

FOCUS ON EXCEPTIONAL CHILDREN

RESPONSIVE TEACHING: FOCUS ON MEASUREMENT AND RESEARCH IN THE CLASSROOM AND THE HOME

R. Vance Hall¹

BEHAVIOR MEASUREMENT AND RESEARCH IN THE CLASSROOM

A long needed revolution is occurring in the fields of psychology and educational research. One impact of this revolution is that psychological and educational research as we have known it is being altered. The emphasis in research is shifting from the investigation of general questions involving comparisons between experimental groups and control groups to investigations of specific procedures and their effects on classroom groups and individual children. The emphasis is also changing from experiments carried out by university level researchers to investigations carried out by teachers and parents in their own classrooms and homes. In addition, tools to observe and to understand behavior and learning problems are now available. Most important, this revolution offers new hope for scientifically evaluating the effects of programs and procedures dealing with behavior and learning problems, a point of special significance for teachers and parents of exceptional children.

NEW WAYS TO OBSERVE AND MEASURE BEHAVIOR

The keynote to the new approach centers around recently developed ways to observe and measure behavior.² Pavlov, Skinner and other researchers were able to look at behavior in the laboratory more closely than had their predecessors because they developed sophisticated measurement techniques and recording devices. In fact, their discoveries about the relationships of behavior to the environment were entirely dependent upon their ability to observe and measure behavior precisely. It can be forcefully argued that the main contributions of these men were due not to their theories of reflex and operant conditioning, but rather to their new methods of observing and recording behavior.

Unfortunately, the automatic recording devices used in the laboratory, such as Skinner's cumulative recorder, are not practical for general research in the classroom

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2. Detailed explanations of the recording procedures mentioned in this section will be found in *Behavior Management Series, Part I*, Hall, 1971.

or home. They are too expensive, they are not generally available, and they will not measure many of the behaviors of interest to teachers and parents. Therefore, it remained for researchers who were interested in carrying out applied research in classrooms and home settings to develop techniques which could be used outside the experimental laboratory.

Recording by Outside Observers

The child development group at the University of Washington were among the early pioneers who developed observation and recording procedures which could be carried out by trained observers. Sidney Bijou, Don Baer, Montrose Wolf, Florence Harris and their colleagues developed interval recording procedures which made possible the preschool studies (e.g., Harris, Baer and Wolf, 1968) which have contributed so much to our understanding of the management of behavior. Many of the studies involving exceptional children which followed, such as those by Becker and by Hall and their colleagues (Thomas, Becker and Armstrong, 1968; Hall and Broden, 1967; Hall, Lund and Jackson, 1968), used adaptations of these interval recording procedures and outside observers.

While these studies were extremely important, they did require trained outside observers (Bijou, Peterson and Ault, 1968; Broden, in press) and were supervised by skilled researchers rather than by teachers or parents. Therefore, the procedures themselves, and certainly the

observation and measurement techniques, were of limited use to the busy classroom teacher or to the practicing parent.

Recording by Teachers, Parents and Pupils

The latest step in the progression which has taken research out of the laboratory and put it into the classroom and home has been the development of observation procedures to be used by teachers, parents and even the children themselves. Although it was impractical for teachers to use automatic recording devices or outside observers since they were too costly or unavailable, teachers can use other procedures that are practical and effective.

One procedure which can easily be adapted to the new research approach is the *direct measurement of permanent products*. Teachers have long been used to recording spelling scores, the number of problems worked correctly on math tests, and whether or not assignments have been completed and handed in. In these cases, the behavior of a pupil results in a permanent product which can be observed and counted and lends itself very well to repeated measures of behavior over time.

Event recording is also a useful tool for observing behavior. It has been found that there are many behaviors which teachers and parents can reliably count and record as they occur. In many instances, to do so does not interfere with ongoing teaching or parental tasks. Thus, a teacher can count the number of times a given event (such as a talk out, an argument, a fight, the number of pupils who come in late) occurs by tallying with a pencil on paper or by using a small hand or wrist counter.

