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ABSTRACT

A classroom observation procedure for recording and quantifying complex, sequential interactions between subject and teacher or peers has been developed. Two instruments, used in tandem, test hypotheses concerning the consistency of the subject's interactions. The Sequential Record, which is used to record observation, is analyzed for repetitious patterns of social behaviors. These patterns are tested quantitatively over time-series observations with the Interaction Recording Sheet, a tabular format containing 35 categories of student or teacher/peer behaviors. Categories are marked continuously and in sequence throughout the observational period; specific patterns of three to six points of interaction are drawn from the data and quantified. (Author)

A Procedure for Recording Sequential Patterns of Social Interaction in the Classroom

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Introduction

Methods of evaluation in behavioral analysis programs have largely been restricted to the observation and recording of specific and limited samples of behavioral events under conditions of time sampling procedures (Hall, 1970). Times series design with baseline, experimental conditions and reversal of experimental conditions have characterized the methodology (O'Leary & Drahman, 1971). Thus the evaluation of experimental conditions have largely been limited to intra-subject comparisons, usually in the tightly controlled laboratory setting, and with observation instruments that have been restricted in both samples of time and behavior within the much larger context of the range and variation of the subject's activities.

The experimental usage of behavioral analysis in recent years in regular classrooms with in-service teachers has clarified the need for experimental designs and observation instruments that permit comparisons across subjects and experimenters (in this case, the teachers). Discussion in this paper will focus on the development of an observation instrument which can better fulfill the requirements of behavioral analysis evaluation in the field setting.

We have found the standard observational schemes (specific behavioral event recording under time sampling conditions) employed in behavioral analysis research to be limited in the following ways:

1) Limitations resulting from behavioral event sampling.

Behavioral categories are limited to a pre-determined set of behavioral actions associated specifically with the selected "target behavior" to be decreased or increased (such as behavioral manifestations of lesson attendance or physical aggression). The experimenter's behaviors, if also recorded, are usually limited to the behavior analysis strategies of the experimental program under evaluation. Further category selection is done on an ad hoc basis. No data can be gathered concerning the range and frequency of behaviors that the subject (or experimenter) exhibits in addition to the "target behaviors" (or program strategies).

2) Limitations resulting from time sampling.

Time sampling procedures limit the data to frequency of incidence. There is no way to record the changes occurring in a behavior from beginning to end or, using these procedures, the duration of a behavioral event. Thus the researcher cannot come to empirically accurate conclusions about the consistancy of behavior. An additional drawback, that Wright has pointed out, is that this method is practicable only for the recording of events that happen often, or at a high rate (Wright, 1960). The behavioral analysis researcher in the field-setting will often find behaviors to decrease that occur infrequently or in sporatic fashion. Limitations in the observation instrument may preclude their study.

3) Limitation resulting from the absence of sequential relationships.

The research using time-sampling and behavioral category restrictions, cannot obtain data regarding the continuity of behavior in the subject or the in-context situation associated with the behavior.

Wright (1960) has noted:

"Time sampling characteristically severs behavior from its immediate relevant context. It does not often link behavior with coexisting situation." (Wright, 1960, p. 100). This process of segmenting behaviors had several implications for research and evaluation in behavior analysis:

a) There can be no data-based identification of antecedent, or eliciting, stimuli which may serve as reinforcement for the operant behavior's recurrance.

b) There can be no data-based identification of the contingency relationship between the subject's behavior and the consequent stimulus. A few recent observation techniques provide a method for recording the contingency relationship (Duncan & Spence, personal communication, 1971) (O'Leary, personal communication, 1972), but the majority do not. Absence of contingency recording precludes the proper evaluation of the implementation of reinforcement strategies. Some researchers record samples of situational factors and samples of child behavior by time sampling procedures, although not in absolute sequence. (For example, 6 one-minute observations of subjects "a" through "f", followed by a one-minute observation of the teacher). (Buckholdt & Ferritor, 1970). But situation and behavior, or the contingent relationship, is not aligned here either in procedure or results.

4) Limitations in subject sample.

The usual observation instrument in evaluating behavioral analysis experiements limits observation to the subject and his behavior. Behavior of the experimenter (in terms of behavioral analysis strategies) may be evaluated in addition. The dyadic behavior model discussed by Sears (1951) or the polyadic behavior model discussed by Caldwell (1968) in ecological study is precluded. These models may be significant in the inclusion of other actors, or contributors, to the child's behavior. Thus, there is no source of data regarding the occurrence of peer reinforcement which may serve a critical role in perpetrating the target behavior of the subject. While such extraneous contributors may be controlled or removed from the laboratory setting, it may be impossible to do so in the natural classroom study, where increasingly this type of evaluation is taking place. Appropriate instruments allowing their identification and recording are needed.

