

## On Steady States or Transitional Behavior: The Case of Social Interference Patterns in Children

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*The behavioral study of individual and social transitions in natural settings, mainly in classroom and playground contexts, is examined. The methodological and theoretical characteristics of the behavior-analytic approach to studying steady states and transitions are discussed. Based on observational methodology a description of a current project of social interference as behavioral transition is outlined as well as some implications for behavior analysis of development.*

Most of contemporary behavioral research has been characterized by focusing on steady states and unidirectional study of individual behavior. Some of the main characteristics of operant methods (Honig, 1966; Skinner, 1966) have included: (a) Intensive study of individual subjects, replicability of findings, stable baseline condition upon which the independent variable of interest is imposed, strict control of the experimental environment, environmental constancy and control to produce behavioral stability, effective means of controlling the subject's behavior, continuous observation and recording of behavior, concentration upon independent variables, emphasis on external observable causes of behavior and functionally/operationally defined terms and concepts.

Most behavioral researchers welcomed such imposed characteristics because they offered theoretical and methodological advantages in a growing field of research, consolidating their strengths on empirical data, experimental validity, and generality. However, some of the practical and methodological strengths of the laboratory were an "obstacle" to field researchers and obviously to developmentally oriented psychologists. Although multiple methodological and strategic advantages derived from the main characteristics of operant methodology (Sidman, 1960), researchers lost a great quantity of interesting information regarding transitional behavior. There is a problem when researchers attempt to extend some of the main principles of behavior analysis to the natural environment, where there is neither strict control nor environmental constancy as a means of controlling the subject's behavior. In addition, there is a problem with functionally and operationally defined terms and concepts, because the search for controlling variables *in situ* follows non-experimental strategies. Therefore, an observational methodology was developed that takes into account the problem of an exhaustive and exclusive system of behavioral categories and an adequate sequential analysis (Bakeman & Gottman, 1986; Cairns, 1979; Sackett, 1978).

The study of *transitional* behavior is interesting because some relevant behavioral phenomena result from transitions among several ecological situations, which exert different control on behavior and provide different setting factors or establishing operations for the behavior. We can identify several levels of transitions between activities, settings, social

status, biological status, academic behaviors, and other factors. Three examples of transitions between activities are presented as follows: from a specific academic activity to another activity in a school setting, from a coercive episode to a prosocial episode, from on-task behavior to off-task behavior in a classroom. Also, the transition between settings offers interesting aspects for research, such as the study of the effect of transitions from classroom to playground or viceversa, the first day in a school setting, a quiet classroom to a busy class environment, the change to a new school or neighborhood.

Some conceptual ideas from different levels of transitions can be identified in the ecology of human development approach (Bronfenbrenner & Morris, 1998). For instance, in Fisher and Cooper's (1989) book "The Psychology of Change and Transition" the effects of some other "life transitions", like divorce, unemployment, disease, marriage, and death of a relative, are examined. Also, Wapner and Denick (1998) conducted a developmental study of educational transitions and transitions across the life span from a person-in environment transition approach.

This paper deals only with transitional behavior in natural settings. When in the context of the steady state-transitional behavior discussion, transitional behavior represents variability sources as "noise" and scarce experimental control, then order could be requested for methodological purposes. However, the study of transitional behavior should be the object of study, the research problem itself, calling for special research procedures and methodologies. Transitional behavior refers to any changes in behavior that accompany a "sustained operational change in the environment, such as a change in the stimulus situation, the conditions of reward or the contingencies or requirements of the responses" (Logan & Ferraro, 1978, p. 268). Transitional behavior can be usefully dichotomized into those behaviors that accompany differentiated (i.e., stimulus control) and non-differentiated operational changes in the environment (i.e., extinction, level of adaptation, inhibition; effects of "frustration" and "elation" related to a change in the density or magnitude of reinforcement). In fact, according to Sidman (1960), a transition state always involves a change from one stable state of behavior to another. For this reason, the study of transition states cannot easily be separated from the study of steady states.

In many procedures the start of a transition can be identified operationally as the point at which the experimental conditions were changed. Conceptually, transition states imply change in relationships between environment and behavior. The identification of this change is important to the study of individual behavior and social interactions in natural settings. Perhaps the main difference between the concepts of Logan and Ferraro (1978) and Sidman (1960), rely in the "molecularity" and "molarity" of the approach, from transition

between behaviors to transition between one stable state of behavior and another. However, transition as a state implies necessarily the assumption of steady state and control (Sidman, 1960).

