Mother and Preschool Child Interaction: A Sequential Approach

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A system for studying sequences of parent-child interaction with a 2- to 3-½-year-old child at home is described. The method focuses on parental initiations of interactions with their child, as well as parental responses to child initiations, to negative or oppositional child behaviors, and to their child's distress. The measures developed for these purposes allow an assessment of extended sequences of interaction, a quantified assessment of the style of the interchange, its affective components, and the resolution or outcome of the interactions.


The objective assessment of parenting continues to be the goal of much current research. Although the definition of maladaptive styles of parenting has been a primary focus, there is an increasing appreciation of the importance of collecting normative data. Clinical judgments based on parental descriptions remain the most used method for assessing family and child functioning, but there is growing interest in the direct observation and quantification of specific aspects of parenting. In this report we discuss the evaluation of parent and child contributions to sequences of interaction and describe a technique for studying such sequences. The method was developed to investigate the qualities of maternal interaction with children of 24 to 42 months of age; the sequential analysis complements other observational strategies of parent-child assessment which were developed in parallel (Dowdney et al., 1982).

**Approaches to the Assessment of Parenting**

The belief that parents have a primary role in shaping the later psychological development of their children has a long history. In this century the mechanism by which this effect takes place has become the subject of academic debate. Psychoanalytic and behavioral theorists have developed elaborate explanations to describe the possible processes involved in parental influences on children's development. While these hypotheses have been difficult to test empirically, they have led to a greater appreciation of the factors which shape development, and of the parental characteristics that lead to both normal and deviant outcomes.

Early textbooks of child psychiatry (Kanner, 1935) document the beliefs of the importance of parental attitudes and activities. However, clinical experience has had to wait patiently for empirical validation. More objective clarification of the key parental variables that were important for later child development began to emerge through the systematic study of clinical (Levy, 1943; Rutter, 1966; Wolff and Acton, 1968) and then later general populations (Rutter et al., 1975; West and Farrington, 1973). While important associations were found, the mechanisms underlying these relationships remained unclear and questions of causality were still unsettled.

**INTERVIEWING STUDIES**

Early child development studies (Baldwin et al., 1945; Bishop, 1951; Schaefer, 1959; Scheafer et al., 1959; Sears et al., 1957) also began to focus on the objective assessment of parental characteristics through the use of interview techniques. Again, substantial associations were found between parental behavior and various aspects of children's functioning. However, questions came to be raised on the specificity, reliability, and validity of these interview measures. In particular, evidence accumulated on the problem that stemmed from a reliance on the retrospective recall of family patterns that existed some years earlier (Yarrow, 1963; Yarrow et al., 1970) and from a failure to make an adequate differentiation between facts and feelings, or between objective events and people's attitudes toward those events (Brown and Rutter, 1966; Rutter and Brown, 1966). However, ways were found for dealing with these methodological difficulties, and reliable and valid interview measures of current family functioning came to be developed.
(Brown and Harris, 1978; Brown and Rutter, 1966; Rutter and Brown, 1966) and were shown to have considerable predictive power (Quinton et al., 1976).

As experience in the assessment of parent-child relationships and interactions increased, both the strengths and limitations of interview methods came to be more clearly delineated. The chief assets of interview strategies include: (1) their ability to cover a far wider range of behaviors and situations than those encompassed in observational approaches, (2) their strength in tapping the affective quality of relationships, and (3) their power to assess the subjective attitudes, beliefs, fantasies, and aspirations that cannot be observed directly. On the deficit side, however, it has become apparent that interviews cannot provide adequate measures of how interactions proceed and of how sequences develop. On the whole, people are not aware of the ways in which they contribute to the continuation of a dialogue or resolve an interchange. Interactions tend to be remembered in terms of the triggering event, the perception of one's role, or the outcome, rather than in terms of the actual sequence of events which occurred. It is just these features that are most successfully assessed through direct observations. Necessarily, observations of parent-child interaction cover a limited number of key interchanges, but observational methods have the power to analyze the microprocesses involved in the how of the interaction. It is specifically this characteristic which constitutes the most serious weakness of the interview. However, the delineation of sequences of parent-child interaction and the measurement of the specific molecular elements that make up the sequence involve problems of their own. In this paper we discuss the problems involved in obtaining a detailed record of the actual unfolding of the series of events that make up parent-child interaction and suggest some solutions.

OBSERVATIONAL STUDIES

Direct observation strategies initially fell into two different categories. There were those which focused on detailed narrative reports that were prepared after an observation period of a specific length and those which reported the absolute and relative frequency of preselected behaviors which were usually recorded as they occurred. Lytton (1971) has described many of these initial studies and highlighted some of the critical variables. More recent work has been reviewed by Roberts and Forehand (1978) who have focused primarily on the nature of the recording scheme and emphasized the usefulness of newer sequentially oriented approaches for analysis.