Time sampling is another tool for observing behavior. It has been shown that teachers and parents can use a time sampling procedure (MacKenzie, Clark, Wolf, Kothera and Benson, 1968) to obtain an accurate estimate of the percentage of time children engage in ongoing behaviors such as wearing an orthodontic device. In time sampling, the pupil is observed at given intervals to determine whether the behavior of concern is occurring. By dividing the number of times the behavior occurs by the number of observations, the level of the behavior can be determined.

Duration, another measure which can be used in applied research, is recorded when the time spent engaged in a behavior is an important dimension of the behavior—as it is in thumbsucking or in practice on a musical in-

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strument. Wall clocks and stop watches can be used to measure the duration of certain behaviors.

Recently, Risley (in press) developed *Placheck* (Planned Activity Check), an observation and recording procedure for measuring the ratio of pupils engaged in a scheduled activity which also shows promise for use by teachers and parents. At given intervals, the observer counts the number of pupils engaged in the planned activity and divides this by the number of pupils present. The result is a ratio or percent of children who are actually participating in the activity.

A NEW RESEARCH APPROACH

In the past almost all psychological and educational research sought to find correlations between certain factors or conditions and behaviors or performance by comparing one group with another. This was often difficult or impossible for the classroom teacher to do. For one thing, it involved equating a classroom with one or more similar classrooms and trying an experimental condition in one class but not the other. Not only was it difficult to find another similar classroom, but also one was never certain whether the classes were truly equated or whether the experimental condition caused any observed difference. A second problem for teachers and parents was that usually the behaviors and learning problems of concern involved individual children and not groups. Since group comparisons are not valid for individual children, teachers and parents could not experimentally determine whether or not the procedures they used with individual children were valid or effective. The development of ways for teachers and parents to accurately measure the levels of behavior of the children in their charge and the use of applied behavior analysis research designs (Baer, Wolf and Risley, 1968) makes it possible for each teacher and parent to become a researcher who could scientifically determine which programs and procedures help children with problems and which are ineffective.

Applied Behavior Analysis Research Designs

The two basic research designs available to the applied researcher have been labeled the *reversal* and the *multiple baseline* design. One characteristic of these designs is that both involve repeated measures of the behavior or performance of concern. That is, once the behavior or behaviors are defined, the level is measured over a period

of days or weeks in order to determine its pre-experimental or *baseline* level.

The baseline record is usually graphed as a simple conventional graph so that a visual representation is available. It has been found that most people can easily interpret behavioral data in this form. Some have advocated the use of special graph paper, log scales, etc. Experience indicates, however, that using conventional graphs is simpler, cheaper, more valid, and results in better communication with a larger number of people.

New Versus Old

The new approach to measurement and research contrasts with the old along the following dimensions:

1. The old focused on the past. Often the old approach sought to discover events or conditions that had occurred during the development of children which might be related to present behavior or learning problems. The new focuses on what is going on in the present and on events and conditions which exist *now* that affect behavior and learning.
2. The old approach focused on using various tests, attitude surveys and other devices designed to provide samples of behavior before and then after experimental programs and procedures were implemented. The new approach emphasizes measuring the behavior of concern more directly and precisely, repeating the measures over time so that a more accurate picture of performance can be obtained. In addition, changes in behavior can be seen as they occur.
3. The old focused on the group rather than the individual. Many valid statistical comparisons could be made only by comparing behavior or performance of an experimental group with that of a matched control group. The new approach allows comparisons of behavior and performance of individuals as well as groups, and eliminates the imprecision associated with attempts to match groups that may differ along many important dimensions.
4. The old approach dictates that research be carried out by researchers and statisticians who impose themselves upon the educational or home environment to investigate questions which may or may not seem valid or important to the teacher or parent. The results of the

research have frequently failed to affect the practice of teachers and parents. The new approach allows the teacher or parent the opportunity to carry out research in the classroom or home. The experiments can be selected on the basis of their importance to the teacher or parent. Therefore, the results are much more likely to affect the practice of the teachers and parents involved as well as of those teachers and parents with the same or similar problems. Thus, the new approach allows teachers and parents to deal responsibly with learning and behavior problems of their children whether or not the children have been labeled exceptional.