Transitional behavior takes place as a dynamic phenomenon in time and must be analyzed as a part of the behavior stream. Transitional behavior is not only a function of the direct variables that produce the change, but it is also a function of the variables that have maintained such behavior in the past. Thus, the study of change in that perspective takes in to account the interaction between present and past conditions of behavior control. Also, behavioral transition must not be studied in isolation from its concurrent and sequential context. Such kinds of transitions have been studied in the experimental laboratory, manipulating specific stimulus, schedules of reinforcement, different variables, and analyzing their effects on the behavioral stream (Logan & Ferraro, 1978). It is necessary, however, to design methodological strategies for the study of the class of "non-differentiated" transitions in natural settings, like school settings in the case of this work. Further, it is convenient to emphasize that behavioral field research also implies an assumption of order in the environment, where such order is not imposed by the manipulation of the experimenter but occurs as natural environmental or behavioral constraints that must be identified (Patterson, 1974, 1979; Santoyo, 1996). Therefore, rather than analyze behavior as an increase or decrease of response rate, the emphasis must be on the processes of organization (or "reorganization") of *behavior patterns*. In short, this paper deals with a special class of "non-differentiated" transitions produced by behavior of third persons: *Social interference*. The study of such phenomena has implications for the psychology of motivation, behavioral development, social interaction, behavior preferences and behavior regulation and organization in natural settings.

## Social Interference

There are three main sets of antecedents from other areas to consider. The first of them comes from the old work of the European studies by Zeigarnik (1927) and Ovsiankina (1928) about finished and unfinished tasks. The specific question posed was: "What is the relation between the retention of activities that have been interrupted before completion and the retention of completed activities?" (Zeigarnik, 1927, p.3; 1938, cited in Van Bergen, 1968, p.300). In general, the core of the theory reads as follows:

When a person intends to perform a task, a quasi need is established which presses in the direction of fulfillment of the intention. Completion of the tasks means release of the tension system, or discharge of the quasi-need. If, however, the activities that are used for execution of the intention are blocked, the quasi-need remains unsatisfied... It was hypothesized that this unreleased tension has an effect on memory" (Van Bergen, 1968, p. 3).

As a matter of fact, such original ideas promoted many experimental studies between 1927-1967 which were reviewed by the group of Annie Van Bergen (1968).

The main conclusion of Van Bergen's book is forceful: The

combined results of the studies on selective recall which have been performed since 1927 are shown to be inconclusive. The assumptions made in the interruption studies are evaluated: several shortcomings with regard to the operationalization of the concepts of Lewin's tension system theory are brought to light. It is concluded that the problem of the selective recall of uncompleted and completed task should be regarded as a non-problem" (p. 342).

The implications of conceptual terms and methodological problems, so suggestive and provocative in Zeigarnik's experiments, had a great impact at that stage of research. But the main problem was empirical: the lack of replication of the Zeigarnik effect on the studies derived from the 12 different experimental variations conducted by the Van Bergen's group. Another problem is the scarce ecological validity of the studies regarding the contrived tasks and experimental situation.

The second set of antecedents comes from the "psychology of motivation and cognition" (Mandler, 1964, 1989; Miller, Galanter & Pribram, 1960). This is a set of well-organized experimental studies of the interruption of behavior, where "the interruption of an integrated or organized response sequence produces a state of arousal which will be followed by emotional behavior" (Mandler, 1964, p. 164). Such a state of arousal implies disorganized responses or persistence, depending on the level of organization of the interrupted response sequence. One problem here for the behavioral psychologist relates to the subjective concepts of "state of arousal", "emotional behavior," "organized response," "level of organization," etc. The other problem is the ecological validity of the arbitrary tasks and experimental situations.

The third set of antecedents comes from the "environmental psychology" field of research directed toward the study of "crowding" (Schopler & Stockdale, 1977; Schopler, McCallum, Rusbult, Hong, & Walden, 1979). This area refers to field studies on a social interference model and crowding, based on indirect psychological measures obtained in natural settings (i.e., college dorms). The social interference model predicts that the "importance of the behavioral goals directly affects not only the magnitude of the interference but also the mechanisms by which people cope with it. Important goals would induce a more active coping strategy in a crowded setting... and would maintain task performance at the price of increasing crowding stress. When the behavioral goal is unimportant, decrements in task performance preclude a rise in stress" (Schopler et al, 1979, p. 1304). Problems with the third antecedent rely on the nature of indirect psychological measures of concepts such as "crowding stress", "perceived social interference," "importance of behavioral goals," and "mechanisms of coping."

