The University of Manitoba

TEACHER INFLUENCE ON CHILDREN'S TASK BEHAVIOUR

by

JULIA SHUK-YEE LAU

A Thesis

Submitted to the Faculty of Graduate Studies

in Partial Fulfillment of the Requirements for the Degree of

Master of Science

Department of Family Studies

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TO MY BELOVED MOTHER

獻給

我敬愛的母親

ABSTRACT

Naturalistic research was employed to identify teacher behaviours that are related to preschooler's increased on-task behaviour, specifically those that are frequently followed by preschooler's continuing on-task and changing form off- to on-task behaviour. Influence of individual teachers and activities of the preschoolers are also examined.

Five early childhood student teachers (4 females, 1 male) and 52 middle-class preschoolers (23 boys, 29 girls; 30 to 60 months old) from two nursery classes of the University of Manitoba, Faculty of Education nursery school, participated in this study.

Non-participant observation was employed to document the teacher-child behaviours. A total of 480 minutes of observation was collected for every teacher over a period of 8 weeks. Chi-square statistics and calculations of 95-percent confidence limits were used to analyze the data.

There were significant differences among the teacher behaviours in their relationship to preschooler's task behaviours ($p < .0001$). Activity and teacher differences were also found. Suggestion, attending, questioning, teaching, responding and rewarding behaviours were found to be similarly effective (over 94%) in keeping children on-task. The use of directing behaviour seemed less effective, and interference seemed more likely to put children off-task. The low occurrence of criticism created difficulty in making definitive statements regarding its effect, but it seemed that over half of the time, preschoolers continued on-task behaviour even following teachers' criticism.

It appeared more difficult to change preschoolers from off- to on-task behaviour, particularly when they were not or had not been engaging in any acitivity. Only suggestion and teaching behaviours were more frequently followed by preschoolers' changing from off- to on-task. Teachers who used more rewarding behaviour, less criticism, few directing behaviour and had frequent interaction with the children seemed more effective in increasing preschoolers' on-task behaviour.

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CHAPTER I

Introduction

When the Child Development Associate Program was formed in the United States, one of their basic beliefs was that the most important factor in a child's life is the quality of care the child received from adult caregivers (Zigler & Kagan, 1981). The most significant adults that determine the nature of the experience for the young child are probably the parents and the teachers.

Recently, Lilian Katz reported significant differences between parenting and teaching (1980), but she concluded that the parents and the teachers each play a unique role in contributing to the young child's development. There is some research evidence that teachers have a long-term effect on pupils' development of ideas, values, academic performance and later successes (Mottl, 1982; Pedersen, Faucher & Eaton, 1978). If teachers have the potential for such a great influence on children, there is a definite need to examine exactly what teacher behaviours can enhance children's learning which leads to later achievement.

A fair amount of research on teaching has already been conducted at the elementary grades and begins to extend to the high school level (Brophy, 1979a; Gage, 1978). However, few research studies have been carried out in the preschool -- the setting where many children have their first contact with the teachers. The preschool years have been shown to greatly influence later development. The present study, therefore, was planned to investigate the relationship between teacher behaviours and children's learning at the preschool level.

For children of such a young age, achievement tests may not be a very relevant measure of children's learning, but engagement or time on task has been found to be consistently related to young children's learning (Anderson, 1975; Cobb, 1972; Lahaderine, 1968; McKinney, Mason, Perkersen and Clifford, 1975).

It is the purpose of this naturalistic study to identify the specific teacher behaviours that are related to an increase in preschoolers' on-task behaviour. The influence of the activity setting in which the behaviours occurred are also considered. It is hoped that the findings will help teachers to be aware of the methods that are effective in enhancing children's learning, and consequently, that they will be able to apply the research findings to classroom practices.

CHAPTER II

Review of Literature

Regardless of the theoretical foundation upon which a program or curriculum is based, or how the physical environment is arranged, the teacher is the media through which the education ideology is transmitted (Johnson, 1980) and the one who directly structures and manages the classroom environment. Thus, the teacher plays a vital role in the educational setting and can determine the ultimate effectiveness of the program implemented.