The Responsive Teaching Model

For the purpose of identification, we have labeled this approach the *Responsive Teaching Model*. Models incorporating similar strategies are Dr. Montrose Wolf's *Achievement Place Model* for delinquents and the University of Vermont *Consulting Teacher Special Education Model* developed by Dr. Hugh McKenzie.

Three points are essential to the Responsive Teaching Model:

1. The behavior or academic task is objectively defined, and the level of the behavior is observed and recorded.
2. A method or procedure designed to improve or remediate the child's performance is introduced.
3. If a desired change occurs, it can be experimentally determined whether the procedures and materials used brought about the change. If no change occurs or if the problem worsens, feedback is available so that the teacher or parent can respond appropriately by altering the procedure or material until more effective ones are found.

Thus, Responsive Teaching and similar approaches featuring simple and effective measurement/recording procedures and research designs help to accomplish a revolution long needed in the areas of educational and psychological research. This revolution is shifting the emphasis of scientific investigation from general effects of procedures on groups in the laboratory to specific effects of procedures on individuals in the classroom and the home. As this revolution is accomplished it seems highly probable that in the future there will no longer be a fifty-year lag between the time research proven procedures developed in the laboratory are implemented in the class-

room. Since teachers and parents now can see clearly and quickly whether or not the procedures and materials they are using are effective and since the most important applied research will be carried out by *them* in their own classrooms and homes, implementation of research findings will be almost immediate.

RESPONSIVE TEACHING STUDIES

The following studies,³ utilizing the Responsive Teaching Model approach, were conducted by persons enrolled in the Responsive Teaching course at the University of Kansas Medical Center.

Increasing Face Wiping in a Cerebral Palsied Girl As a Treatment for Drooling

Madelyn Regan

Drooling is a frequent problem of the mentally retarded and cerebral palsied. Swallowing therapy is usually prescribed as the treatment procedure in such cases. There are a few subjects, however, for whom such treatment seems ineffectual. The present study employed a face wiping procedure to decrease the high incidence of a wet face resulting from frequent drooling.

Subject and Setting

Marta was a nine-year-old, quadriplegic, cerebral palsied girl of normal intelligence enrolled in a special class for the orthopedically handicapped at the Children's Rehabilitation Unit, University of Kansas Medical Center. Marta had a long history of drooling and had been seen for two years by speech and occupational therapists who attempted to remediate the problem. Treatment included encouraging frequent swallowing and a token reinforcement program for a dry face. Although the treatment produced a temporary decrease in drooling, the decrease was not maintained. Marta had expressed a desire to reduce drooling because she was due to transfer

3. Other studies and a more complete description of the Responsive Teaching Model may be found in Hall and Copeland (1971), Hall, Fox, Willard, Goldsmith, Emerson, Owen, Davis, and Porcia (1971), Hall Axelrod, *et. al.* (in press), Hall, Cristler, Cranston and Tucker (1971).

to a regular public school classroom and because she was afraid her future classmates would not approve of drooling.

Observation

A practicum student assigned to the class observed Marta from 9:00 to 10:00 each morning. A five minute time sampling procedure was used. At the end of each five minute period, the student recorded whether there was any visible moisture on or about the area of Marta's chin. The regular classroom teacher made independent, simultaneous observations for 14 days during the study. Agreement between records ranged from 92% to 100% with a mean of 99%.

Baseline₁: During a 16-day baseline phase, it was found that Marta's chin was dry on an average of 32% of the time (see Figure 1).

Reinforcement₁: During the next 14 days, the teacher placed a chart on the child's desk and began recording the number of times she observed Marta wiping her face with a facial tissue. She also praised her for remembering to wipe her face. Under these conditions, the mean of dry face checks rose to 80%.

Baseline₂: The teacher then told Marta that she was doing so well that a face wiping chart was no longer necessary. She also withdrew her attention and praise. Over the next three days, the mean of dry face checks decreased to 53% and was trending downward.

Reinforcement₂: When the teacher again began charting and praising face wiping, the mean level of dry face checks rose to 87%.

