Differences in the effectiveness of auditory and visual cues for autistic children in a two-choice discrimination learning task.

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University of Windsor

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DIFFERENCES IN THE EFFECTIVENESS OF AUDITORY AND VISUAL 
CUES FOR AUTISTIC CHILDREN IN A TWO-CHOICE 
DISCRIMINATION LEARNING TASK

by

SYLVIA ROSE
B.A., University of Windsor, 1962

A Thesis
Submitted to the Faculty of Graduate Studies through the 
Department of Psychology in Partial Fulfillment 
of the Requirements for the Degree of 
Master of Arts at the 
University of Windsor

Windsor, Ontario, Canada
1964
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ABSTRACT

This study was an attempt to investigate the differential effectiveness of visual and auditory stimuli as cues in a simple two-choice discrimination task of learning for autistic as compared to nonautistic children.

The experimental group consisted of 18 hospitalized autistic children, and 13 nonautistic children. The stimulus conditions were light alone, buzzer alone, and light and buzzer combined. The learning task was to determine that one of two doors should be opened to obtain a reward. The subjects were measured for number of responses, number of correct responses, and reaction time to each stimulus condition.

The auditory cue was found to be less effective than the visual cue. It was even less effective for autistic than for nonautistic children, and this difference was statistically reliable.
This study began with my curiosity as to the possible variables in the etiology of the autistic syndrome. Experimental studies in perception led to interest in this field in relation to autism, which was further stimulated by contact with some of these children. Most of the background material came from the writings of L. Kanner, L. Bender and W. Goldfarb on the subject of childhood psychoses.

Thanks to the cooperation of the staff and children at Thistletown Hospital, the ideas for the study were modified and finally became a reality. My thanks also to the school inspector, principals and teachers of St. Angela's and St. Edmond's schools for their permission to test and cooperation in testing further subjects for the control group, and to the children themselves for taking part.

Finally thanks to my Mentor, Dr. A. Smith, for his early help in the formulation of the study, and his encouragement, criticism and patient guidance through its later stages; and to my readers, Mr. M. Starr and Dr. F. T. Kingston, for their guidance and suggestions. Also my thanks to Dr. B. Noddinott of Thistletown Hospital for his assistance in the experimental design, for making the hospital children and facilities available for the experiment, and for testing the six new autistic children.
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Autistic Children</td>
<td>1</td>
</tr>
<tr>
<td>Background of Related Research</td>
<td>3</td>
</tr>
<tr>
<td>Purpose of Present Research</td>
<td>6</td>
</tr>
<tr>
<td>Experimental Sample</td>
<td>8</td>
</tr>
<tr>
<td>Equipment</td>
<td>10</td>
</tr>
<tr>
<td>Experimental Procedure</td>
<td>11</td>
</tr>
<tr>
<td>Mean Responses for Groups and Conditions</td>
<td>12</td>
</tr>
<tr>
<td>Relative Effectiveness of Sound Compared to Light</td>
<td>13</td>
</tr>
<tr>
<td>Differences in Relative Effectiveness</td>
<td>14</td>
</tr>
<tr>
<td>Differences of Reward Value</td>
<td>15</td>
</tr>
<tr>
<td>Differences Between Hospitalized and School Children</td>
<td>16</td>
</tr>
<tr>
<td>Non-scorable Responses of Autistic Subjects</td>
<td>18</td>
</tr>
<tr>
<td>Differences between Stimuli</td>
<td>19</td>
</tr>
<tr>
<td>Summary and Conclusions</td>
<td>20</td>
</tr>
<tr>
<td>Bibliography</td>
<td>22</td>
</tr>
<tr>
<td>Vita Authoris</td>
<td>23</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mean Scores for Experimental and Control Groups for Three Conditions</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Relative Effectiveness of Buzzer vs Light (R/L x 100)</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Results of Mann-Whitney U Test of Percentage Differences of Buzzer over Light Scores</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Differences in the Average Number of Responses between the Two Control Groups</td>
<td>16</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

