

THE COMPLEMENTARITY OF CONTINUOUS AND DISCRETE STATE  
ANALYSES  
OF FAMILY INTERACTION

by

Gloria L. Krahn

A Thesis  
presented to the University of Manitoba  
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## ABSTRACT

Two distinct methodologies to analyze social interactions have been developed recently. The continuous state or correlational approach uses quantitatively rated data and determines the interdependencies in behaviours as manifest across the entire observation time. The discrete state or lag sequential approach on the other hand, uses qualitatively defined data and searches the behaviour streams for sequences of behaviour which occur significantly more often than chance. The potential complementarity of these methodologies has been suggested but has not been demonstrated.

In the present study, observational data of individual triads of mother, father, and child interactions were analyzed for relationships across interactants' behaviours using the two methodologies of the correlational approach and the lag sequential approach. Multidimensional scaling techniques (MDS) were employed to condense the data from their original codings as categories of the Behavior Coding System to a quantitative form amenable to correlational analyses. The MDS results identified the two conceptual dimensions of Prosocial--Deviance and level of Involvement as underlying the behaviour categories. Univariate and multivariate correlations were performed on the time-lagged data

on these two dimensions for six family triads. A relatively high degree of interdependence across interactants' behaviours was generally evident. Interactional patterns manifested across the six families could be identified, as well as patterns unique to individual families. The multivariate regressions were seen to increase predictability in many cases, but made summarizing across families difficult. One triad's data were used to demonstrate the complementarity between the continuous and the discrete state approaches. The multivariate regression results were seen to indicate general interdependencies in interactants' behaviour which were then verified by the lag sequential results. The lag sequential analyses identified specific behaviour categories which illustrated these interdependencies. Joint use of both methodologies appears to be most informative. Inaccuracies in attempting to conceptualize these time-based data as sequences of discrete events are demonstrated. The results are discussed in the context of viewing the family as a continuously interactive system.

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## INTRODUCTION

The manner in which parents relate with their children has been of virtually universal interest. For the past four or five decades social scientists have attempted to investigate this phenomenon in a systematic manner. During this time tremendous advances have been made in the general approach of research directed toward this subject and in the methodologies employed. Direct observation of children interacting with their parents has become the preferred and popular method of collecting data and computer processing of data has facilitated much more complex and informative analyses. Various techniques for the examination of interactions have been developed recently.

The increased utilization of observation as a method of data collection has necessitated greater understanding of the classic psychometric issues of reliability and validity as they relate to observation. Extensive investigations have been evident recently, resulting in a voluminous and valuable literature devoted to factors influencing the generalizability of observational data. This literature is reviewed briefly in the present paper.

Concurrent with the development of observation as a technology has been an increasing sophistication in the methodologies used for analyzing those data. It is to this area of statistical methodology that the current study is primarily addressed. The recently developed analytic approaches facilitate a fuller investigation of the interactive nature of interaction. That is, they facilitate an investigation into the mutual interdependence of family members' behaviours as they occur in time.

A variety of techniques have been developed, many of which can be classified into one of two general methodologies. The first methodology has been termed the continuous state approach since it employs data that are rated quantitatively along a continuum. This approach considers the simultaneous behaviour streams of the interactants and provides an overall finding regarding their inter-correlation. This approach may be viewed as a macro-level approach. The second group of methodologies has focussed on discrete categories of behaviour and searches what might be labelled the "streams of behaviour" for interactive sequences which occur more frequently than chance. This is a more micro-level approach.

The potential complementarity of these two methodologies is easily seen. The continuous state methodology provides a more general context for viewing the interaction, essen-

tially a skeletal outline, while the discrete state methodology provides a more minute and specific explication of the interaction. The present study was addressed to the specific task of investigating the comparability and complementarity of employing both the continuous state and the discrete state approaches on a single set of data. If these procedures could both be implemented effectively with the same observational data, they should provide a much richer and more complete description of family interaction.