Historical Perspective

Studies designed to delineate characteristics of a good teacher have been appearing in the literature since the year 1896 (Medley, 1972). Following this, other researchers focused on similar topics and examined the characteristics of an effective teacher basing their studies mostly on student reports. In the 1930's, more researchers began to look at the influence of teaching behaviours and strategies on student learning (Silvernail, 1979), but it was around the sixties when a renewed interest in examining the teaching process came about (Rosenshine, 1976). In recent years, more research has been directed to study teaching in order to monitor the implementation of educational programs and to reveal teaching strategies that are best able to enhance student learning and achievement (Becher, 1980).

Overview of Research on Teaching

More studies on teaching were carried out in the elementary grades than in the high school or preschool level (Brophy, 1979a; Gage, 1978). A majority of this investigation has tried to relate the teaching process or behaviours to student learning in forms of achievement

scores, acquiring of specific skills in a particular subject (mostly in language arts and mathematics), and engagement or persistence in tasks.

Some of the studies on teaching were general investigations of teaching in the natural educational settings, while others involved experimental design that examined specific teacher behaviours. Although it is difficult and perhaps even impossible at the present stage to demonstrate empirically a cause-effect relationship between specific teacher behaviours and student learning because of the complex nature of the teaching process, a substantial amount of evidence provided by the correlational approach has identified and confirmed the importance of the relationship between teacher behaviours and student learning.

When examining the effectiveness of specific teacher behaviours, however, few of them are appropriate in all educational settings (Brophy, 1979a), indeed, some mixed and contradictory results have been found. More detail will be discussed later in this review. Brophy and Evertson (1977) explained the inconsistencies as due, in part, to the difference in student grade and ability level which require different teaching strategies for the best result. They also noted the influence of the student's socioeconomic background.

Indeed, teacher effects have been found to be greater and more influential for the disadvantaged (Veldman and Brophy, 1974), those with low aptitude and low academic concepts (Anderson and Scott, 1978), younger children (Harter, 1975; McCoy and Zigler, 1965 and Zigler and Bella, 1972) and elementary grades than high school students (Ryans, 1961). Moreover, Anderson and Scott (1978) have reported that

not only different teachers use different behaviours for different amounts of time, but also for the same group of students, there were differences across the teachers even when the same teaching strategy was used.

The search for studies which examine individual behaviour in order to generalize across different settings is disappointing. But, when data are gathered at a higher level of generality, several patterns are consistently related to learning gains (Brophy, 1979a). The important key is that these results have to be adjusted sensibly to apply them to different educational settings. Furthermore, it was found that teachers tend to have stable teaching styles (Ayers, 1982 and Spaulding, 1982), but special training programs can modify teacher behaviours to a certain extent (Stallings, 1979). Thus, investigation of the effects of specific teacher behaviours on children's learning behaviours becomes even more important.

Ethnographic Approach to the Research on Teaching

Ethnographic research is a term that encompasses qualitative research, case study research, field research, anthropological research and ethnography (Smith, 1979). Its distinctive charactertics includes the use of participant or non-participant observation, use of participant constructs to structure the research, focus on the natural environment, the behaviours take place, and the avoidance of the manipulation of the variables studied (LeCompte and Goertz, 1982).

Ethnographic studies of classroom settings have been appearing in the literature since the mid-1970's (Bolster, Jr., 1983). Now, more and more researchers are acknowledging the value of using this research

model to study teaching and to evaluate the effectiveness of teachers (Bolster, Jr., 1983; Powell, 1982 and Scott, 1977). The reasons are: (a) this kind of approach can obtain systematic and detailed observations of both the natural setting and the behaviour of the teachers and children in it as they go about their daily classroom routines, (b) it minimizes interference with the classroom life, (c) it is more likely to generate information that is interesting and helpful in teacher development as the basic conceptualization of this approach is consistent with the teachers' perspective on teaching (Bolster, Jr., 1983).

In summary, ethonographic research is a method that has great potential for yielding valuable information about teaching and was therefore chosen for the present study.

Relationship Between Teacher Behaviours and Student Behaviours

Participation and involvement by the teacher. Molnar and Weisz (1981) examined the influence of teacher presence on preschoolers' mastery behaviour and found that just the presence of the teacher had a powerful impact on task completion of children on task. However, Johnson and Scriven's study (1979) further specified that it was only the presence of a responsible and interactive adult that affected the children's engagement in play. The presence of a 'passive' teacher, one who did not initiate any interaction with the children nor with the play material, was found to be ineffective in encouraging children to be actively involved with the play materials.