Behavior researchers have marginally studied *social interference* with both "behavior modification" and "applied behavior analysis" approaches aimed as the study of "on-task & off-task" behavior and disruptive behavior. However, they have not really analyze transitional behavior and interruption of behavioral sequences, both of which serve as the antecedents, patterns and consequences of social interference. Although the previous psychological approaches subsuming such perspectives are different and their main conceptual assumptions limited from a behaviorist view, both have an heuristic value for behavioral researchers in order to study such ideas with a systematic, reliable, replicable, and objective

methodology. In fact, there is scarce behavioral literature about social interference as a transition. There is no longitudinal research on social interference. The study of social interference as a behavioral transition class is relevant for behavior analysis in school settings, social behavior, and developmental psychology, as we can see in the next section.

### Social Interference and Behavioral Patterns

In general, behavior analysts have emphasized chronically the study of steady states instead of behavioral transitions. The latter helps to understand the sequential dynamics of behavioral organization in natural settings. Recently, a conceptual and methodological strategy was developed for the study "in situ" of behavioral transitions produced by the behavior of third persons and their individual and social consequences, like "social interference" (Santoyo, Espinosa & Bacha, 1996). This strategy involves the observational study of the behavior stream "in situ" based on a behavioral code and key words, which permits the identification of the main ongoing activity and the activity or behavior that the target emits as a consequence of interruption (behavioral transition). Based on sequential analysis, the strategy provides information on the components of the behavior pattern, like the specific behavior of a person (i.e., peers and teacher) that interrupts the activity of the target. Also the length of the ongoing activity, the time that it takes for the interrupted subject to reinitiate the activity, the changes of activities of the target without the intervention of a third person, are to be analyzed. Specific details on the strategy and some representative results are described in Santoyo, et al. (1996).

The study of social interference patterns in a school setting permits the investigator to respond to questions about time allocation in the classroom and playground, the coherence of behavioral distributions with educational and normative goals, control by the teacher or materials on the activities. At an individual level, the analysis of interference patterns also offers important information on individual behavioral transitions independent on explicit changes of the stimuli in classroom, "on-task persistence", individual differences between children showing different patterns of transitional behavior, etc. For developmental psychology, the study of the stability or change of patterns of behavioral transitions and the individual differences involved is scientifically important.

The interruption of behavior stream research is a "core" component to the comprehension of social interference as a behavioral transition. However, the effects of social interference can be heterogeneous, as a function of behavioral preferences of subjects and time allocation of the activities. Technically, in order to analyze such a complex behavior stream, an observational design must be proposed, with a high level of flexibility and with the goal to integrating information from four basic sources of information: (a) target repertoire (defined by activities time allocation); (b) the nature of interruption: who, how, when?; (c) responsiveness of social agents in setting; (d) consequences of the interruption.

The delimitation of such basic sources of information requires the development of systematic strategies for the study of social interference "in situ". The main strategy to cope with this research problem is to take advantage of observational methodology (Santoyo & Anguera, 1992).

### Advantages of Observational Methodology to the Study of Social Interference

The experimental study of the processes derived from the individual transitions (i.e., the target changes the activity, ten seconds or more, without an explicit stimulus), and social interference transitions (i.e., the target changes the activity, ten seconds or more, as a consequence of the intervention of another person) is possible. Experimental study has the advantages of control, manipulation, the use of automatic recording equipment, etc. In the context of this work, however, we attempt to direct the attention to the study "in situ" of behavioral transitions and their implications for behavioral development in school settings.

Observational work implies assumptions of order and consequence control, systematically identifying and describing events that control behavior, strategically analyzing the stream of behavior, searching for regularities and making predictions on the basis of sequential analysis (Sackett, 1978; Bakeman & Gottman, 1986; Santoyo, et al. 1996). The use of non-intrusive strategies permits the evaluation of the generality of some behavior principles in natural settings. The research must be supported by an observational design, with an adequate framework of categorization of ongoing activities and interference events, sampling strategy for sequences of events and time allocation, reliability, validity, coding, and sequential analysis. However the main guidelines of the work are theoretical. Without a clear idea of where we want to go, the outcomes could be irrelevant and useless. One initial step is empirical, the other is theoretical, and both of them will be described in the next section. The main characteristics of an "observational and behavioral system of social interactions," fitted to the study of social interference and behavioral transitions, responds properly to the four sources of information previously mentioned (Santoyo, et al. 1996).