With awareness and concerns about the limitations of many existing observational schemes, we have attempted to develop a technique for evaluating CEMREL's training program in behavior analysis (Classroom and Instructional Management Program, Buckholdt & Sloan, 1972). This program is based on social exchange pricipals as well as behavioral analysis techniques, thus, there was an additional need for an observational technique for recording both the sequence of patterns of interaction and the frequencies of occurrence of specific subject and experimenter behavioral events.

Major considerations in the development of the Sequential Pattern Observation Technique, then, include the following:

1) Recording and evaluation of sequences; thus the contingencies of subject behavior.

2) The identification and evaluation of antecedent, or eliciting, stimuli in terms of the effects of their presentation and removal on the subject's behavior.

3) The recording of subject-peer interactions as well as subject-teacher interactions for identification of additional sources of reinforcement.

4) The recording of a variety of other desirable or undesirable behaviors in which the subject might engage in addition to his targeted behaviors in order to obtain data regarding the range and duration of the remainder of his activities. This information may also be used to determine the validity of the teacher's impressions of the child's behavior.

The Observation Instrument

Preliminary research and development of the Sequential Patterns Observation Technique took place in a study during the spring, 1972. Limited additional use

of the instrument had been made since that time. It is expected that an additional study will be conducted this spring, 1973, to refine the instrument and engage in validational as well as additional reliability testing. This report, then, is a preliminary one, based on early and limited data in the instrument development.

The Sequential Patterns Observation Technique is composed of two instruments used in tandem: The Sequential Record (a descriptive recording) and the Interaction Recording Schedule (a standard format for recording frequencies of behaviors and behavioral sequences).

The Sequential Record was initially derived from the Skinnerian mand (Skinner, 1957), which served as a useful conceptual schema for categorizing operant activities. We found that the S → R → RF sequence could be identified and recorded in the observation of two or more actors in a polyadic behavior exchange.* This format was carried over to the second observation instrument also.

The Sequential Record is an "open" system in that the user is open to the recording of all behavioral actions and stimuli related to the Subject (as in speciman description in Wright, 1960). The user records all observable study and social behaviors of the specified Subject continuously and sequentially in longhand notes. The Subject's interpersonal exchanges with peer or teacher are

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*Bishop (1951) developed a dyadic observation schedule recording "initiations" and "responses" between mother and child in an effort to account for sequential units of actions. The Sequential Patterns Observation Technique can be used to record longer and more complex patterns of interaction.

recorded, including those initiated by the peer or teacher. The Sequential Record is usually completed prior to the use of the second instrument, and it's function is the development of hypotheses concerning the Subject's behavior which will be tested empiricially later by the Interaction Recording Schedule.

Longhand notetaking with the Sequential Record in an initial observation may range from 20 minutes to 2 hours, although one hour is adequate for its purposes. Thus, one may obtain an array of behaviors occurring over several classroom learning periods and transitions. The user will then tape record the observation, noting specific patterns of actions or interactions and any repetitions. Eliciting stimuli and reinforcing stimuli will be tentatively identified in preparation for testing with the second observation instrument. In the course of observation and tape recording, the observer will seek to generate hypotheses concerning the role of specific stimulation in the child's actions or the sequence in patterns of action. The tape recording is typescripted and further analysis of patterns of behavior may follow, if necessary. Usually the process is now ready for the statement and testing of explicit hypotheses of subject behavior patterns.

The hypotheses that have been generated may serve at least two functions:

1) To test, in hypothetico-deductive fashion, the frequency of occurrence of specified patterns of behavior as opposed to alternative patterns of behavior or alternations in the hypothesized sequence. Thus, for example, in the following sequential pattern concerning aggressive behavior, one may hypothesize that aggression occurs in an exchange of the following order significantly more frequently than in its alternatives:

   Hypothesized sequence: Peer distracts S → S strikes peer → teacher instructs social behavior → S attends work assignment.

   One may want to consider several alternative patterns, with modifications in the eliciting stimuli or the consequent stimuli, such as:

Alternative A: Peer attends work → S strikes peer.
Alternative B: Peer distracts S → S converses with peer.
Alternative C: Peer distracts S S strikes at peer → Teacher ignores interaction → S attends work assignment.