In the conclusion of Phyfe-Perkin's (1981) review of the effects of teacher behaviour on preschool children, she also pointed out the importance of adult participation with the children in order to stimulate

and guide children's autonomous learning. Similarly, a study by Anderson, Nagle, Roberts and Smith (1981) revealed that young preschoolers exhibited more exploratory behaviours and attached more to caregivers who were more responsive and highly involved with the preschoolers. Furthermore, teachers' individual instruction and involvement with students were found to enhance elementary children's task persistence (Stallings, 1975) and achievement in reading (Martin, Veldman and Anderson, 1980) as well as the infants' and preschoolers' overall activity span (Tyler, Foy and Hutt, 1979). It appears that it is not just the physical presence, but rather it is the quality of the teacher involvement with the children that will exert a positive effect.

Teacher-student relationship. As well as the presence of the teacher and their involvement in children's play, the nature of the relationship between the student and the teacher has been found to influence how effective the teacher will be in reinforcing elementary-age student behaviour (McCoy and Zigler, 1965)

Ryans (1961) has reported a direct relationship between productive elementary-age student behaviour such as participation, confidence, taking initiative, etc. and teachers who are friendly, understanding, responsible and enthusiastic. Similarly, Flanders (1965) found that teachers who were warm had students with increased levels of task involvement, creativity, initiation and good emotional adjustment. Another study by Goldberg and Mayerberg (1975) reported experimental findings that irrespective of race (black vs. white students) or grade (second vs. sixth grade), students performed better on both

cognitive and non-cognitive tasks under a positive teacher affect condition. It seems evident then, that teachers who are warm, friendly, enthusiastic and understanding, and who can establish a good interpersonal relationship with the students are more likely to have a positive impact on student learning and behaviour in the classroom.

Praise and rewarding statements. What does it mean to be a warm and understanding teacher? It seems to narrow down to the way the teacher interacts and talks to the students. A large number of studies have reported the positive influence of teacher praise and rewarding feedback on student task involvement and persistence (Anderson, Nanoogian, and Reznick, 1976; Fagot, 1973; Swan and Pittman, 1977; Taffel, O'Leary and Armel, 1974) and especially for children from lower socioeconomic background (Brophy and Evertson, 1977). Harter (1975), however, found that the influence of adult praise and approval in motivating performance on tasks declined with age. Stallings (1975) also found that too much praise from the teacher resulted in students being less independent. Brophy and Evertson (1977) found only a weak relationship between praise and achievement for low socioeconimc status elementary-age students and a slightly negative relationship between praise and achievement for high socioeconomic students. When they examined the nature of praise in more detail, they found that specific praise that indicated what specifically about the student work was praise-worthy, correlated positively with student-learning gains as opposed to simple praise that involved only a general positive remark.

Although the effectiveness of praise seems to vary for students of different age groups and from different socioeconomic backgrounds, Brophy (1972) and Anderson, Evertson and Brophy (1979) suggested that, in general, praise should be used in moderation and should be used as specifically and individually as possible. The teacher should also praise thinking and effort more than just getting the right response from the student.

Criticism. The other extreme of praise and reward will be criticism. Teachers who tend to criticize frequently seem to be less effective in encouraging children to stay and work on tasks (Fagot, 1973; Hamilton and Gordon, 1978). Also, a significant negative correlation between teacher criticism and student achievement in reading was found by Martin, Veldman and Anderson (1980). Stallings (1975) and Brophy and Evertson (1977), however, reported that criticism after the student had answered incorrectly was positively correlated with student achievement. The findings about the effect of teacher criticism still seem to be inconsistent and in need of more carefully designed investigation, but under no circumstances has extreme criticism been shown to enhance student learning. Anderson, Evertson and Brophy (1979) recommended that when teachers do criticize, the criticism should be as specific as possible and should include specifications of desirable or correct alternatives.

Question. In most educational settings, teacher criticism does not occur very often, but it seems that teachers ask many questions during an average school day (Gall, 1972; Wood, H. & Wood, D., 1983). Fortunately, the frequent use of question has been found to be related to student achievement (Stallings, 1975).