The general characteristics of an observational and behavioral system of social interactions include: (a) the coding system contains exclusive and exhaustive behavioral categories; (b) it is a flexible system of categories; for example, it allows the definition of academic activity or play behavior to be adjusted depending on the changes in the behavioral setting (i.e., teacher instructions, availability of resources); (c) it is made up of representative behavioral categories of the actions that subjects exhibit in educational settings (i.e., on-task behavior, social interaction, off-task behavior, individual play, group play behavior, self-stimulation).

The above categories can be divided in the following classes: (a) individual behavior, including academic behavior, non-academic behavior (self stimulation, isolated play); (b) social interaction defined as social actions initiated by and directed to another person; social actions initiated and directed by others to the target; dyadic and group activities or social interactions such as coercive behavior, group play, negotiation, and sharing; (c) the observational system is an event-based sequential record, with five second intervals, where well trained observers write the order and sequence of the events within an interval; (d) the observational system makes possible the sequential study of the processes of social

interaction, academic persistence, social interruption, change of activities of target, conflict and aggression; (e) it allows the study of the context *where* social interchanges emerge; (f) it allows the detection of the direction of social interaction to identify *who* initiates an interchange. This information is important for the comprehension of the mechanisms of mutual control, interpersonal choice and social preference.

Finally, the observational and behavioral system of social interaction (Santoyo, et al. 1996) includes information about the quality, direction, contents and resolution of individual and social episodes. Using key words or verbs that describe the class of specific action of the category, it provides a descriptive complement to the codified information.

### Social Interference as Behavioral Transition

The study of "social interference" embraces the analysis of contextual constraints, which influence social interactions, and the study of the behavioral stream of individual and social activities of children (i.e., time allocation, on-task behavior, social interaction, the effect of availability of resources on behavioral interruptions, behavioral setting, and so forth). The effects of social or non-social events, which interrupt the behavior stream, can be evaluated on the basis of time allocation of the interrupted activity. In that case, behavioral interference can be analyzed as a function of the following factors: time allocation of the target activity, the particular partner who interrupts the activity (considering subject's social preference), and the context of the interchange.

This class of elements permits the development of a simple model of social interference among children (Santoyo, et. al., 1996). This model is not directed at the study of "crowding," but at the behavioral consequences of social interference, depending on behavioral and environmental factors. Knowledge of this phenomenon shows us situational information of interaction mechanisms of behavior organization *in situ*. Thus, in order to study social interference in natural settings, like school, it is necessary to evaluate children's behavioral organization or patterning, considering transitions between activities in school settings, the quality of "on-task" behavior, and mainly the behavioral consequences of social interference. For example, we found some temporal properties of social interference episodes such as: preschool and elementary school children involved in three behavioral episodes each minute. Children's bouts of "on-task" behavior were very short (around 30 seconds). Also, the probability of the "off-task/on-task" transition, after a behavioral interruption, depended lineally on the time allocation of the interrupted activity.

In a recent study (Santoyo, 1999), we analyzed the dynamic properties of behavioral transitions in school settings, based on the organization of behavior (defined as time on the activity), and the behavioral preferences of the target. To obtain this goal, our research attempted to respond to the following: (a) *Quantity and context?* What is the "natural" frequency of elementary school children's behavioral transitions, whether or not they are produced by the behavior of a third person in school settings?; (b) *timing?* What are the consequences of social interference as a function of "on-task" time constraints, before the interruption?; (c) *stability or change?* Are there changes in patterns over time?

As part of the procedure, we observed ten children in the first grade of an elementary public school, during three annual samples. Behavioral observations were conducted in the classroom and playground. Each child was observed, with the "observational and behavioral system of social interactions", during three consecutive years, based on 11 behavioral samples (six samples of 15 minutes in the classroom and five samples of 10 minutes on the playground). Reliability was always higher than 80% of agreement between observers, and Kappa index was always higher than 0.7.

**Coding and sequential analysis.** The identification of social interference episodes was based on behavioral transitions produced by the third persons' behavior toward the target, which changed or interrupted the pattern of the ongoing behavior for 10 seconds or more. All the episodes were computed and revealed that the quantity of individual transition episodes (not produced by a third person's behavior) varied between three and four per minute in the classroom. The data are consistent with that obtained in previous studies with children of different ages (Santoyo et al., 1996).