The Autistic child, from very early age, appears to shut out his environment, and does not develop social relationships in the normal pattern. He fails to develop adequate vocal or physical communication with the world, and movement that does occur tends to be repetitious. People, objects, even himself, he seeks to control through manipulation. A toy truck, e.g., might be interesting to the child because he could repeatedly spin its wheels or stroke its shiny surface, but there would be no interest in it as a truck. If an adult, e.g., was barring his way to a goal, the adult would not be attacked as a person, but the interfering arm or leg or body would be pushed or pulled as an object without any reference to the rest of the individual. Thwarting of his wishes is as likely to give rise to a temper tantrum as to an objective attack on the offending object; and self-destructive acts as well as twirling and rocking movements of his own body are not uncommon. It is a strange sight to see a group of these children, 5, 6, 7 and 8 years of age in a playroom together, each occupied with his own thoughts or movements, and paying little or no attention to each other.

The Autistic child is happiest when alone. Although seemingly unaffected by environmental stimuli that do not directly interfere with him, changes in living patterns and routines produce
acute anxiety. His thinking seems to be so concrete and specific as to prevent generalizations, and inhibit grasping causal relationships. These children are not feebleminded, and show evidence of native intelligence often above average. However, because they are autistic, they have no desire to communicate with the external world except for basic self-gratification, and are thus severely retarded socially, and give a general impression of feeblemindedness.

A good example of this is their speech. Because of their disinterest in communicating with others, speech is usually delayed by several years, and may never develop spontaneously. Those children who are not mute tend to use speech more for their own amusement than as a means of communication. Thus echolalia is a common phenomenon, and although sentences or phrases may be repeated immediately, they are often stored for hours, days, or weeks, and then delivered completely out of context. One of the children observed by the author would remain mute for days, then suddenly parrot some phrase without any connection to present events, and all the more startling because of its mature content. Another of the children rarely spoke without encouragement, yet would go about singing to herself from a seemingly limitless repertoire of songs and hymns which she had heard on the radio or from the staff. In some children speech may deteriorate, even to mutism, after having once been acquired.

Another severely abnormal feature in these children, and one in which they resemble the adult schizophrenic, is their affect. They do not react in a normal way to stimulation. When one of these children is hurt he may show no emotion, or he may smile, laugh, or giggle,
or a more normal type of reaction may be delayed for hours, days, or longer. Displays of emotion, including severe hostile aggression, may occur without any apparent environmental stimulus preceding it.

The classification of these children has been debated, and they are often said to have "Early Childhood Schizophrenia". However, as Robinson (1961) has pointed out, one of the main features of schizophrenia is deterioration, and signifies regression from an earlier, more normal period of development. He goes on to say:

In the majority of severe disturbances of early childhood, the onset of the disease can, as Kanner stated, be traced to the earliest years. Withdrawal in the young child consists of self-isolation and a failure or refusal to enter into interpersonal relationships, rather than an actual departure or regression or regression from a previously achieved level of social participation.

The symptomatology of childhood psychoses differs from that of schizophrenia, as we know it in the older patient. Frank delusional material is absent. Favoured ideas are expressed in a repetitive stereotyped manner. Repetitive or compulsive motor activity often represents the most evident features of the illness. Hallucination is unusual, excepting in the form of momentary experiences which are associated with terror or anxiety. ....... The similarity of childhood psychoses and schizophrenia in the adult rests chiefly on the factor of social withdrawal (failure to participate) and the bizarre or unusual qualities of the behaviour.

Kanner (1943) termed this "Autistic Disturbances of Affective Contact", and later, (1944), "Early Infantile Autism", and remained convinced that it was a distinct syndrome, "differentiated from childhood schizophrenia by virtue of detachment present no later than the first year of life, and from oligophrenia by the evidence of good intellectual potentialities." However, in follow-up studies on Autism, Eisenberg and Kanner (1956) have included in their classification a number of children reported to have developed normally for the first 18 to 20 months, because the onset was much earlier and the phenomena-
logy distinct from cases of childhood schizophrenia.