Winne (1979) classified questions into two types, the higher cognitive and the lower cognitive questions. Higher cognitive questions require students to manipulate information to create and support a response; lower cognitive questions call for verbatim recall or recognition of factual information. Regarding which type of question can better enhance student learning, Winne (1979) reported no difference but Redfield and Rousseau (1981) found that student achievement is positively related to the use of more higher cognitive than lower cognitive question during instructions. And yet, Silvernail (1979) reviewed several studies and concluded that the most effective teacher questioning behaviour includes the mixed use of both higher and lower cognitive questions.

In summary, the frequent use of questions by teachers does correlate positively with student learning, but no conclusive results have been reached about the most effective type of question. Perhaps the type of question that is most effective may vary according to the characteristics of the students, their age and ability level.

Directing and controlling requests. There are inconsistent findings regarding the effect of teachers' use of controlling statements. Rosenshine (1976) reported a study which showed no significant relationship between control statements and student achievement. However, Fagot (1973) and Hamilton and Gordon (1978) both reported that when teachers were highly controlling and directing, children exhibited less on-task behaviour in class. Stallings (1975) also found that elementary children whose teachers gave excessive directing requests were less independent.

Suggestion. Instead of using controlling statements, sometimes teachers may still elicit the same response from the student when he or she suggests the alternative and leaves the decision to the student. Study of reading instruction at the elementary grades (Martin, Veldman and Anderson, 1980) revealed a positive association between student growth and achievement in reading skills and teacher use of guides and probing questions to improve student response. Similarly, Hamilton and Gordon (1978) reported a positive relationship between teacher use of suggestion and kindergarten children's in-class on-task score as well as experimental task persistence behaviour. Further, Krantz and Scarth (1978) conducted an experimental study on preschoolers investigating the effects of different types of teacher assistance behaviours (proximity, verbal reinforcement, prompting, reinforcement with prompting) and nonintervention on children's task persistence. Except for the older females (46-54 months), the use of prompting or suggestion either in isolation or in combination with verbal reinforcement by the teachers was found to have a significant positive effect on the children's task persistence. The researchers explained the non-significant effect of the teacher prompting behaviour in the older females as due to the high spontaneous task persistence of these older preschoolers under the no intervention condition.

More studies that examine the influence of the use of suggestion on different age groups of students are needed before any definite statement about the effect of suggestion can be made.

Interference. Sometimes, teachers may interfere with student learning without being conscious of it. The so called "interfering behaviour" may be motivated by the teacher's desire to help the student. Teachers' sensitivity and discernment can help to avoid unnecessry interruption.

Very few research studies have systematically explored the relationship of teacher interference and student behaviour. There was an experimental study conducted by Farnham-Diggory and Ramsey (1977) which investigated the effects of interruption, social reinforcement and defective toys on disadvantaged children's play persistence. They found that the children's play persistence was most negatively affected by interruption. Constant interference upon the play activities of these children set up emotional tensions and significantly decreased their play persistence. Thus, it seems that teacher interruption can be adversely related to students task involvement and subsequently, their learning.

Summary. In summary, the research suggests that effective teachers are those who can establish a good interpersonal relationship with the children and are willing to participate and get involved in their tasks. They praise moderately, specifically and praise not just right responses, but also efforts and thinking. Effective teachers can give criticism when necessary, but also specify why and provide the desirable alternatives. They ask questions frequently, using probing questions and suggestions to guide children to arrive at the solution, but always avoid giving excessive directing questions. Last but not least, their sensitivity and discernment

enable them to avoid unnecessary interference with children's activity.

Task Involvement and Student Learning

A group of researchers (Anderson, 1975; McKinney, et al., 1975; Cobb, 1972; Lahaderine, 1968) had the same belief that overt classroom behaviour was an important determinant of learning and academic progress. They conducted similar studies and systematically observed student behaviours in order to search for those behaviours that were indicators of learning. Interestingly, they all found that student involvement in task was one measure that was highly correlated to measures of student achievement and task performance. The correlation was found to be particularly high for the younger age group. Moreover, McKinney, et al. (1975) findings also indicated that the classroom behaviour of a child not only revealed the child's present progress, but also predicted his progress later in the school year. Indeed, a long-term observational study (Gauer and Richards, 1980) on forty-five second-grader's revealed that the children's task orientation was a significant predictor of their achievement test performance five years later.