Problems of reliability and standardization have led to a decline in narrative recording over the past decade. Concurrently, the introduction of a variety of recording devices which could produce tallies of increasingly large numbers of behaviors has resulted in the growing use of "event recording" strategies (Johnson and Brown, 1969; Risley 1968). However, both interval recording (Forehand and Scarboro, 1975) and the recording of temporally associated events (Cunningham and Barkley, 1979; Mash et al., 1973; Terral et al., 1976) have also been prominent. The association of two events occurring in two successive time periods demanded new approaches to analysis.

Clarke-Stewart (1973) developed a system that allowed the observer to designate the temporal order of mother and child events which occurred in successive 10-sec intervals, and hence to derive various contingencies of interaction. Dunn and Kendrick (1979, 1980) have extended this system to include parent interaction with older children and also sibling interaction.

Both behavioral psychologists (Patterson, 1976, 1977a, 1977b; Patterson and Cobb, 1971; Patterson et al., 1969) and ethologically oriented researchers (Blurton-Jones and Woodson, 1979) recognized the value of sequential recording. Sequential systems are influenced by the specific behavioral codes used for the elements in the sequences and also by the scheme used to organize the series of recorded events into meaningful units. One approach (Blurton-Jones et al., 1979; Wolkind et al., 1977) has been to look at the associations which occurred in a continuous stream of events, rather than attempt any subdivision into discrete sequences with a beginning and end. At first sight this method has the appeal of providing an apparently complete picture of the interaction, but to a substantial extent this is illusory. There are three main limitations. First, the picture obtained is heavily dependent on the discriminatory power of the terms used to describe the stream of events. Thus, in some schemes all episodes of speech are recorded as "verbalization"—a categorization that allows no differentiation between the effects of sarcasm and of reassurance. Second, as it is not possible to record all aspects of behavior, there has to be some choice of the items to be given priority. Unless these are clearly specified in advance, there is the danger of bias and of a changing basis for decisions on inclusion. Third, in the analysis of the stream of events there have to be decisions on what to relate to what. Inevitably these involve decisions on when a sequence is to be regarded as beginning and ending. Continuous recording postpones the decision (that could have advantages) but does not obviate the need to make one.

An alternative strategy to continuous recording is provided by the designations of some specific behavior
of the mother or of the child as the predetermined "starting point" of a sequence, and hence the signal to initiate coding. It is apparent that the choice of a child behavior as the initiator of a sequence focuses the observation on the mother's response to the child. Conversely, the choice of a maternal behavior places the emphasis on the child's response. While the subsequent analysis of the sequence can deal with the dyadic interactive negotiation of the couple, the decision on the event or events that initiate sequences necessarily places limits on the analysis and on the direction of the hypothesized causal process to be studied.

Patterson (1976) defined an "interaction" as occurring in a 5-sec period after an initial target behavior and limited the length of the studied "sequence" to three elements. Peed et al. (1977) focused on the response of the child to a set of parental behaviors, again using a limited sequential coding system which restricted the time period to the 5 sec following the parent's initiating command.

Yet another strategy to capture the nature of interaction is to employ "grammatical events" (Burgess and Conger, 1978; Lytton, 1973, 1976). These systems are designed to define a number of related aspects of the interaction. Specifically, the (1) identity of the primary initiator, (2) the nature of his behavior, (3) the individual to whom the communication is directed, (4) the affective tone, and (5) the consequence of the communication are recorded as a five-part unit. Such systems have been made more feasible by the introduction of high speed event recorders (Stephenson and Roberts, 1977). Some of the implications of these methods of data collection for later analysis are discussed in Sackett's review (1978).

The Concept of "Sequences"

The most basic decision in designing a sequential scoring system concerns its time dimensions. To the historian, a revolution is one element in the sequential evolution of a government. At the other extreme, a linguist may document a series of microevents lasting a few seconds in the utterance of a single sound. A sequence is an interconnected, temporally related, series of events. The temporal dimension of these events depends entirely on the nature of the phenomena which are to be studied.

On approaching the analysis of mother-child interactions one has an intuitive sense of what the elements are which made up an interaction. The "turn taking" of a dialogue provides a starting point in determining an approach to the documentation of an interchange from a semantic or psychologically meaningful perspective. However, human interaction has been studied at a variety of "levels." For example, microanalysis of dyadic interaction reveals an intricate pattern of reciprocity between infant and mother which can be demonstrated by as little as 1 min of computer-analyzed audiovisual recording (Brazelton et al., 1974, 1979) or audio analysis (Stern et al., 1975). Using an alternative set of defined events one can trace the dynamic evolution of parental coalitions or family alliances of an hour long conjoint family interview noting the behavioral impact of verbal attacks, conflict acknowledgment, or requests for commitment (Kinston et al., 1979). In reviewing the literature it becomes clear that the "level" of focus chosen should be dependent on the nature of the question being asked.