Post Checks: Two post checks taken at three day intervals after continuous observation was discontinued indicated that dry face behavior was being maintained at high levels.

At the end of the study, Marta was enrolled in a regular school classroom. By this time face wiping had been well established, and the regular classroom teacher reported that drooling (or at least a wet face) was not a problem.

Discussion

Although we cannot be certain from these data whether teacher praise, feedback provided by charting, or both were responsible for the observed change, it would seem that this simple procedure was effective. It is significant

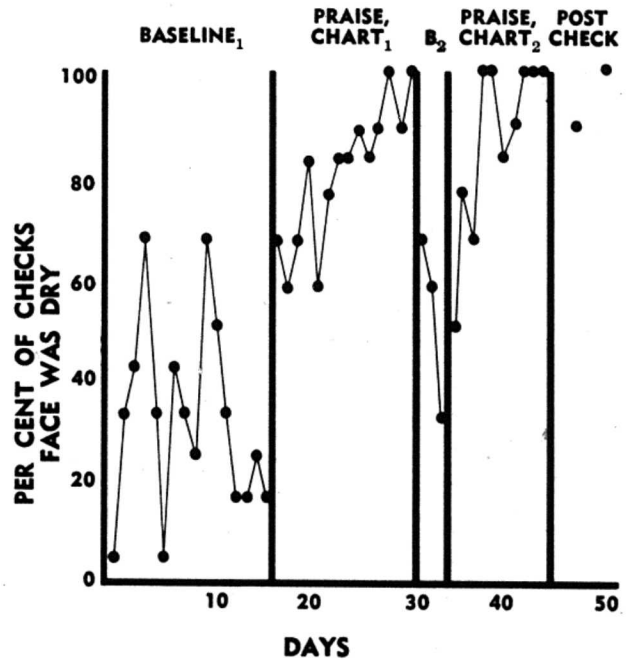


FIGURE 1

A record of the percentages of time that a 9-year-old cerebral palsied girl's face was dry during time sample checks during *Baseline₁*—prior to experimental procedures. *Praise and Chart₁*—teacher provided feedback by charting and gave praise for dry face. *Baseline₂*—charting and praise withdrawn. *Praise and Chart₂*—charting and praise reinstated. *Post Checks*—periodic post checks, 3 day intervals.

that the teacher and her practicum student succeeded in solving the problem of a wet face caused by drooling after other approaches involving special therapists proved ineffective. Furthermore, they were able to scientifically verify the causal relationship between their procedure and its effect on the behavior they observed by using a single subject reversal design.

Decreasing Talk Outs in Reading, Writing and Math: A Multiple Baseline Study

Zora Milne

Talking out in the classroom seems to be one of the most universal problems confronted by teachers (Hall,

Fox, Willard, Goldsmith, Emerson, Owen, Davis, and Porcia, 1971). In this study a special education teacher used a novel consequence and a multiple baseline research design in decreasing talk outs of an educable mentally retarded boy.

Subject and Setting

Jerry was an eight-year-old boy enrolled in a self-contained, special education classroom for 11 educable mentally retarded pupils in the Turner, Kansas, Public School District. Jerry, who had a Stanford Binet I.Q. of 80, had been excluded from a regular classroom because of his failure to achieve academically and because of high rates of disruptive behaviors. He continued to be disruptive in the special education classroom, frequently talking without raising his hand or respecting class rules about interrupting.

Observation Procedures

The teacher observed Jerry for 20-minute sessions during reading, writing, and math classes. The number of talk outs in each class was tallied with pencil and paper. Talking out was defined as: (a) interrupting while another pupil was talking, (b) interrupting while the teacher was giving directions, (c) interrupting the teacher while the teacher was listening to another pupil read, and (d) talking out during assignment periods. An outside observer made an independent, simultaneous record in one class. There was 100% agreement with the teacher's record.

Experimental Procedures and Results

Baseline records of Jerry's talk outs were made prior to instituting experimental procedures. As can be seen in Figure 2, these baseline records revealed that the mean number of talk outs was 4.5 in both reading and writing, and 3.7 in math.