Thus, although a few of the 18 children in this study have been diagnosed as "Early Childhood Schizophrenia" rather than "Primary Infantile Autism", they all fit the autistic syndrome already described. Since the researchers in this field by no means agree on the nomenclature, research on children classified in categories other than that of Early or Primary Infantile Autism has been utilized by this author if such children fitted Kanner's syndrome.

Primary Infantile Autism is a condition for which the cause has never been adequately demonstrated. Eisenberg and Kanner (1956), in studying 120 of these children could find no consistent or apparently related physical abnormalities. They found a sex difference of boys over girls in a ratio of 4 to 1. They found that almost universally the parents were intelligent, obsessive and emotionally frigid, but did not consider this to be more than a possible contributing cause. Bender (1956), Fish (1959) and others consider one of the major contributing causes to be a deviant maturational pattern, which Bender terms "a maturational lag at the embryonic level characterized by a primitive plasticity in all areas from which subsequent behaviour develops". Bender definitely claims a biological basis for the behavioural deviations which these children exhibit.

Servis and Garcia (1961) recently studied 80 such children, and concluded that the difficulties invariably involved the developmental stage when the mother was the child's primary object. Many investigators seem to agree that an early unsatisfactory mother-child relationship may well be an important, if not the most important,
aetiological factor in this condition. However, the parents of such children usually claim that the children were "different", i.e., unresponsive, almost from birth.

If such children had something wrong with one or more of their sense modalities, this might well account for the difference in their responsiveness from that of other infants. One of the most common and most remarkable symptoms of this condition is the disturbance of the normal speech pattern. Not only do these children show various degrees of autism, various degrees of delay in the acquisition of speech, as well as limited vocabulary, poor sentence structure, concreteness and literalness in word use and echolalia, but many of them never acquire speech, (Kanner (1960) estimated one-third), and many of those who do do not speak distinctly. Is this speech disturbance, like the neologisms of the schizophrenic, a result of the autistic personality, or could it be due in part to defective auditory input, or to an inability to utilize auditory cues effectively?

It has often been observed that people who are blind seem to suffer less personality disturbance than people who are deaf, and Sharoff (1959) discusses the possible effect on the emotional development of the deaf child when non-verbal communication is abruptly cut off in favour of talk, which he cannot hear. He quoted Reusch and Kees:

"In the first year of life expression necessarily must occur through non-verbal means. The child literally speaks with his whole body. Difficulties arise when parents are not flexible in communicating non-verbally and fail to respond at each age level with appropriate motions. An impoverishment of communication and character development can be observed in those children, who
grow up in surroundings, where the verbal was emphasized too early and when messages expressed in non-verbal terms were left unanswered." Reusch and Kees here are referring to the development of the hearing child. How much greater impoverishment of communication and character development may we anticipate in the deaf child, where the non-verbal constitutes his only method of communicating.

As Rosensweig (1959) notes, sensory deprivation would restrict the meaning of the environment, and observes, "As a model psychosis, the sensory deprivation experiment much more closely resembles schizophrenia than do the experiments with LSD or mescaline."

Goldfarb (1956 and 1961) reports that the contact sense modalities are preferred by the more regressed childhood schizophrenics to the visual and auditory fields. Harris (1959) noted that schizophrenics were more tolerant to conditions of a soundproof cubicle than normals. Mettler (1955) claims an organic dysfunction as the basis for the perceptual capacity disturbance of schizophrenics which makes it difficult or impossible for the child to establish adequate reality contacts. Hall (1954) noted that acute schizophrenics showed a high degree of response time deficit to auditory stimuli. In an unpublished study carried out in Denmark, it was found that the hearing of children of schizophrenic parents was not as good as the hearing of the children of non-schizophrenic parents.*

On the basis of all this evidence, then, it appears that there may be a factor of sensory deprivation of some type, and probably in the auditory field, in the aetiology of Primary Infantile Autism. Since any such postulated sensory defect could well be difficult to