These findings are logical because the longer one is able to be involved and attend a task, the more efficient should be the information processing. This will, in turn, increase the probability of learning and problem-solving.

Further, Kounin's (1970) study suggested that one of the keys to successful classroom management is keeping students actively involved in productive activities. Brophy and Evertson (1974)

replicated Kounin's findings and extended them by showing that such teachers also tended to produce greater learning gains in their students.

In conclusion, the task involvement is a behaviour that appears to be positively and highly related to student learning, and therefore, a behaviour that merits investigation.

CHAPTER III

Statement of Problem

The research findings have shown that involvement in task is highly correlated with student learning. Thus, teacher behaviours may be considered as supportive of children's learning if they relate highly with an increase of children's on-task behaviours.

The present study aims to identify the presence, absence, and the degree of the relationship between specific teacher behaviours and preschooler's task behaviours, to examine if teachers vary in their frequency of use of different behaviours in different activity settings and to investigate if the activity setting is a significant factor in influencing the teacher-child behaviour pattern.

Hypotheses

Hypothesis 1

Frequencies of children's consequent task behaviours are related to specific teacher behaviours.

Hypothesis 2

Frequencies of use of specific teacher behaviours are related to individual teachers.

Hypothesis 3

Frequencies of children's task behaviours consequent to specific teacher behaviours are not dependent upon individual teachers.

Hypothesis 4

Frequencies of specific teacher behaviours are related to the activities in which they occurred.

Hypothesis 5

Frequencies of children's task behaviours consequent to specific teacher behaviours are related to the activities in which they occurred.

Dependent Variables

The dependent variables were the pattern of child's task behaviour antecedent and consequent to the teacher behaviours. There are a total of four patterns: (1) child continues to be on-task after the teacher behaviour (on-task -- on-task), (2) child goes off-task after the teacher behaviour (on-task -- off-task), (3) child changes from off-task to on-task following the teacher behaviours (off-task -- on-task), and (4) child continues off-task following the teacher behaviours (off-task -- off-task). Operational definitions for children's on-task and off-task behaviours are listed in Appendix A.

Independent Variables

The independent variables were teacher behaviours, activities and individual teachers.

The teacher behaviours that were being tested in all of the hypotheses were attending, criticising, directing, interfering, responding, rewarding, suggesting and teaching behaviours. Their operational definitions are listed in Appendix A. The activities that were treated as independent variables and were tested in Hypotheses 1 and 3 were creative play, dramatic play, cognitive activity, exploratory play, gross-motor play, self-help activity, and non-activity. Their operational definitions are listed in Appendix A.

The teachers were the five teachers who participated in this study, teachers A, B, C, D, and E.

CHAPTER IV

Methodology

The present study was an attempt to integrate both a quantitative and an ethnographic approach to investigate the relationship between teacher behaviours and children's task behaviours. It was a non-participant observation study with no experimental manipulations of either the environment or the variables investigated. An observational instrument was used to quantitativly document the naturally occurring behaviours (frequency measures) in the natural preschool setting.

Subjects

The teacher. The total population consisted of five fourth-year university students majoring in early childhood education and registered for practice teaching in the University of Manitoba, Faculty of Education nursery school. There were three female teachers in the morning group, and one male, one female teacher in the afternoon nursery class. All the teachers were in their twenties and have experience in teaching young children. In addition to teaching in the nursery school, the teachers met with the supervisor of the nursery school weekly for a three-hour curriculum class, and with a graduate student to plan programs and activities for the children.

An attempt was made to obtain the total population sample. A letter explaining the general purpose and nature of the study was distributed to the teachers through their supervisor (see Appendix B). A consent form (see Appendix B) was also enclosed in the letter. Besides, there was an arranged meeting with the teachers to clarify any doubts the teachers had about the study. Time was given to the

teachers to consider participating both before and after the meeting. It turned out that all of them consented to participate in the study.