During baseline Jerry had frequently requested permission to move his desk to sit next to Donna. After 9 days of baseline the teacher gave him permission to sit by Donna during reading, on the condition that he was not to talk out or disturb anyone. Each morning he was reminded that sitting by his friend in reading was dependent on his behavior. On day 13 he was granted permission to sit by Donna during writing class as well

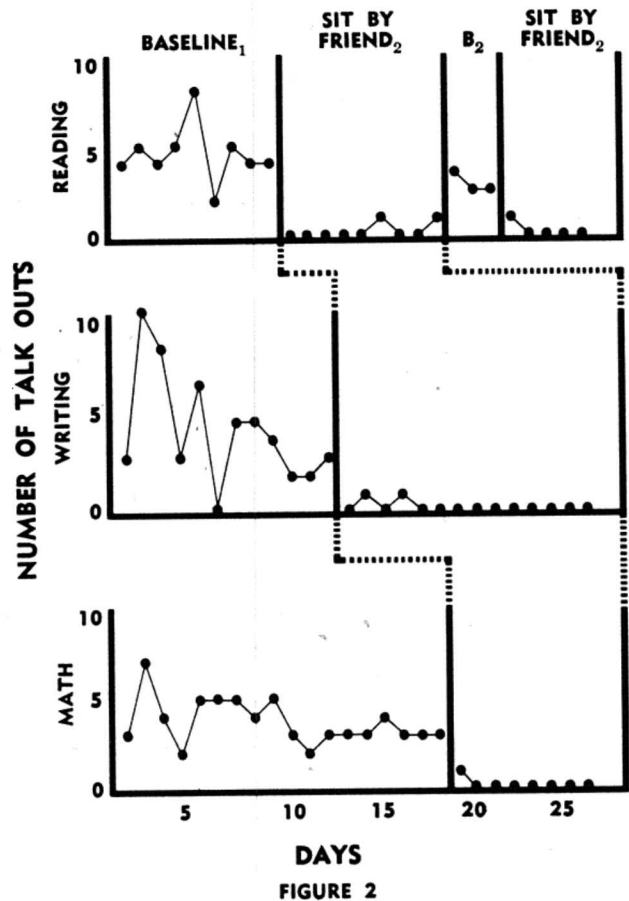


FIGURE 2
A record of talk outs by an 8-year-old boy enrolled in a special education classroom during reading, writing and math periods. *Baseline*—prior to experimental procedures. *Sit by Friend*—Jerry was allowed to sit by a friend contingent on low talk out rates. *Baseline₂*—return to baseline conditions in reading only.

as during reading, contingent on low talk out rates. Beginning on day 19 Jerry was allowed to sit by his friend during math period as well as writing, contingent on not talking out and disturbing the class. Under these conditions, there was an immediate decrease in talking out in each class when Jerry was allowed to sit by Donna. The mean rate of talk outs for Jerry decreased from 4.5 to .2 in reading, from 4.5 to .1 in writing, and from 3.7 to .1 in math.

A brief reversal procedure was introduced during reading period on the 19th day. During this phase Jerry was told he could not sit next to Donna during reading, but

he was encouraged not to disturb the class. Talk outs during reading increased over the next 3 days but decreased once he was allowed to sit by Donna again. There was no corresponding change in talk outs during writing and math.

Discussion

This study showed that a contingency as simple as allowing a disruptive boy in a special education class to sit next to a friend was effective in decreasing talk outs. A multiple baseline procedure in which the same behavior was recorded in three different stimulus situations (Hall, Cristler, Cranston, and Tucker, 1970) with successive introductions of the experimental condition was used to demonstrate causality. A further verification was made by introducing a brief reversal during the reading period.

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RESOURCE MATERIALS

Avaril Wedemeyer and Joyce Cejka

The Distar Arithmetic Program, presented in two consecutive parts, is designed to provide basic understanding of arithmetic and the skills necessary to attack and solve problems. In Arithmetic I, the child is taught to count to and from specific numbers; he also learns how to follow directions. The child is taught to identify, understand and use numerals, the plus and minus signs, and the symbols for equality and inequality. As the child gains understanding in these concepts, he then learns to group and regroup numbers and objects and to produce statements with numbers.