* Dr. B. Hoddinott, personal communication.
demonstrate by standard tests, particularly in view of the real problem in communicating with these autistic children, it was decided to study the way they handled sensory cues in a simple learning problem, with a food reward to encourage response. The particular learning task chosen was a simple two-choice discrimination. The particular hypothesis was that auditory cues would be less effective than visual, for autistic children.
CHAPTER II

METHODOLOGY AND PROCEDURE

Subjects

Experimental Group. There were 18 autistic children in this group. There were 12 children, 4 girls and 8 boys, between the ages of 5 years 6 months and 10 years 3 months, who had been classified as Autistic, and had been under residential treatment in the same hospital ward together for a period of more than 18 months. Six of these children had been shown to be conditionable in an experiment carried out the previous year, in which the manipulation of objects had been rewarded by popcorn. Another group of autistic children, five boys and one girl, between the ages of four years and seven years one month, were tested by Dr. E. Roddinott, following approximately six months residential treatment in the same hospital as the first group.

Control Group. There were originally a total of 18 children in this group, matched for sex, and as closely as possible for age, to the experimental group. Six of these children, five boys and one girl, were from the same hospital as the experimental group. They were classified neither as schizophrenic or autistic, but as neurotic or character disorder, and none of their parents were known or suspected to be schizophrenic. The other 12 children in this group, 4 girls and 8 boys, were from two Windsor grade schools. They were rated as normal by their teachers, and there was no known history of mental
illness in their backgrounds. Of these children, for various reasons, (failure to respond to the buzzer, failure to respond to the first series of trials, attitudes toward the testing situation, etc.), five had to be eliminated from the analysis. The usable control group, therefore, included 6 children from the hospital setting, and 7 from the Windsor schools, for a total of 13 subjects.

Experimental Design

Groups. The experimental subjects were divided into two groups of nine children each, matched as well as possible for sex, age, and conditionability, (since this is a conditioning type of experiment). Since there were two boys in whom some type of hearing impairment seemed more obvious, one was placed in each group. The groups were also matched as well as possible for degree of impairment of the children; e.g., ability in speech, self-care, self-protection, etc.

The control subjects were also split into two groups, matched as closely as possible for age and sex to the experimental groups. These groups are called Experimental Group I, Experimental Group II, Control Group I and Control Group II. Group I was given the visual stimulus first, and Group II was given the auditory stimulus first.

Trials. There were three blocks of twenty trials each. In each half of the twenty trials there were five cues for the right side and five cues for the left side, in random order, but never more than three of the same side in a row. A different random order of presentation was used for each block and for each child. Every other correct response was rewarded with two pieces of buttered popcorn. In Groups I, the
series of trials were in the order of light, buzzer, light and buzzer; and in Groups II, the order was buzzer, light, light and buzzer. The subjects were scored for number of responses, number of correct responses, and reaction time.

Equipment. This consisted of a large cardboard carton, with the back cut out. The front of the carton was three feet wide, and two feet three and one-half inches high. A door, eight inches wide and nine inches high, was cut in each of the outer lower corners of the carton front. Above each door a circle three inches in diameter was cut and backed with red silk. The distance between the centres of the circles was two feet, two and one-half inches. Looped white pipe cleaners were used as handles for the doors. A space five and one-half inches by eight inches behind each door was partitioned off with white paper. This was done to provide a clean white surface for the reward, and to obstruct the subjects' view from the equipment and experimenter behind the carton front.

A 60 watt light bulb was suspended behind each circle, and a muted darkroom buzzer was placed on the back edge of the table at one side or the other to produce a change in the direction of the stimulus. An audible switch was used for the lights and for the buzzer, to turn them on and off. This equipment, the popcorn used for the reward, a stop-watch and the scoring sheets, (which also included the schedule of reinforcement and the stimulus direction order), were placed on the table behind the carton front, the sides of which were angled out to approximately 120 degrees. A low child-size table was used for the equipment, and the experimenter sat on a small chair behind
the equipment, while the subject sat on a small chair 80 inches from
the table front, facing the centre of the equipment. Two stop-watches
were used, one by the examiner, and one by the assistant.

