsler Scale he should be cautious in staying within the prescribed instructions, as a variance in the area of reinforcement will affect

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<sup>48</sup>Mansling, op. cit., 1957.

<sup>49</sup>Mansling, op. cit., 1960.

<sup>50</sup>Weiss, op. cit.

<sup>51</sup>Kanfer, op. cit.

<sup>52</sup>Wickes, op. cit.



the amount of verbalization on subtests of comprehension, similarities, and vocabulary.

Null hypothesis number two was also rejected because the reported t reached the .05 level of confidence. The null hypothesis as stated was, "There will be no significant differences between the scaled scores between the experimental and the control groups when positive verbal reinforcement is administered to the experimental group using three subtests of the Wechsler Intelligence Scale for Children."

Many studies have indicated that examiner influences play an important part in testing.<sup>53, 54, 55, 56, 57</sup> These studies point out the role of the examiner and the influence that he exhibits on the results of the test with the use of various procedures. One of these procedures is that of positive verbal reinforcement. When an examiner is testing a child, he should be aware that by the use of positive verbal reinforcement a child's subtest score (comprehension, similarities, and vocabulary on the Wechsler Intelligence Scale for Children) may result in an increased scaled score.

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<sup>53</sup>Mansling, op. cit., 1957.

<sup>54</sup>Mansling, op. cit., 1960.

<sup>55</sup>Weiss, op. cit.

<sup>56</sup>Kanfer, op. cit.

<sup>57</sup>Wickes, op. cit.

Increased scaled scores can in some instances affect the overall Intelligence Quotient reported by the Wechsler Intelligence Scale for Children. And if this were the case, the score reported by the examiner would not be accurate because the procedure of positive verbal reinforcement was not used in the standardization of the Wechsler Scale.

### Summary

One hundred fifth grade students were selected from Geary County Unified School District, No. 475. These subjects had a mean chronological age of ten years, 4.8 months. The range of the chronological ages was from ten years, zero months, to ten years, eleven months. The subjects had a mean Intelligence Quotient of 99.85. The range of their Intelligence Quotients was 95 to 105.

Of the original one hundred students, thirty were selected by the use of a table of random numbers. These thirty were then divided into two groups by the use of a table of random numbers. The groups were then designated control and experimental by the toss of a coin.

The subjects in the control group were given three subtests (comprehension, similarities, and vocabulary) of the Wechsler Intelligence Scale for Children. These subtests were administered using standard Wechsler manual procedure.

The subjects in the experimental group were then given the same subtests of the Wechsler Intelligence Scale for Children. These subtests were administered using standard Wechsler manual procedure but with the addition of positive verbal reinforcement.

The statistical analysis revealed that there was significant difference between the control and experimental groups in verbal output. The experimental group did significantly better, statistically, than the control group. The null hypothesis was rejected and the  $t$  was significant at the .05 level of confidence.

The statistical analysis also revealed that there were significant differences in scaled scores between the control and the experimental groups. The experimental group did significantly better than the control group. A  $t$  test found that the difference was significant at the .05 level of confidence. The null hypothesis for this variable was rejected.

### Recommendations

The following recommendations are made on the basis of the findings of the present study:

- (1) The number of subjects in the sample should be increased.

(2) The Wechsler Intelligence Scale for Children should not be used with positive verbal reinforcement under standardization as it now exists.

(3) The full scale of the Wechsler Intelligence Scale for Children should be used in order to increase the significance of the study.

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