2) As in Alternative Hypothesis C, one may wish to consider the effects of modifications in S's behavior as a function of conscious change in the behavior of another actor in the exchange. Therefore, a second function of the generation of hypotheses is a diagnostic one; serving as a basis of the systematic investigation of intervention in social learning disabilities.

The second instrument, the Interaction Recording Sheet, is an efficient recording format that may be used by trained observers to record frequencies of categories of behavior. One subject and his teacher and the appropriate interacting peer(s) may be observed. Efforts have been made to observe two or three subjects; while frequencies of occurrence of most specific behaviors can be established, it is not impossible to record the sequence of interaction patterns of more than one subject in continuous fashion.

The Interaction Recording Sheet contains two major divisions of verbal and non-verbal behaviors which have been arranged across the top of the page: the subject's behaviors and the teacher's/peer's interactive behaviors. The total number of categories is about 45.

The first division, Subject's Behaviors, contains 4 groupings (or fields) of behaviors that the subject may exhibit. The groupings include the following general behavior areas that we have found to be relevant to this type of observation:

1) Behaviors relating to absorption in on-going work activity;

2) Behaviors relating to mild distractions to work activity;

3) Interpersonal contact, as initiated by the S or as responded to by the S.

4) Expression of negative affect or positive affect.

Each of these behavioral groupings contain from 4 to 12 categories of specific, observable behaviors. The child's behavior, verbal or non-verbal, is recorded in the appropriate category as it occurs.

A fifth grouping, Location of Subject, allows the observer to record changes in the subject's location in the classroom.

The second division, Teacher/Peer Behaviors, contains 3 groupings or fields of behavior which describe the type and quality of interaction with the subject. They include the following:

1) Teaching or communicative behaviors (both initiating the interaction and responding to the subject's initiation);

2) Reinforcing or supportive actions;

3) Disapproving or abusive actions.

Each grouping contains from 8 to 15 specific, observable verbal or non-verbal behaviors that may be marked appropriately.

The cue for the observer's recording is verbal or non-verbal behavior relating to the Subject. This may be action directed toward him and initiated by a peer or teacher, or it may be the Subject behavior.

Subsequent actions by the subject, and individuals interacting with them are recorded in sequential fashion. Time recordings taken at 30 - second intervals denote the continuation of action and give an approximation of the duration of the action. Basically, however, the instrument has been designed to provide data of a quantitative nature: frequency of occurrence. It's innovation lies in the quantification of repeated and therefore predictable sequences or <u>patterns</u> of behavior, rather than isolated occurrences.

Several observers have been trained in the use of the Interaction Recording Schedule. Inter-rater reliability* was computed by ratio of number of agreements to potential number of agreements during two minute intervals of observation drawn from continuous 20-minute observations:

$$B = \frac{\text{Number of agreements}}{\text{Potential agreements}}$$

Results

The Sequential Patterns Observation Technique was used to generate and test hypotheses in a preliminary study of 18 students in six classrooms of a suburban school district of St. Louis in the spring, 1972. The results reported here are from this initial study.

The results will be presented as several brief case studies illustrating the generation and testing of complex sequences of social interaction. In this preliminary study, the function of the observation technique was to describe and quantify behavioral sequences and to provide this feedback to the cooperating teachers. In time and with refinement of the technique, we expect to be able to test the hypotheses longitudinally and compute probabilities of future occurrence.

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*The inter-rater, reliability, thus determined, ranged from .74 to .86. based on 198 common units recorded in both protocols. For this type of instrument, the reliability is of an acceptable level; for a similar type computation or a similar type of instrument, APPROACH, Bettye Caldwell (1968) reports inter-rater reliability coefficients ranging from .53 to .65. The continuous nature of the recording as opposed to time sampling is the central source of variation between observers.

Case 1

Another student, a boy, age seven, in a kindergarten class was described as having a short attention span, poor work habits, and aggressive behavior toward peers and teacher.

Observation with the Sequential Record suggested that one of the eliciting stimuli for aggressive teacher attention-getting behavior during seatwork period was his observation of a female peer at his table helping other children with their work.

The hypothesized sequence of behavior (with 7 points of interaction) was as follows:

S attends seatwork → S observes peer aiding another → S signals peer → peer shows disapproval → S out of seat to teacher → teacher responds neutrally to S → S attends work at seat.