A further issue in the conceptualization of a sequence concerns the boundaries of events. Of course, this is a minor problem in the study of conversational interchanges because the strong turn-taking tendency defines the beginning and end of the contribution of each of the participants. But boundaries are much less clear in other forms of interaction in which it is common for both participants to "behave" simultaneously rather than in turn. Related issues concern the definition of the beginnings, ends, and causal connections of sequences. Thus, if the objective is the study of maternal responsivity, there is a need to define the child "stimulus" to which she might respond. What type of stimulus (distress, disturbance, or demand) should be included? And what level of stimulus (a down-turned mouth, a whimper, a cry, or a scream)? But then the question of what constitutes the mother's response; any behavior in the next 5, 10, or 30 sec; the next maternal behavior (but then what constitutes a lack of response?); one of the next two, three, or four behaviors; or that which results in a change in the child's behavior? Any of these strategies might be appropriate, depending on the questions being tackled, but the choice of definition will shape the answers obtained. Similarly, when does a sequence end? Should it be limited by time, or some specified number of interchanges, or some specified outcome, or simply a change in the behavior of the initiator of the sequence? Also, what determines the inference of a causal effect? Conditional probabilities based on time-series analyses constitute the usual answer to that question—that is, if the probability of a child crying in the next time sample is increased above base line by maternal behavior X, the assumption is that X has played a part in causing the child to cry. But, as Martin et al. (1981) have shown, it is necessary also to take into account the self-perpetuating tendency of some behaviors. If a child starts crying, there is a strong tendency for it to persist for a while, and even the most effective soothing actions by the mother take
A Method of Assessing Interaction

The method of assessing mother-child interaction that we describe in this paper differs from previous systems in several key respects. Much past research into interaction has been concerned with either infants (e.g., Brazelton et al., 1979; Stern, 1977) or adolescents (e.g., Patterson, 1976); whereas we have focused on interactions with children of 2 to 3½ years, at an age when issues of autonomy and control are becoming important. We have particularly focused on those aspects of parenting that seem likely to be important with respect to influences on children’s psychosocial development rather than with those primarily affecting cognitive or linguistic development. Moreover, within those parental behaviors we have endeavored to assess aspects that might be related to psychopathology as well as to normal development. Because of these interests we have chosen to analyze more prolonged and complex sequences of interactions so that we would be able to make more objective statements about the psychological meaning of interactions. Last, there is an emphasis on the affective tone of the interaction, so that the emotional components of specific behaviors can be more clearly understood—an aspect that seems particularly crucial when parenting is going awry (Burgess, 1979).

This system for studying parenting was developed in conjunction with a larger research program designed to document the current life circumstances and psychological adaptation of a sample of men and women in their 20s who had spent a substantial period of their early years in a residential institution (Rutter and Quinton, 1981). A comparison group of young adults of similar age, social class, and ethnic background was also studied. The primary method used was an intensive semistructured interview that included detailed measures of parenting skills and qualities (Quinton and Rutter, 1982a, 1982b).

After the completion of the interviewing, all the mothers with children in the 2- to 3½-year-old age group were invited to participate in the observational study, the emphasis being placed on the importance of direct assessment of the child’s behavior. The systematic observations of parent-child interaction in the home provided a second evaluation of parenting that allowed a more detailed and intensive assessment of variables evaluated more extensively in the interview. These observations additionally allowed an analysis of aspects of the interactions that could not be tapped at all in the interview. In order to avoid the possibility of investigator bias, all observations were undertaken “blind” to whether the mother was in the institutional or comparison group and “blind” to all interview data.

The 2- to 3½-year age range was selected as the phase of development that highlights the need for the development of parental control strategies as children become more oppositional and negative during the process of individuation, a developmental issue for all parents. Two years of age was set as the youngest age to be evaluated because of the rapid increase in the child’s activity and use of language over the second year. This allowed for greater reliance on verbal communications in developing the observational system, while alternative categories of communication would have been necessary for the study of younger children. Another issue considered in choosing this lower age limit was the evolution of attachment. While children in the first 18 months of life are in the process of forming and strengthening attachments, by the age of 2 the establishment of a primary bond should be nearing completion. Thus, the comparison of dyads at this age would be more reflective of the nature of the established relationship. The upper limit of 3½ years was set because it was unusual for children to have entered a playschool setting before this point but increasingly common after this age. Experience outside the nuclear family was also relatively limited. The general strategy was essentially to choose a period of development during which parenting interactions would have the primary impact on the child’s development. Finally, despite the developmental importance of the preschool period, relatively few systematic interactional assessments of mother-preschool child behavior have been reported.

Three specific areas of interaction were selected as particularly important in the assessment of the quality of parenting at this age. First, how is interaction initiated, and once started, how is it facilitated? Secondly, how is the child’s early autonomy tolerated by the mother, and what strategies does she employ to deal with emerging independence of the child? Finally, how sensitive is the mother to the distress which her child is experiencing, and how effective is she in comforting him? Therefore, the sequential system which was developed focused on the reciprocity of the relationship, the quality of the mother’s approach to maintaining social control, and her sensitivity and response to distress.