The children. When the parents enrolled the children in the nursery school, the supervisor had already obtained a general consent from the parents to conduct observation in the nursery school. The sample of children consisted of 57 children, 28 in the morning and 29 in the afternoon group. The total population was included with the exception of five children who were diagnosed as developmentally delayed or having learning problems. There were other student teachers who were specifically assigned to work with these children on a one-to-one basis.

The final sample comprised of 25 children (12 boys and 13 girls) in the morning group and 27 children (11 boys and 16 girls) in the afternoon class. These children attended the nursery school on different days. For example, some came to the nursery every Tuesday and Thursday and some came on Monday and Friday. With this arrangement, the size of the group was kept down to an average of fifteen children per day for both the morning and afternoon nursery class. The children's ages ranged from two-and a-half to five years old. They were all from the middle socioeconomic class.

The Setting

The study was conducted in the Faculty of Education nursery school which operated from 9:00 a.m. to 11:30 a.m. (morning class) and 1:00 p.m. to 3:30 p.m. (afternoon class), Tuesday to Friday.

The nursery school was divided into different learning centres

and had a wide selection of toys available for children to freely select and play. The learning centers were a home centre and a grocery store with dress-up clothes and objects that resembled those of the adult world; an arts and crafts center with paints, easel, paste, colored paper, collage materials, etc.; a reading center with a wide selection of story books; a building center where blocks of different sizes and shapes are available; a gross-motor play area with climbing equipment, rope ladders, rocking boat, etc. and a quiet play or fine-motor center for all kinds of manipulative toys, puzzles, matching and sorting games of all kinds. There were also a tub for water play, a sand box, a wood-working bench and a record player.

The basic philosophy of this nursery school was to provide an enriched and interesting environment for the children to freely explore and learn by participating in the activities. The teacher's role was to facilitate, support and enhance the maximum involvement of the children with the activities and with each other. Besides the basic equipment and toys, the teachers could set up unique activities or group projects for the children who were free to participate or not to participate. There was no formal or compulsory teaching session.

The daily schedule for both the morning and afternon nursery classes was approximately: free play for the first hour, then snack time, then fifteen to twenty-minutes of free play, then clean-up, and then group singing or games and then twenty to thirty minutes of outdoor play. However, if the weather was bad, the children stayed inside to do some quiet activities (such as reading stories, arts

and crafts, or solving puzzles) for the last half hour.

Instrument

The instruments used was modified originally from the observational coding system that Dr. Donald A. Gordon and Jane V. Hamilton and Gordon (1978) examined the relationship between children-child interaction and kindergarten-age children's task behaviour. The inter-observer agreement they obtained for the instrument ranged from 80% to 100%. They considered it a reliable instrument.

However, after three weeks of pretesting using the video-tape equipment in the Faculty of Human Ecology nursery school and two more weeks of testing in the Faculty of Education nursery (the setting where this study was actually carried out), the instrument was further modified in order: (1) to make the list of teacher behaviours more exhaustive so as to account for more behaviours that could occur in the nursery school; (2) to elaborate the categories by subcategorizing some of the teacher behaviours as specific or general; (3) to gain more insight into the children's task behaviour by noting the child's task behaviours both before and after the teacher behaviours; and (4) to speed up the coding process by using symbols to record the behaviours.

The finalized instrument that was used in this study is shown in Appendix D. It is a recording sheet that is divided into different columns for the activity, child code, teacher behaviours, and child's antecedent and consequent task behaviours. Each row represents one episode of teacher-child interaction. Symbols are used to record

the observation in the appropriate box. There is also space available in the comment column for writing the child's response and other comments.

There are a total of fourteen categories of teacher behaviours, three categories of children's task behaviours and seven categories of activities. The 'unable to determine' category is included to avoid any guessing, which should undermine the validity of the data. All the behaviour and activities categories are low inference because they are discrete and observable units of activity. Their operational definitions are listed in Appendix A.

This observational coding instruments was pretested and good interobserver agreement (87.12%) was established before it was used to collect the data. The formula for calculating percentage of agreement is as follows:

$$\text{Percentage} = \frac{\text{Number of agreements}}{\text{Number of agreements} + \text{Number of disagreements}} \times 100\%.$$

Further, to check that reliability was being maintained, co-observation was done again near half-way and near the end of data collection. The percentage of agreement obtained was 85.86% and 89.52%, respectively.