This sequence of behaviors occurred 11 times in 20 minutes o ne initial observation. On subsequent observation, it occurred more frequently than any other pattern of interaction during the seatwork period. Because of the child's abusiveness the teacher was unwilling to try to ignore him; therefore we recommended the peer be seated at another tab'e. With this action, this particular sequence of interaction was terminated.

Other patterns of attention-getting behavior were observed and quantified in other situations with this child, such as falling down, throwing objects, and shoving. Each sequence was preceeded by poor performance or failure in the ongoing activity and an effort to make eye contact with teacher or peer prior to or following the attention-getting behavior.

Case 2

A kindergarten child was observed who frequently signalled the teacher to check her work. Limited observation with the Sequential Record indicated a repetitious pattern of interaction as follows:

Subject attending assignment at seat → Teacher attending another child → Subject signals Teacher (by calling Teacher's name) → Teacher responds positively to Subject → Subject attends assignment.

This represents a five point pattern of interaction. We were able to ascertain that the eliciting stimulus was the teacher's attending another child (any of the rest of the students) and since the eliciting stimulus could not be removed entirely, we recommended the use of CLAIM's strategy of ignoring the signal. (The signals at that time were occurring at a rate of 5 to 6 times per 20-minute observation period). We tested the frequency of occurrence of the alternative interactions:

1. Interaction when the Teacher responded positively to the Subject's signal.
2. Interaction when the Teacher responded negatively to the Subject's signal.
3. Interaction when the Teacher ignored or did not see the Subject's signal.

The Interaction Recording Sheet yielded data indicating the first pattern of interaction clearly occurred more often that the second or third despite the teacher's efforts to modify her own behavior. (See Table 1 below.)

Further, consistent types of actions by the subject were found in response to the second and third alternatives. These included signalling again or distracting a peer.

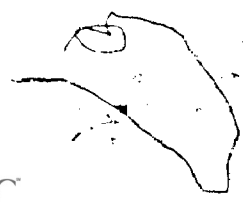

TABLE 1 (Case 2)

Teacher's Response to Signalling

HYPOTHESES	PERCENT OF TOTAL OCCURRENCES
1) S signals → teacher responds positively or verbally → S attends work again =	50%
2) S signals → teacher responds positively or neutrally → S does not attend work =	18%
3) S signals → teacher responds negatively → S signals again =	14%
4) S signals → teacher ignores or does not respond → S signals again =	18%

TOTAL OCCURRENCES = 34 over 4 observations

Case 3

A third kindergarten child was observed who had been described as withdrawn and unwilling to respond to other individuals or the classroom activities. This student was observed for initiation and response to interpersonal contacts.

While the average number of interpersonal contacts related to the Subject was lower than the class average during a 20-minute observation ($\bar{X}$=17 for S; $\bar{X}$=25 for class during seatwork) the Subject's efforts to initiate interpersonal exchange was about average or slightly about ($\bar{X}$=14 efforts). Teacher or peer initiated contact with Subject was very low ($\bar{X}$=3 efforts). We recorded the interaction sequence under Subject initiation and Teacher/peer initiation with the following results and hypothesis (See Table 2 below):

1) Teacher/peer initiates interaction → S responds positively.
   Teacher/peer initiates interaction → $\underline{S}$ responds neutrally.
   Teacher/peer initiates interaction → $\underline{S}$ ignores.
   Teacher/peer initiates interaction → $\underline{S}$ responds negatively.

2) S initiates interaction, teacher/peer response positively.
   $\underline{S}$ initiates interaction, teacher/peer responds neutrally.
   $\underline{S}$ initiates interaction, teacher/peer ignores.
   $\underline{S}$ initiates interaction, teacher/peer responds negatively.

The initial description of withdrawn and unresponsive behavior is not supported by these data. These particular results illustrate the need for data-based descriptions of behavior (Bijou, Peterson, & Ault, 1968). Further, by pinpointing responses that tend to reinforce undesirable behaviors, one may then recommend modification in the behavior of the subject's associates that will reinforce desirable behaviors. In the above case, both increased positive responses and increased efforts to interact with the Subject would be useful intervention strategies.