Methodological Issues

Every observational study must address a number of variables which influence the nature of the data collected. These variables include: (1) observational
setting, (2) duration and timing of observation, (3) definition of the focus of the observation, and (4) strategy of recording. The nature of the data collected will vary with the approach which is employed.

**OBSERVATIONAL SETTING**

A universal concern in studying parenting is the possibility that the setting of the observation or the presence of an observer may affect the nature of the interaction so that it does not truly represent the usual pattern. Another set of specific issues is raised when mothers and children are observed. Parents may be expected to modify their behavior in an attempt to conform to their perception of what is "good parenting." Thus, there is the concern that the researcher is getting the benefit of a performance rather than seeing the "real" interaction between parent and child. While some older children may also attempt to modify their behavior when observed, it is less frequent that very young children are able or inclined to assume atypical socially approved behavior in order to impress an observer over a sustained period of time. However, other problems exist in observing these children which relate to their differential response to "strange situations." If previous contact with unfamiliar adults has been very limited, the initial influence of a stranger in the home may for a short time greatly alter the child's behavior.

To minimize the impact of being observed on "natural" interaction, some researchers have chosen to make home observations as these were felt to more accurately reflect the usual parent-child interaction (Blurton-Jones et al., 1979; Dunn and Wooding, 1977; Wolkind et al., 1977). As this consideration seemed particularly valid when observing a preschool population, a home observation strategy was adopted. However, the issue of differential response to a strange adult, even within the home, raised the question of what stance the observer should assume in the home setting. We found that if we responded to the child in what would be a normal socially accepted fashion, this tended to markedly change the pattern of interaction. Therefore, it was decided to take a very passive non-responsive posture. Our decision to be silent and unresponsive over the course of the morning in the home explained in some detail to the mothers during a preliminary visit. This sustained uncommunicative role was terminated at the end of the recording period, and an inquiry about the mother's reaction to the morning observation subsequently was elicited.

An interesting pattern emerged regarding the child's reaction to the observer. While some mild wariness was not unusual at the beginning of the observation, the children initially were quite interested in our presence. It was common for them to approach us once or twice and attempt to engage us in some social interaction. However, if their overtures were simply passively ignored, with rare exception they would pay little attention to us for the remainder of the morning session.

A major drawback of home observations is the large number of uncontrollable variables which threatens to make comparison of different settings problematic. Therefore, it was decided to impose three standard conditions on the observation to increase the validity of comparison. These conditions were: (1) the limitation of the number of individuals in the home, (2) the introduction of a specific toy, and (3) the presentation of a picture book as a gift.

The limitation restricting the number of individuals in the home during the morning of the observation was particularly important. Having another caretaker present usually markedly decreased the amount of mother-child interaction. Other research (Clarke-Stewart, 1973) has shown that father's presence actually alters how mothers behave. The presence of additional children was somewhat less of a problem in terms of effects on parent behavior, but created major difficulties in coding. Our system could not deal with the increasingly complicated interactions of a group of individuals in an adequate fashion. Therefore, we arranged that the mother and target child be the only ones at home on the mornings of our observation.

While most of our recording was done while the mother carried on with her usual morning activities, two standardized conditions were introduced to increase comparability of particular variables. The first of these, 30 min before the completion of the first observation, was the presentation of a novel toy (Fisher-Price Cash Register). This toy was somewhat difficult for the children in the target age group (2 to 3½) to master, and usually it resulted in a sustained period of mother-child interaction in which the operation of the cash register was explained. The second standard condition was introduced at the end of the second morning. At this time the mother was given a present for the child. This gift was a book of pictures with no words depicting a story. The mother was asked to "have a look at it" with her child, and some sustained interaction between them usually followed.

By this combination of standardized and unstandardized periods, we hoped to obtain a picture of the style of interaction as it usually took place and also a set of measures that would be comparable from family to family. A total reliance on unstandardized conditions may provide a reflection of what the mother and child usually do together; however, if these activities vary greatly from family to family, there are major problems in comparing styles of interaction across mother-child pairs. If one pair shows more positive (or nega-
tive) affect than another, for example, this could be a function of what they are doing together (some activities provide more opportunities for emotional expression than others) rather than the affective qualities of parenting. Conversely, standardization allows direct comparisons on style just because the content and context of the interaction have been controlled, but the specification of standard conditions may mean that the mother-child pair are involved in activities that form no part of their usual repertoire. Neither approach on its own seemed satisfactory, whereas the combination allowed some measure of "natural" content, as well as comparability in style.

DURATION AND TIMING OF THE OBSERVATION

The time of the observation was standardized as much as possible without disrupting the families' usual patterns of behavior. Morning observations were preferred as it was usually a time that the children were alert and rested. After a preliminary explanatory visit during which no recording was done, the two observation visits were scheduled. During each of these there were alternating periods of interval recording and sequential recording (figure 1).