Procedure. The assistant brought the child into the room and intro-
duced him to the experimenter, who gave him popcorn from a cup. The
experimenter then placed the cup behind the equipment and opened the
right-hand door, showing the child the popcorn which had been placed
there. The child was encouraged to come up to the door, get the pop-
corn, then sit down again. This procedure was repeated with the left-
hand door. The experimenter then went behind the equipment and began
the trials. The assistant stood behind the child. Each twenty-second
trial began with a three-second presentation of the stimulus. For the
first trial of each series, the child was led up to the correct door
if he failed to respond to the cue within the first ten seconds. The
assistant tried to prevent the child from opening the second door,
(or from going behind the table), by going in the opposite door direc-
tion from the child. It was also the assistant's responsibility to
lead the child back to his seat, and to time the child's reaction from
the beginning of the trial to the pulling on the door handle, as the
experimenter could not see the child, and to report the reaction time
to the experimenter verbally.

Instructions. Because of the muteness and negativity of many of
the autistic children, formal instructions were not given. The chil-
don were told that they were going to play a game, and the children
in the control group were told that in this game we did not tell them
how it was played, that they had to figure that out for themselves.
CHAPTER III
PRESENTATION AND ANALYSIS OF RESULTS

Results

The mean number of responses, (correct and incorrect), mean number of correct responses, and average reaction time to the three stimulus conditions (light, buzzer, light and buzzer), were determined for both the experimental and control groups. These data are shown in Table 1.

Table 1

Mean Scores for Experimental and Control Groups for Three Conditions

<table>
<thead>
<tr>
<th>Groups</th>
<th>Light</th>
<th>Buzzer</th>
<th>Light &amp; Buzzer</th>
</tr>
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<tbody>
<tr>
<td>Nonaut.</td>
<td>16.92</td>
<td>16.84</td>
<td>5.16</td>
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</table>

* R. = Number of Responses
C.R. = Number of Correct Responses
R.T. = Average Reaction Time

Since the response data seemed very heterogeneous, and since the primary interest was in the differential effectiveness of light...
vs. sound as stimuli, it seemed more appropriate to derive a measure of the relative effectiveness of the auditory stimulus, as a percentage of the buzzer score with respect to the light score, for all three response categories, (number of responses, number of correct responses, and average reaction time), for each subject group, and to assess the group differences by a non-parametric test. Table 2 gives these mean relative effectiveness scores for which these groups averaged for all three response categories.

Table 2

<table>
<thead>
<tr>
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<th>No. of Responses</th>
<th>No. of Correct Responses</th>
<th>Av. Reaction Time</th>
</tr>
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<tbody>
<tr>
<td>Autistic</td>
<td>61.53</td>
<td>40.86</td>
<td>119.27</td>
</tr>
<tr>
<td>Nonautistic</td>
<td>95.82</td>
<td>56.77</td>
<td>133.51</td>
</tr>
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The auditory stimulus thus appears to be relatively less effective in the autistic children. The significance of the differences between the two groups was assessed by the Mann-Whitney U test (McNemar, 1962, pp. 377-378). The results of this analysis are given in Table 3.
Table 3
Results of Mann-Whitney U Test of Percentage Differences of Buzzer over Light Scores

<table>
<thead>
<tr>
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<th>$U_1$</th>
<th>z Score</th>
<th>Level of Significance</th>
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<tbody>
<tr>
<td>No. of Responses</td>
<td>176</td>
<td>2.30</td>
<td>.021*</td>
</tr>
<tr>
<td>No. of Correct Resp.</td>
<td>164.5</td>
<td>1.90</td>
<td>.057*</td>
</tr>
<tr>
<td>Av. Reaction Time</td>
<td>107</td>
<td>.40</td>
<td>.68916</td>
</tr>
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</table>