TABLE 2 (Case 3)

Response to Interaction Efforts

HYPOTHESES	PERCENT OF TOTAL OCCURRENCES
1a) Teacher/peer initiates interaction → S responds positively =	43%
b) Teacher/peer initiates interaction → S responds neutrally =	43%
c) Teacher/peer initiates interaction → S responds negatively =	14%
d) Teacher/peer initiates interaction → S ignores =	0%
Total occurrences of teacher/peer initiated interactions = 14 over 4 observations	
2a) S initiates interaction, teacher/peer responds positively =	22%
b) S initiates interaction, teacher/peer responds neutrally =	22%
c) S initiates interaction, teacher/peer responds negatively =	30%
d) S initiates interaction, teacher/peer ignores =	26%

TOTAL OCCURRENCES OF TEACHER/PEER INITIATED INTERACTIONS = 54 over 4 observations

These case studies hopefully illustrate the uses of the Sequential Patterns Observation Technique both as a device to identify and quantity complex patterns of interaction and or a descriptive and diagnostic instrument. Efforts to further refine and validate the instrument are planned for the spring, 1973. A computer program to quantify sequences and identify ranges of behavior is in development. It is expected to be completed for use in the coming study. It will greatly facilitate analysis of the data, an operation that is very time-consuming if executed by hand.

Conclusions and Implications

We may draw several conclusions from this initial study:

1) It is possible to identify complex and repetitious patterns of behavior in children.

2) It is possible to determine antecedent stimuli which seem to elicit certain predictable behavior patterns in some children, as well as consequent stimuli which tend to reinforce the sequence.

3) It is possible to quantify those patterns of behavior through brief, reliable, and systematic observation periods over time, thus moving from qualitative descriptions in open-ended observation to quantitative descriptions in a more efficient and reliable instrument.

Thus, it appears with this observation instrument we may systematically test impressions of behavioral traits or actions in a deductive fashion through hypothesis testing. We may further test empirically the effects of presentation or removal of eliciting stimuli and the modification of consequent stimuli on behavior patterns.

The limitations of the procedure are several:

1) The Interaction Recording Schedule may be used for recording the actions of only one subject at a time.

2) Quantification of complex patterns is laborious if computed by hand. A computer program should make the procedure a fast and efficient one.

3) Use of the Sequential Record is probably limited to experienced and sensitive observers. Training is likely to be difficult. Two observers have used it at about 80% reliability, but both had extensive backgrounds in behavioral observation.

4) It appears that the Sequential Record hypothesis development is a necessary prerequisite to the most effective use of the Interaction Recording Schedule. Efforts to analyze patterns simply from the standard format have not been successful.

The potential uses of the instrument include the following:

1) Its greatest potential seems to be in the area of diagnosis of a range of social learning disabilities for making data-based decisions regarding

the child's behavior and strategies for intervention.

2) It may be used for making in-depth analyses of the effects of various classroom management techniques on a subject and his peers, as in the behavior analysis program mentioned above.

3) It may be useful for in-depth analysis of teaching style and interpersonal style and their effects on a subject and his peers, thus contributing to an analysis of classroom climate.

4) It may also be useful as a feedback device for pre-service and in-service teachers who would like to improve their social interaction methods. Recording of teacher behavior only (the Teacher/Peer division of categories) is presently in use in 45 classrooms in the greater St. Louis area for this latter purpose.

Bibliography

Bijou, S., Peterson, R., and Ault, M. A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis*, 1968, 1, 197-191.

Bishop, B. Mother-child interaction and the social behavior of children. *Psychological Monographs*, 1951, 65, No. 11.

Buckholdt, D., and Ferritor, D. Program Data and Data Collection Procedures, Technical Report No. 9, St. Louis, Missouri, CEMREL, Inc., 1970.

Buckholdt, D., and Sloan, H. Classroom and Instructional Management Program, St. Louis, CEMREL, Inc., 1972.

Caldwell, B. A new "Approach" to behavioral ecology. In J.P. Hill (Ed.), *Minnesota Symposia on Child Psychology*, Vol. II. Minneapolis: University of Minnesota Press, 1968.

Hall, V. *Behavior Management Series. Part I. the Measurement of Behavior*, Shawnee Mission, Kansas: H & H Enterprises, 1970.

O'Leary, K.D., and Drabman, R. Token Reinforcement Programs in the Classroom: a review. *Psychological Bulletin*, 1971, 75, 379-398.

Sears, R.R. A theoretical framework for personality and social behavior. *American Psychologist*, 1951, 6, 476-483.

Skinner, B.F. *Verbal Behavior*, Appleton-Century-Crafts, Inc., New York: 1957.

Wright, H.F. Observational Child Study. In P.H. Mussen (Ed.), *Handbook of Research Methods in Child Development*, pp. 71-139, New York: Wiley, 1960.