An interval sampling recording strategy was employed to provide an objective documentation of the type and frequency of a variety of significant behaviors. Four 15-min periods when only interval sampling techniques were employed were designated over the course of the two mornings in order to meet two objectives. First, by using this method the relative impact of the mother and child's increasing familiarity with the observational process on a number of discrete behaviors could be checked. Second, a full hour's documentation of these variables could be collected in a manner which would be less likely to be affected by an unusually prolonged period of any one particular activity. This hour of coding was designed to provide an important contrast to the new sequential system of recording which was developed. Frequencies of target behaviors and the duration of a variety of different types of interaction were derived from this data. Additionally, specific types of behavior which were not scored during the remainder of the observation could be documented. Yet another method of interval sampling for documenting affective reactions and monitoring spontaneous play was used throughout the entire 4 hours of the observation. A more comprehensive description of this method of observation, as well as a plan for the analysis of recorded language and the relationship between these two recording techniques, is provided in a separate report (Dowdney et al., 1982).

Sequential recordings were made for a full 3 hours. Most of the recording (2 1/4 hours) was accomplished while the mother and child were occupied with their usual morning activities. Forty-five minutes were scored during the standardized toy and book periods. Specific questions which related to the on-going interaction could be answered using this data collection system. These included: (1) how was interaction initiated and maintained? (2) how was compliance achieved? and (3) how did the mother respond to the child's distress? Other aspects of the interaction that were considered to be relevant for the assessment of the mother-child relationship (e.g., harsh punitive behavior) but which occurred less frequently were also noted. Finally a global rating of both maternal warmth and sensitivity and a narrative description of the morning's activity were made at the conclusion of each observation (table 1).

To increase the reliability of the coding method, the entire dialogue that took place over the course of each 2-hour observation was recorded on one channel of a U.H.R. stereo portable tape recorder that was carried in a leather case by the observer. A miniaturized Sony cassette tape recorder was also carried by the observer.

<table>
<thead>
<tr>
<th>Morning #1</th>
<th>Present Toy</th>
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<tr>
<td>Interval Recording</td>
<td>Sequential Analysis</td>
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<td>Interval Recording</td>
<td>Sequential Analysis</td>
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<tr>
<td>Morning #2</td>
<td>Present Book</td>
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<tr>
<td>Interval Recording</td>
<td>Sequential Analysis</td>
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<td>Interval Recording</td>
<td>Sequential Analysis</td>
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**FIG. 1. Format of observation.**
A specially recorded “time interval” cassette was used to synchronize the recorded mother-child dialogue and the notations of the sequences of specific behaviors on the coding sheets. This was accomplished by playing the time interval cassette over the course of the observation with two separate audio outputs: one going to an earplug worn by the observer providing him a running account of the passing time intervals, and the other being connected to the second channel of the stereo audio tape. After the observation, the dialogue could be reviewed by listening to the first channel. By listening to the coded time intervals on the second channel, the dialogue could be precisely synchronized with the recorded sequences on the coding sheets. As both tape recorders were battery powered, the observer could move easily throughout the home, following the parent and child as they went about their usual morning activities.

FOCUS OF THE OBSERVATION

A primary objective of the observation was to document whether these mothers could sensitively respond to their children. Specifically we studied: (1) the child’s attempts to initiate contact with the mother, (2) the child’s opposition, and (3) the mother’s response to the child’s distress. When any of these three events occurred, the sequential system was employed to document the mother’s cognitive and affective response.

THE SEQUENTIAL SCORING STRATEGY

As in all systems which are based on sequential recording, behavior and verbalizations were noted using a predetermined set of codes. Existing behavioral codes (Blurton-Jones et al., 1979; Dunn and Kendrick, 1980; Lytton, 1976; Patterson et al., 1969) were inappropriate for the age group or did not cover the variables that we wished to study. Accordingly, categories of maternal verbalizations were derived and operationally defined over the course of 30 pilot observations (see table 2).

An assessment of the affective tone of the contributions of both mother and child was an important requirement in order to be able to understand the psychological meaning of a given element within a sequence. The reliability of subtle judgments of affect based on audio recording alone has been achieved (Scherer, 1979), while reliability of judgments based on facial expression has been repeatedly demonstrated (Ekman and Friesen, 1978; 1979; Ekman et al., 1972; Gaensbauer et al., 1979). While slight variations in emotional tone are indeed communicative, reliability in documenting subtle shifts in affect was difficult to reach using the described method. Therefore, only unambivalently positive or negative affect was noted; all uncertain affects were rated as neutral. Positive affect included pleasurable verbal expressions as well as responses marked by pronounced warmth and empathy. Negative affective tone was scored when anger, irritation, fear, or sadness accompanied a response. Consequently, this system allowed for the differentiation of statements with the same verbal content but different meaning. For example, if a mother told a child to “pick up the toys” in the course of a normal dialogue, the code would be INS/0 (instruct—neutral tone). The same verbal expression if accompanied by the mother happily chuckling with pleasure at the child’s well-meaning efforts would be coded INS/+ (instruct—positive tone). If the mother used the identical words but with an imperative tone, the code would be ORD/0 (order—neutral tone). Finally, if a mother was exasperated by the child’s messiness and angrily used the same phrase to command the child to begin picking up, this would be scored ORD/— (order—negative tone).