M = 31  Mean = 117  $\sigma = 27.65$  .05 z Score = 1.63
The fact that the experimental group, on the average, made fewer responses, fewer correct responses, and slower responses to all stimulus conditions than the controls was to be expected, as a lack of responsiveness to the environment is one of the characteristics of autistic children. Popcorn was chosen as the reward in an attempt to minimize these expected differences. The original group of 12 autistic children at the hospital had been inordinately fond of two food items, potato chips and popcorn. Friday for them was not Friday, but Chipday. One Friday when chips were not served, through an oversight on the part of the kitchen staff, many of the children refused their suppers. Whenever they went on an outing, popcorn was a must on the supply list, and even some of the children who spoke very little would say "Popcorn, popcorn", over and over, and the scattered were suddenly a group when it was being served. It was hoped, therefore, that the use of popcorn would elicit more responses from these children than other types of reward. However, it is questionable as to whether popcorn had the same reward value to all the children in the control group. It is probable that there would be a difference here between the grade-school group and the hospital children, as the former would have more opportunity to get popcorn and its nonessential dietary 15.
equivalents either from parents, other children, or with pocket-money, than would the hospital children. Table 1 shows the differences between the average number of responses of the hospital controls and the grade-schoolers.

Table 1

Differences in the Average Number of Responses between the Two Control Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Av. No. Responses Light</th>
<th>Buzzer</th>
<th>Both</th>
<th>Av. No. Correct Responses Light</th>
<th>Buzzer</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>17.50</td>
<td>16.16</td>
<td>19.60</td>
<td>12.83</td>
<td>10.83</td>
<td>19.60</td>
</tr>
<tr>
<td>School</td>
<td>19.28</td>
<td>17.71</td>
<td>19.00</td>
<td>17.71</td>
<td>10.71</td>
<td>17.71</td>
</tr>
<tr>
<td>Differences</td>
<td>1.78</td>
<td>1.55</td>
<td>.80</td>
<td>1.88</td>
<td>.12</td>
<td>1.89</td>
</tr>
</tbody>
</table>

There was only one hospital child who deviated much from the rest of the hospital control group. He had been in the hospital only about three weeks prior to the testing, and was more erratic in his general behaviour than the other children in this group. Also he was less well acquainted with the examiner and the assistant than any of the other hospital children tested, including the experimental group.

The school children differed from all the hospital children, both autistic and nonautistic, in at least five factors. (1.) The school children were considered to be normal in their general behaviour and attitudes. (2.) They had had no previous acquaintance with the
assistant, and little or none with the examiner. (3.) The hospital children went to school in the same building in which they lived, so that the fact that they were being tested in a room of the building which housed their school would mean less to them, especially since all but six of the hospital children, (the six newer autistic children), were tested at a time when school had been out for two months, whereas the grade school children were tested during their school year. (4.) The hospital children all had more test sophistication than the school children. All the latter had had were group I.C. tests administered by teachers. (5.) The atmosphere in the hospital was permissive, spontaneity and acting-out were more encouraged than discouraged, and counsellors and staff were not looked upon primarily as authority figures.

Although all of the hospital children made some responses, three of the school children failed to make even one response; one made one response to the second series, three to the third and none to the first, and one child began responding only on the second series. Most of the school children looked for approval from the assistant, whereas few of the hospital children did. One of the school children tiptoed up to the door each time he responded. Only one of the children in the schools showed the spontaneity evident in all the hospital subjects.

In trying to overcome these situational differences, a little extra time was spent with most of the school children, and more encouragement was given to them. However, one of the children to whom extra encouragement was given, (e.g. "This is just a game.")
"Pretend you're out on the school ground at recess." "Don't be afraid to do whatever you want."), was one of the three who failed to respond. Another was one who failed to respond until the second series. Of the first three subjects, who did not receive as much extra encouragement, two failed to respond at all, and one was the child with no responses to the first series, one to the second, and three to the third. One of these three children, who did not respond at all, when asked by his teacher why he didn't "play the game", said he was trying to figure out how the equipment worked. The other child who didn't respond watched the room clock more than the equipment. The child who failed to respond even with the extra encouragement, according to the assistant, just never did seem to figure out what it was all about.