Procedure

Direct observation was employed to document the naturally occurring behaviours in the University of Manitoba, Faculty of Education nursery school.

Before the actual data collection, the observer had done some observation in the nursery school for two weeks, not only to get

familiar with the setting and the pace of the nursery school, but also to familiarize the teachers and children with the presence of the observer. It was believed that when the observer had been there long enough, the teachers and children would pay little attention to the observer.

The observer collected all the data over a period of eight weeks. Four hundred and eighty minutes of observation was obtained for each of the five teachers.

Observations were carried out only during the free-play period when children were free to participate in any activities in which they were interested and free to interact with the teachers.

The observer had a clipboard, stop watch and coding sheets. She sat in the best position to see and hear the target teacher and his or her interaction with the children. She maintained a neutral presence and tried to remain as unobtrusive as possible throughout the observation in order to minimize observer effects. Actually, the children and teachers were used to being observed because the teachers themselves had to observe the children and write reports, and the supervisor of the nursery school observed the teachers so as to give them feedback, thus the presence of the observer to collect data would likely have minimal effect on the subjects and probably not alter their behaviours very much. Indeed, the teachers and children seemed to be at ease throughout the entire data collection period.

One recording sheet was used for only one teacher at a time. The observer followed the target teacher, whenever the teacher responded to or initiated contact with a child, the child's task behaviour at

the time of the teacher behaviour (antecedent task behaviour), the teacher behaviour, and the child's task behaviour after the teacher behaviour had occurred (consequent task behaviour) were recorded. Also, the child's code number, child's response and the activity that the child was engaged in were also noted. As soon as the teacher initiated another contact, the teacher and child behaviours were recorded in the next row and so on. The observer continued to observe and record the teacher behaviours and his or her interaction with the children for five minutes, took a few minutes break to write down extra comments, then observed that teacher again for another five minutes before she proceeded to observe the second teacher using a new coding sheet. The observer tried to obtain twenty minutes of observation per teacher per day. Also, the order of the observation of teachers was counterbalanced in order to avoid any effects of the time of day observed.

Analysis of Data

After 480 minutes of observation were collected for each teacher, all the data were coded and stored into a computer. There were a total of 12,150 units of observation. Since the study is interested in dyadic interaction between the teachers and normal children, data that contain information about teachers' interaction with delayed children and more than one child at a time are excluded form the statistical analysis.

The data obtained are frequency counts, a categorical type of data. Moreover, because of the nature of the study, naturalistic research with no exprimental control, the data are neither normally distributed nor their variances within groups homogeneous. As a

result, non-parametric statistical procedures, the chi-square test, was employed. Furthermore, the frequency counts were later changed into percentages, and estimations of 95 percent confidence interval were performed.

Ehrenberg (1975, 1977) recommended a method for organizing tables, to improve their display so that the main patterns and exceptions in the data are more obvious. The first step is to round the readings to two or three significant digits. Not only will this process make the data more visually clear, it also allows the reader to perform mental arithmetic more easily. Secondly, averages are calculated to reveal which particular readings are similar to or very different from the average reading. Thirdly, the rows and columns are arranged in order of their average size to give a clearer structure to the table. Usually, the rows with larger averages lie above rows with smaller averages to make mental subtraction easier. As for the columns, their averages can increase from left to right, or right to left. Ehrenberg's method appears to be very helpful in improving the presentation of data, so it was used to rearrange some of the tables of this study while the precise data were put in the Appendix E.

CHAPTER V

Results

The results are presented in three main sections. The first section presents the findings of the testing of Hypothesis 1 which examines whether the children's consequent task behaviours were related to the specific teacher behaviours. Section II first discusses the frequencies of use of the different behaviours by the different teachers (Hypothesis 2), then about whether there were differences among the teachers in the children's task behaviours; and lastly, the results of the testing of the Hypothesis 3. The third section gives information regarding: the relationship between children's task behaviours and activities, the frequencies of dyadic teacher-child interaction that occurred in different activities, the frequencies of use of different teacher behaviours in different activities (Hypothesis 4), and lastly, the findings of the testing of Hypothesis 5.

All the hypotheses are stated in the null form for chi-square testing. The .0001 level of significance was chosen when the number of observations was very large.