Each methodology utilizes a different type of data. The continuous state or correlational approach utilizes data that are scaled along some continuum (e.g., degree of intensity or positivity). The discrete state or lag-sequential approach utilizes data that are coded as discrete categories (e.g., talk, hit). Since observational data are typically coded in discrete categories, it is necessary to transform the categorical data into continuous data in order to conduct the correlational analyses (Gottman & Bakeman, 1979; Bakeman & Dabbs, 1976). A method regarded as well-suited to this task is multidimensional scaling. This method refers to a group of techniques which utilize ratings of conceptual similarity of objects within a set (e.g., behaviour categories within a coding system). The techniques can determine both the number of conceptual dimensions underlying the coding system and can assign scale values to each category for each dimension.

With few exceptions both the continuous state methodology and the discrete state methodology have been employed with groups no larger than dyads and, for the continuous state approach, examining only one variable at a time. Interactions are, however, rarely so simple. Consequently, the current study examined the interactions of family triads -- mother, father and child. This triad is considered much more representative of the family unit without creating a confusingly complex interactional network. Additionally, social interaction is regarded as a multi-variable process with numerous preceding behaviours influencing a host of resultant behaviours. Investigations of interaction examining only one behaviour at a time cannot possibly capture the complexity of interactive behaviour. Therefore, a multivariate approach to the correlational methodology was employed.

Before the reader becomes either disinterested with or intimidated by the statistical analyses discussed, it might be helpful to present the general historical context for this study in the area of parent-child interaction.

#### Orientalions of Earlier Research

In the earlier social science literature on parent-child relations, at least two distinct theoretical orientations can be identified, one stemming from the child study movement and the second from clinical work with families. The literature from the child study area has provided quantified

descriptions of the relationship between selected parent variables (e.g., education, attitudes, degree of permissiveness) and selected child variables (e.g., cognitive style, academic performance, dependency). The Fels longitudinal study (Baldwin, Kalhorn & Breese, 1945, 1949) is an early example of this approach. With a few exceptions most of these studies examined only the mother-child dyad, with fathers and siblings being virtually ignored. As well, although theoretical orientation determined the selection of variables to be investigated, the scope of the studies was characteristically broad and not designed to test specific theoretical hypotheses. The major aim was to increase understanding of the process of child development. Lytton (1971) provides an extensive review of the earlier observational studies of this genre.

The literature originating in the clinician's office began with the early investigations of families with a schizophrenic child (Wynne & Singer, 1963; Mishler & Waxler, 1965, 1966). These studies frequently included father and siblings as well as mother and the identified child. In addition, the studies were typically designed to test specific theoretical hypotheses about how the "deviant" family functions. Such concepts as the double-bind, pseudomutuality, and marital schisms and skews were investigated in searching for an etiological explanation for schizophrenia (Mishler & Waxler, 1965). Since this early work the focus



of the clinically-based investigations has broadened to include families experiencing other difficulties. The thrust of much of this research has been to facilitate therapeutic intervention with distressed families. This literature has been reviewed by Riskin and Faunce (1972) and more recently by Jacob (1975).

During the earlier decades there was little overlap between these two streams of research. Riskin and Faunce, in their evaluative review of family interaction research, lamented the extent to which family interaction research has been limited by interdisciplinary isolation. Yet the problem persisted. A comparison of the references of Riskin and Faunce (1972) with those of Lytton (1971) in his review of observational studies of parent-child interaction reveals that of the 373 studies cited by either author, only seven were cited by both. Despite their surveying different areas in the literature, both authors recognized the need for a broader scope in the approach to family interactions and for greater attention to methodology. The family interaction research of the past decade has demonstrated significant advancement in both these areas and has increasingly integrated findings from the clinical and the child experimental streams.

### Recent Advances in Orientation

One of the most significant developments in the area has been a broadened perspective in viewing parent-child interaction. This has been accomplished by expanding the scope of research with respect both to the type and level of the behaviours observed, and with respect to the family members studied.