Arithmetic II stresses independence in problem solving, and the student learns to work with many new relationships. The program is developed so that each skill is expanded and built into the next skill.

The following materials are utilized: Teachers Guide; spiral-bound lesson presentation books (5 for Arithmetic I and 4 for Arithmetic II); one student workbook for Arithmetic II; group progress indicators; acetate page protector for presentation books; 4 decks of geometric figure cards and 11 form boards for Arithmetic I; one wall-size and 10 student-size multiplication charts for Arithmetic II.

The Distar Arithmetic I Teachers Kit (#7-7800) is priced at \$160.00 (list) and \$120.00 (net). The Distar Arithmetic I Student Set of Ten (#7-7810) costs \$107.00 (list) and 80.00 (net). The Distar Arithmetic II Teachers Kit is priced at \$160.00 (list) and \$120.00 (net). The Distar Arithmetic II Student Set of Ten costs \$120.00 (list) and \$90.00 (net). These materials may be purchased from Science Research Associates, Inc., 259 East Erie Street, Chicago, Illinois 60611.

CLASSROOM FORUM

Edited by Austin J. Connolly, University of Missouri

PROBLEM 13

I teach in the intermediate grades. My youngsters can do computation problems, but seem totally unable to handle word problems. What are your suggestions?

In essence, word problems are simply the integration of computation problems into a practical context. It is logical to question why so many youngsters have difficulty in this aspect of arithmetic. It appears that the following five major factors mitigate against performance in this area:

1. The reading level of many children is below their mathematics level and, consequently, hinders their performance on word problems.

2. Texts and other printed matter are relied on heavily as the source for word problems in contrast to computation where the teacher feels free to generate problems (sometimes too free).

3. Word problems are frequently allowed to remain abstract, i.e., the child independently pitted against the word problem presented on the printed page.

4. The daily schedule and lesson plans of most teachers provide relatively little time for practice in the area of word problems.

5. Intrinsic to the four problems above is the problem of motivation. Unless the teacher addresses herself or himself to the possible negative influences of reading deficits, stereotyped presentations, abstractions, and lack of practice, it is understandable that the class will be "turned off" by word problems.

In the remainder of this discussion, let us focus on "turning the class on" to word problems by dealing effectively with the interrelated problems posed above.

Control the Reading Level. Initially present word problems orally, based on situations in class or pictorial presentations. Slowly integrate reading into the context as the children are able to handle it. Keep the reading level well below the level of the arithmetic problem. Remem-

ber, in this setting you are most interested in developing skill in reasoning and application.

Vary Presentations. While printed material is a valuable source of story problems, your classroom and children are equally important. Develop problems on things that are easily observed and verified. Let the children formulate story problems based on situations observed in the room and pictures supplied by you through opaque or overhead presentations.

Make Learning Active. Base simple word problems on objects that can be readily manipulated by children. As progress is made to more difficult problems, engage small groups or the entire class to attack the problems as they are posed. Challenge them to become "good detectives." Ask, what are we looking for, i.e., what are the "facts", the clues, etc.

Integrated Practice. The only way that youngsters can attain mastery over word problems is through frequent exposure. The integration of word problems into the daily routine is limited only by teacher creativity and initiative. Don't restrict yourself to problems posed on the printed page. Teach reasoning, comprehension, and application.

Teacher enthusiasm coupled with an adequate control of problem relevance and difficulty determine student acceptance. Remember that student success, regardless of how small, is the only thing that ensures the move toward larger accomplishments.

PROBLEM 15

I teach a special class that is located in a large elementary school. My principal doesn't understand special education. What should I do?

All readers are invited to send their solutions to Problem 15. The February 1972 issue will summarize contributions by readers. Complimentary subscriptions will be awarded each month for the best solutions. Send your response to the Editorial Offices, *FOCUS ON EXCEPTIONAL CHILDREN*, 6635 East Villanova Place, Denver, Colorado 80222.

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