Given the basic set of 89 codes, three different types of sequences were recorded: responsivity, control, and distress. Each type will be discussed separately although they share the same basic principle of organization (i.e., a sequence is begun after the occurrence of a key behavior on the part of the child). However, termination rules vary with each type of sequence since each was designed to elucidate different aspects of the interaction.

Responsivity Sequences

The importance of sensitive responsivity in the interaction of mothers and infants has become increasingly recognized (Brazelton et al., 1979; Sander, 1977), but has been less studied with older children. The responsivity sequences which we coded began when the child initiated an interaction. The object was to document the nature of the initiation, the maternal responses, and the process by which sustained interaction either was established or failed to occur. The child’s initiations were divided into physical ap-
proaches and verbal approaches. The specific nature of the verbal initiation was documented. In order to avoid confusion regarding the establishment of the beginning of these sequences, only child initiations which followed a period of at least 20 sec of noninteraction were analyzed sequentially. Thus, we were primarily measuring the process by which a joint interaction began rather than the subtle turn taking of language that has been elucidated by microanalysis (Stern et al., 1975).

The maximum number of responses that were scored after the child's initiation was predetermined. No specific criteria needed to be met in order to terminate scoring. Rather, the interaction between mother and child was routinely scored noting their alternating contributions until either the mother had made six responses to the child or their joint interaction had terminated. If the former situation occurred, the nature of the continued joint interaction after the mother's sixth response was noted (e.g., JP—joint play). The rationale behind this convention was that the process of initiation and establishment of interaction was more highly reflective of maternal responsivity and sensitivity than the analysis of the continuation of an extended interaction.

Control Sequences

Control sequences began with a defined child key behavior which was either oppositional or destructive in nature. These included active opposition (OP), passive noncompliance (NC), destructive acts (DES), aggression (AG), and misbehavior (MSB). Whenever these key behaviors occurred, a sequential record was made of the following events. Thus, a control sequence may have been initiated after the commencement of a responsivity sequence, during an extended joint interaction, or during periods when there had been no on-going interaction. After the key event was recorded, the mother's response to the key behavior was documented. Then the alternating mother and child contributions to the sequence were noted. This recording method of documenting the alternating mother and child events was consistently employed for all three types of sequences once initiation of the interaction had been established.

However, unlike responsivity sequences, the control interaction was scored continually until one of two situations occurred: either compliance was achieved (i.e., CC—child complies) as indicated by termination of the key behavior; or the mother ceased trying to influence her child, allowing the behavior to continue (i.e., NC—noncompliance). Thus, control sequences may have continued as long as the mother was trying to modify the child's behavior and the child was resisting. A specific advantage of this convention was that every control sequence contained a final statement reflecting the outcome. The sequence also provided a complete record of the sequential maternal elements, reflecting both the mother's cognitive strategy and the fluctuation of her emotional state as she dealt with these difficult child behaviors.

Distress Sequences

Distress sequences were begun when the child expressed mild (WH) or severe (CRY) distress. A special code (HUR) was used if the child was distressed because he was physically hurt. As with control sequences, a terminating condition must have been achieved before the coding would end. In this case, the sequential recording ended at the point when the child ceased to be distressed. Thus, there was a complete sequential record of all maternal responses which were required to achieve this end.

Maternal Initiations

Approaches by the mother were not scored in the same sequential manner as the child. However, all mother initiations which took place during the period of sequential recording were noted. Mother initiations were defined in a parallel manner to child initiations and required a period of noninteraction before they could be scored. The two maternal responses directly following the child's reaction to the mother's initiation were also recorded. If still further interaction continued, its quality and duration were documented using the same categories of joint interaction which were used to describe the nature of the ongoing involvement after child initiations. (For further discussion of the application of this technique see Dowdney et al., 1982.)

Illustration of Sequential Recording

The following vignette illustrates how a particularly complex interaction is coded (see figure 2).

The interaction begins as a responsibility sequence when Jonathan enters the room where his mother is ironing and says, “Where is sister?” (CQ/O). Mother replies, “She's with Aunt Mary.” (EXP/O). Jonathan then makes a request, “I want tea.” (REQ/O). Mother replies, “Not now Jonathan.” (MNC/O). Jonathan doesn't like being put off and shouts, “Tea, now!” with an angry stamp of his foot (REQ/—). Mother is displeased by this show of temper and takes a firm irritated stand, “No, Jonathan, I'm very busy and must finish the ironing!” (MNC/—) and (EXP/—). Jonathan then takes a folded shirt, throws it on the floor and says, “Tea now.” (REQ/—). Mother says, “Stop that this instant!” (MNC/—) and (PRO/—).