Perhaps foremost in advancing a wider scope in the study of mother-child interaction is Blurton Jones. His comparisons of the mother-child contact of humans with that of other mammals (Blurton Jones, 1972) and his highly descriptive investigation of mother and child behaviours at separation and reunion (Blurton Jones & Leach, 1972) have demonstrated the value of extensive observation of a multitude of behaviours. The feeding behaviours of mother and infant during the first ten days post partum have been documented by Richards and Bernal (1972). Stern (1974) conducted a micro-analysis of a mother's differential interaction with her three and one-half month old twins and indicated its usefulness in predicting later child behaviours. Also utilizing a more descriptive approach, Lytton (1976) provided some normative data on the social behaviour of two and one-half year old boys with their parents.

As well as broadening the perspective on the types of behaviours observed, the recent literature has begun to exa-

mine the complexity of influences in family interaction. This has been reflected in an increased tendency to view the family as an interactive system. This systems orientation has been manifested both by consideration of the reciprocal nature of interaction and by the inclusion of many family members as subjects for study.

Historically, the literature on parent-child interaction has reflected a change from a uni-directional to a bi-directional model of influence. The parent's influence on the child occurs concomitantly with the child's influence on the parent. This increasing trend to a bi-directional model was noted by Lytton (1971) and discussed more fully by Fox (1978). A refined example of this model is the dyadic dialogue approach which has been utilized recently, primarily in mother-infant studies (e.g., Brazelton, Koslowski & Main, 1974; Tronick, Als & Brazelton, 1977; Thoman, 1974; Bakeman & Brown, 1975; Bronson, 1974; Goldberg, 1977; Stern, 1974).

Increased attention has also been paid to the inclusion of family members in addition to the mother and the target child. Kogan (1971) and Stern (1974) have both made comparisons within individual families of dyadic interaction patterns between mothers and two offspring. Changes in sibling behaviour as a result of a parent-training program implemented to alter a target child's behaviour have been investigated by Arnold, Levine and Patterson (1975). Fathers

have also been included more frequently in the observer's field of vision (e.g., Eyberg & Johnson, 1975) and this has facilitated the investigation of the differential effects of mothers and fathers (e.g., Patterson, 1973; Lytton & Zwirner, 1975) and of parents and siblings (Wahl, Johnson, Johansson & Martin, 1974) on the behaviours of the target child. More recently, Fox and Hogan (1978) employed an interacting system model in studying the interactive behaviour of mother-father-child triads. The family unit being observed becomes much more representative of the total family when fathers and siblings are included.

This broader orientation has also been apparent in the increased overlap between the clinically-based and the experimentally-based research. This is perhaps most apparent in the research stemming from the behaviourally oriented types of treatment for child and family disturbances.

Employing a social learning model, these studies have typically sought to determine the specific antecedent and consequent behaviours which maintain certain deviant child behaviours and have done so in order to facilitate therapeutic intervention. In addition both to increasing the understanding of parent-child interaction and to providing empirical validation of the effectiveness of the therapeutic procedures, this body of research has made major contributions to developing and refining methods for data collection.

### Methodological Advances

The methods used to study family interactions can be grouped into the two general categories of data collection procedures and of statistical analysis procedures. The extent and nature of the developments during the past decade in both these areas was anticipated in a general way by Lytton (1971) and by Riskin and Faunce (1972).

A major change has been the tremendous popularity of observation as a procedure for collecting data on family interaction. These observations have been made most frequently under structured to semi-structured conditions with little use of truly ethological observation. Hughes and Haynes (1978) have reviewed many of the studies employing structured laboratory observations. Perhaps more important than the popularity of observation is the extent to which observational technology has been investigated and developed. Numerous issues surrounding its use have been outlined in the literature and are reviewed in a later section of this paper.

In addition, several researchers have investigated the comparability of observation with other methods of data collection. Lytton (1973, 1974) compared several methods of data collection in studying the interactions of 2 1/2 year old boys with their parents. By utilizing a global trait approach he found that experimenters' ratings based on home