The autistic children made other responses than opening the doors. One child once opened the room door, another turned on the room lights during the buzzer series. More than one child made more than one response of poking his fist or finger through a window. Three attempts were made to come around the back of the equipment. One child spent much of the time ignoring the equipment, twice in the first series (buzzer), punched through the window, (only one of these times did he open the door), and once he opened the wrong door but managed to grab the reward from the other door. He came around the equipment, and attempted to do so another time. His scoreable responses, however, were only two, two and one. When the trials were finished, he dashed behind the equipment and began flicking switches, looking to see which did what. This child was the most severely autistic of the
first twelve, was mute, often soiled himself, and had shown little improvement compared to the others during his hospital stay. Many of the responses which the autistic children made were not scoreable, nor could it be determined accurately whether these were simply random actions or whether they were autistic responses to the stimuli. Many of them certainly appeared to be in the latter category.

In Table 1 it can be seen that even in the control group, the average number of responses to the light exceeds that of responses to the buzzer. Also the number of correct responses is greater for the light. The percentage of correct responses to the light is 99.52, while for the buzzer it is only 55.17. This difference may well be due to the equipment itself, although the percentage correct for the autistic group was only 50 for the buzzer, compared to 66.78 percent for the light. The buzzer was not a pleasant sound, and the space between the doors did not afford much change in direction of the auditory stimulus. In the other condition the light went on directly above the door, and behind the circle of red cloth, which, aesthetically, was a more appealing stimulus. Two of the control children verbalized their liking for the red colour.

Thus, for all children tested, the buzzer seemed relatively less effective than the light in eliciting learned discriminatory behaviour. Despite this, however, and despite the other gross differences reported, it appears that the buzzer was even less effective for the autistic than for the non-autistic children.
CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

An experiment was carried out to determine the differences in the effectiveness of auditory and visual cues in a two-choice discrimination learning task for autistic and nonautistic children. There were eighteen hospitalized autistic children, five girls and thirteen boys, and eighteen nonautistic control children, matched as well as possible for age and sex to the experimental group. Six of the control group were children from the same hospital, classified either as neurotic or character disorder. The other twelve children were from two Windsor grade schools, who were classified as normal by their teachers. (Five of these subjects had to be eliminated from the final analysis due to failure to respond.) None of the children in the control group were known to have schizophrenic parents.

The two stimulus conditions were a light and a buzzer. The experimental and control groups were divided into matched groups. Each group received a different stimulus order of presentation, in three series of twenty trials each. For experimental and control groups I, the order of presentation was light, buzzer, light and buzzer. The order for experimental group and control group II, was buzzer, light, buzzer and light. The children had to learn to open the door over which the light shone or behind which the buzzer sounded.
in order to get the popcorn. The schedule of reinforcement was a reward for every other correct response. The children's behaviour was recorded and scored for total number of responses, number of correct responses, and reaction time. The effectiveness of the buzzer relative to the light was also computed for these three response measures.

The average responses of the autistic children to both buzzer and light were consistently fewer and slower than those of the non-autistic group. For total responses, the relative effectiveness of the buzzer was significantly lower ($p = .02$) in the autistic group; the same relationship held for correct responses, but the differences did not quite reach the conventional 5% level of significance ($p = .06$).

Conclusions

It appears, then, that autistic children do not utilize either light or sound cues as effectively as normal children do in a learning situation, and that sound is even less effective than light. However, since the conditions in this experiment were less ideal for the control group than for the experimental group, it may be that there is actually a greater difference between the normal and autistic children than actually appears in these results, which were only significant for number of responses at the .05 level of confidence.

Experimentation with different types, distances, and intensities of sound might show more illuminating differences. This same type of experiment using sound only, and differing the tone or intensity for the reward cue might also better indicate the reason for the reduced effectiveness of sound stimuli.


HALL, K., & STRIDE, E. Some factors affecting reaction times to auditory stimuli in mental patients. J.ment.Sc., 1951, 100, 462-477.


METTLER, F. Perceptual capacity, functions of the corpus stratum, and schizophrenia. Psychiatr., 1955, 22, 89-111.


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