At this point a control sequence begins as Jonathan
Fig. 2. Diagrammatic illustration of sequential coding method. (a) Shift to a control sequence. (b) Child has complied so this control sequence ends. However, as the child begins to whimper, a distress sequence is initiated. (c) Distress ends, mother and child begin a joint dialogue.

reaches for another shirt which follows the first (OP/–). Mother is now very cross and says, “Pick those up.” (ORD/–). Jonathan just watches her (NC/O). Mother repeats the command (ORD/–). Jonathan defiantly blurts out, “No!” (OP/–). Mother threatens to spank him (THR/–). Jonathan silently watches (NC/O). Mother finally says, “You are a bad one,” (DPV/–) spans the child (MAG/–) and says, “Now pick them up!” (ORD/–).

When the child does comply, the control sequence ends, but because he begins to whimper (WH/–) a distress sequence begins. The mother responds by asking, “What’s wrong now?” (MQ/O). The child says nothing but continues to whine (WH/–). Mother then says, “Come to mama.” (INS/O). The child comes but is still fussing (WH/–) (CC/–). Mother then holds him on her lap and says in a warm tone, “Shall we go for a walk when I finish the ironing?” (CUD/+ SUG/+). At this point the child smiles, and for 40 sec mother and Jonathan discuss going for a walk together (STPD–40 sec).

This relatively long interaction would actually be scored as three sequences. As it began with a child initiation, it would usually be scored in the above manner for six maternal elements at which time the nature of the sustained interaction would be documented. However, in this example opposition occurred so that a new control sequence had to be scored. It was marked by prominent negative affect and concluded with a statement about compliance as do all control sequences. At the same time that the child complied, he began to show low level distress, thus defining the commencement of a distress sequence. During this interaction the affective tone of the mother shifted to a comforting mode, and the child was quieted.

Reliability

A major concern in developing a system as complex as the one presented is the assurance that the recorded data are accurate. During the initial piloting attempts were made to analyze only the written notation of sequences scored in the home without using synchronized audio tape recording. This proved to be too difficult a recording task to be performed reliably. However, the introduction of the use of audiotapes to record the mother-child dialogue allowed the raters to concentrate their attention on three aspects of the sequence recording task. These were: (1) the initiation of a given type of sequence, (2) nonverbal components, and (3) the affective tone of specific elements of the interaction. Given this modification, reliability was improved dramatically over the course of a year of piloting.

The first question was how well observers would agree on the occurrence of a sequence and on its length. This was investigated by having two raters simultaneously score the interactions in the home, independently checking the scoring afterward through the use of audiotape recordings. There was a high level of agreement on the length of sequences ($r = 0.99$)—there being perfect agreement 84% of the time and disagreement on more than one element in only 2% of the sequences.

The second question in the reliability study was the documentation of agreement on the content of the specified elements. This was initially done using the coded sequences from the simultaneous observation
sessions. However, in order to increase the number of total elements scored, two other techniques were employed. The first of these was to score videotaped mother-child interactions. The second was to score typed transcripts that were coded with time intervals and narrative descriptions of nonverbal behavior. While these two approaches were a somewhat less direct reflection of the coding task, they permitted a wider variety of behavioral interactions to be examined. Additionally they provided a collection of standardized sequences that were subsequently used for training and testing other raters. Table 2 presents the percent agreement on the specific behavioral categories scored throughout the observations using these three techniques (as calculated by number of occurrences observed by one observer and those agreed upon by the other divided by the total number of occurrences scored by either observer).

While most categories were rated quite reliably, an area of difficulty arose related to the relative rarity of the coded elements SUG (suggest), REJ (reject), and CMFT (comfort). In retrospect, the lack of the regular occurrence of these responses during the early piloting phase of the project delayed the development of a sufficiently detailed empirical definition of the code. This was particularly true for the identification of the code "comfort," as its definition required recognition of widely different maternal styles.

However, with these exceptions, interrater reliability was generally good, and some codes (especially those that initiated or terminated a sequence) had very high or near perfect agreement.

The third question concerned the reliability of sequences when considered as a whole—that is, agreement that there was a sequence and that it consisted of a specific pattern of combined mother and child behaviors. Reliability was found to be high. Thus, the pairing of child initiation and the type of maternal response showed 88% agreement; the same level of reliability was found for the final maternal response and the way the sequence ended. Agreement on the nature of the initial maternal response to key control events was 81%; to distress events it was 92%. There was also high reliability for measures on the persistence of distress—for example, 100% agreement on the pairing of the third consecutive child distress code with the maternal response, and 83% agreement on the final maternal response to distress.