In short, this longitudinal study showed a decreasing trend between ages on the frequency of behavioral transitions, probably due to the control of the classroom by teachers; but, developmental factors also could be involved. Even so, there were differences on the number of transitions between settings (context), where the frequency of transitions was varying between two or three per minute in the playground. No systematic trend between ages was detected in this setting. The quantity of social transition episodes (produced by a third person's behavior or social interference) was stable over time, approximately . Three episodes per minute, and no trend between ages and context was found.

In general, time allocation to on-task behavior before the interruption was a good predictor of the frequency of interrupted episodes. The data describe a general pattern where short duration of the activity predicts more social interference. While the involvement grows (defined as a higher on-task time allocation), the probability of social interference decreases. Quantitative differences between ages were found. The smaller children were more easily interfered than the older. However, the pattern of dynamic changes is similar, where frequency of social interference is a negative function of time on task before the interference (i.e., an inverted J curve). Also, small children take more time to return to task once interrupted with than the oldest ones. However, there were similarities in the trend of data of the same children in the second and third year of longitudinal observation. The average length of time to return to task was a negative lineal function of time on task allocation before the interference. Finally, there were changes in the magnitude of the effects but not in the trend of data. The only exception found was in the playground setting where no effects on frequency of episodes (or transitions) and no differences in trends were found.

### CONCLUSION

A strategy for the behavioral study of individual and social transitions of school age children was presented. Some of the descriptive data refers to differences in quantity but not necessarily in pattern or trend. There are several implications

for this. First, social interference can be systematically studied as a behavioral transition, and individual and social transitions can be compared on the basis of their different sources of control. Second, differences in context can be identified and described, showing different levels of occurrence of the behavioral transitions. Of course, differences in sources of control must be emphasized. For example, the differences in frequency of behavioral transitions between classroom and playground could be due to normative control, instructional control, the quality of materials, or some interaction of them.

One implication of such differences could be found in the relative reinforcing value of the activities for children. Perhaps the reinforcing value of playground activities is higher than that of classroom activities. Perhaps persistence is higher on the playground because children often select the activities there, whereas they cannot select as often as they want the activities in the classroom. One of the main advantages that the behavior analysis approach has is the empirical possibility of submitting to experimental or empirical evaluation the different questions that investigations offer. Evaluation of the value of different stimulus situation or different behaviors can be conducted as a choice responding approach with the advantages of consistent theoretical and methodological models, both in the laboratory and in natural settings (e.g., Fisher & Mazur, 1997).

Another problem remaining is the developmental study of individual differences, stability and the change of behavioral patterns of children, focusing on behavioral transitions. Research on such transitions is being conducted in an ongoing longitudinal study in our laboratory to evaluate the effects of peer relationships on the interference patterns. This longitudinal study also evaluates the quality of the academic context, the nature of the interrupted activity (i.e., social play, self-stimulation, social interaction) and the degree of control that the teacher exerts, to name a few. Time allocation on task before the interruption is a good predictor of the frequency of interrupted episodes and the time needed to take up the task again. This data set has a relationship with Zeigarnik (1927) effect, and Mandler's (1964, 1989) and Schopler's et al. (1977) work. The main advantage of this strategy relies on the systematic approach and on the environmental situations that are included in the study of behavioral transitions and their ecological validity.

Our approach in the longitudinal project was descriptive and several implications are derived from it. The number of behavioral transitions in this sample is high (3 or 4 per minute) and the children take a lot of time to return to the activity once they were interrupted. The study was replicated in a private school, with preschool age children, and within different grades of elementary school displaying similar results. The results have an important implication for instructional psychology and the psychology of motivation. Conceptually, this strategy, based on a behavior-analytic approach, can be related with some of the main topics of experimental analysis of behavior, in our case they included: time allocation, choice and behavioral preferences. Some preliminary data on the study of relative frequency of transitions as a function of behavioral preferences were obtained. In fact, a regression analysis describes the data of relative frequency of transitions as a function of behavioral preferences defined by the relative

frequency of activities (Santoyo, 1999). However, this function is different depending on the class of analyzed activity.

In sum, some implications of trends on persistence and "susceptibility" to social interference must be analyzed focusing on individual data rather than on aggregated information across subjects (Magnusson & Stattin, 1998). In fact, a primary goal of developmental research should be to understand "those individual processes that contribute to the ontogeny of the child's adaptations in the particular settings of life" (Cairns, Cairns, Rodkin & Xie, 1998, p.16). On this account, the present perspective is full of challenges and we may have more questions than answers at this point, but it seems like a worthwhile task.

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