**Validity**

Determination of the validity of a data collection system is both critical and elusive. On the most basic

<table>
<thead>
<tr>
<th>Codes</th>
<th>N</th>
<th>% Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHILD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WH (whine)</td>
<td>53</td>
<td>100</td>
</tr>
<tr>
<td>CRY (cry)</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>AG (aggressive act)</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>OP (active opposition)</td>
<td>17</td>
<td>98</td>
</tr>
<tr>
<td>NC (noncompliance)</td>
<td>32</td>
<td>98</td>
</tr>
<tr>
<td>AP (child approach)</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>REQ (child request)</td>
<td>36</td>
<td>97</td>
</tr>
<tr>
<td>CQ (child question)</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>CVA (child discusses self)</td>
<td>75</td>
<td>93</td>
</tr>
<tr>
<td>VAP (verbal approach)</td>
<td>27</td>
<td>96</td>
</tr>
<tr>
<td>HUR (child hurt)</td>
<td>7</td>
<td>92</td>
</tr>
<tr>
<td>CV (nonspecific child verbalization)</td>
<td>96</td>
<td>94</td>
</tr>
<tr>
<td>CAP (child initiation)</td>
<td>125</td>
<td>98</td>
</tr>
<tr>
<td>CLVE (child leaves)</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>MLVE (mother leaves)</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>IP (independent play)</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>CC (child complies)</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

| TERMINATION |    |             |
| STP C (control ends) | 5 | 100          |
| STP D (distress ends) | 8 | 100          |
| END (reciprocal interaction ends) | 22 | 93          |
| JP (joint play) | 4 | 100          |
| JV (joint verbalization) | 14 | 100          |
| JCU D (joint affection) | 1 | 100          |

| MATERNAL |    |             |
| EXP (explain) | 94 | 94          |
| SUG (suggest) | 7 | 83           |
| MQ (mother question) | 86 | 96          |
| PER (persuade) | 24 | 74           |
| DIS (distractions) | 7 | 100          |
| INS (instruct) | 240 | 96         |
| APV (approve) | 93 | 96           |
| ACK (acknowledge) | 104 | 86         |
| MV (nonspecific mother verbalization) | 86 | 83          |
| MC (mother complies) | 10 | 88           |
| IG (ignore) | 51 | 95           |
| TSE (tease) | 7 | 100          |
| S (sarcastic comment) | 33 | 90           |
| DPV (disapprove) | 30 | 97           |
| MNC (mother noncomplies) | 24 | 100          |
| ORD (order) | 18 | 100          |
| PRO (prohibit) | 12 | 96           |
| RSS (restrict) | 5 | 89           |
| REJ (reject) | 2 | 67           |
| THR (threat) | 22 | 98           |
| NPA (negative physical affect) | 3 | 100          |
| MAG (maternal aggressive act) | 4 | 82           |
| MAT (maternal affection) | 11 | 84           |
| CPT (comforting) | 6 | 50           |
| CT (caretaking) | 18 | 97           |
| HLP (physical help) | 6 | 91           |
| PHY (takes object away) | 12 | 100          |
level there is face validity because the system is based on direct observations as opposed to second hand reports of past events. The inclusion of long periods of observation (2 hours) on multiple occasions provides much greater assurance that what is being observed reflects a more accurate picture of the "natural" interaction. The issue of "play acting" is minimized by the child being at a developmental level at which this is not common as well as by the fact that empirical experience has shown that there is a marked decrease in the child's interest in the observer if a noninteractive posture is taken. Nevertheless, the issue of observer impact on the interaction must remain a consideration.

The content validity of the system is enhanced in that the behaviors observed are both empirically derived and reflect theoretical issues related to the development of maternal interactions with preschool children. It is not surprising that the issues of control and compliance should be important for mothers of 2-year-old children. Concurrent validity can be established subsequently with the further analysis of other measures. The similarity of the results derived from interval sampling and global impressions is a first step, while correlation with the final results of the interview study will be of even greater interest. Construct validity will be linked to the comparison of the two contrasting groups of mothers included in the study and to the specific hypotheses related to the impact of their institutional upbringing. The further analyses of the role of intervening variables could strengthen this comparison.

**Sequential Analysis**

A sequential approach to the study of mother-child interaction can give rise to three primary descriptive aspects of "behavioral dialogue." First, the absolute amounts and temporal distribution of "interaction" can be determined in a more discrete manner than is usually possible with interval sampling techniques (Lewis and Lee-Painter, 1974). Second, the initiators and terminators of the chain can be determined. For example, using the described method both the nature of the conflicts between the mother and child as well as the outcome can be derived. Third, the nature of the chain is recorded in a way that allows for analysis of intervening events prior to termination of the sequence. In the case of an oppositional sequence involving mother and child the impact of such variables as maternal strategy and affect can subsequently be determined.

**Summary**

A system for studying sequences of parent-child interaction with a 2- to 3½-year-old child at home has been described. The method focuses on parental initiations of interactions with their child, as well as parental responses to child initiations, to negative or oppositional child behaviors, and to their child's distress. The measures developed for these purposes allow an assessment of extended sequences of interaction, a quantified assessment of the style of the interchange, its affective components, and the resolution or outcome of the interactions. Particular attention is paid to the combination of standardized and nonstandardized approaches in the home setting in order to obtain measures that both reflect the usual patterns of parent-child interaction and also allow direct comparisons across families.

**References**