Section I

Hypothesis 1: Frequencies of Children's Consequent Task Behaviours are not Related to Specific Teacher Behaviours

This hypothesis has pulled all the data for the teachers and activities together, and examines only the relationship between children's task behaviours and teacher behaviours.

Before testing Hypothesis 1, all the data when the children's antecedent task behaviour were on-task were treated as one group, and all those data when the children's antecedent task behaviour were off-task were treated as another group. The reason is to test when the children were already on-task, was there any significant difference among the teacher behaviours in their relationship to children continuing on-task and in their changing to off-task behaviour? Similarly, when the children were off-task, was there a significant difference among the teacher behaviours in their relationship to children changing to on-task and in their continuing to stay off-task? As a result, Hypothesis 1 is split into two sub-hypotheses:

Hypothesis 1a: Frequencies of children's consequent task behaviours are not related to specific teacher behaviours when the children's antecedent task behaviours are on-task. The Hypothesis 1a is rejected because the chi-square test result showed that there was a significant difference among the different teacher behaviours in their relationship to children continuing on-task and in their changing to off-task behaviours (see Table 1), $\chi^2(8, N = 6830) = 2432.2$, $p < .0001$.

After reorganizing the table for the percentages using the method recommended by Ehrenberg (1975, 1977), Table 2 illustrates that suggesting, attending, rewarding, questioning, teaching and responding behaviours were more frequently followed by children continuing on-task (over 95%), whereas, directing was less effective. The effect of criticism was intermediate. Interference was more

Table 1

Frequencies and Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours[b]

Children's	Teacher behaviours									
task behaviours	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	Mean
On-task--on-task										
Frequency	1413	33	303	82	1303	768	758	734	1021	713
Column %	(97.79)	(67.35)	(91.54)	(27.99)	(97.60)	(95.64)	(97.68)	(97.87)	(97.42)	(93.92)
On-task--off-task										
Frequency	32	16	28	211	32	35	18	16	27	46
Column %	(2.21)	(32.65)	(8.46)	(72.01)	(2.40)	(4.36)	(2.32)	(2.13)	(2.58)	(6.08)
Total Frequency	1445	49	331	293	1335	803	776	750	1048	

Note. [a] Children's antecedent task behaviour = on-task. [b] $\chi^2(8, N = 6830) = 2432.2, p < .0001$.

frequently followed by children going off-task than continuing on-task.

In order to make a statement about the influence of the specific teacher behaviours, and to take into account the large differences in the frequency of occurrence of some of the teacher behaviours (see last row of Table 1), 95 percent confidence intervals were calculated for each of the percentages (see Table E-1). The equation for calculating the 95 percent confidence intervals is:

$$\hat{p} \pm \sqrt{1.96 \frac{\hat{p} \times (100\% - \hat{p})}{n}} \qquad (1)$$

where $\hat{p}$ = percentage of times when children continued to stay on-task; $100\% - \hat{p}$ = percentage of times when children changed from on-task to off-task; n = total frequency for that particular teacher behaviour. When the children's antecedent task behaviours were on-task, n_1 was used for n and when the children's antecedent task behaviours were off-task, n_2 was used for n.

The confidence intervals for behaviours that were followed by children continuing on-task (Figure 1) and the confidence intervals for behaviours that followed by children changing to off-task are mirror images of each other because their percentages totalled up to 100%. Findings will be presented in relation to children's continuing on-task behaviour.

In Figure 1, the teachers' behaviours are listed in descending order in their relationship to the children's continuing on-task behaviours. The frequencies of each of the teacher behaviours when the children's antecedent task behaviours were on-task (n_1's) are

Table 2

Rounded Percentages of Children's Task Behaviours [a] Following the Teacher Behaviours

Children's task behaviours	Teacher behaviours								
	Interfere	Criticize	Direct	Respond	Teach	Question	Reward	Attend	Suggest
On-task-- on-task	27	67	92	96	97	98	98	98	98
On-task-- off-task	73	33	8	4	3	2	2	2	2
Total	100	100	100	100	100	100	100	100	100

Note. Table re-organized according to method recommended by Ehrenberg (1975, 1977).

[a] Children's antecedent task behaviour = on-task.

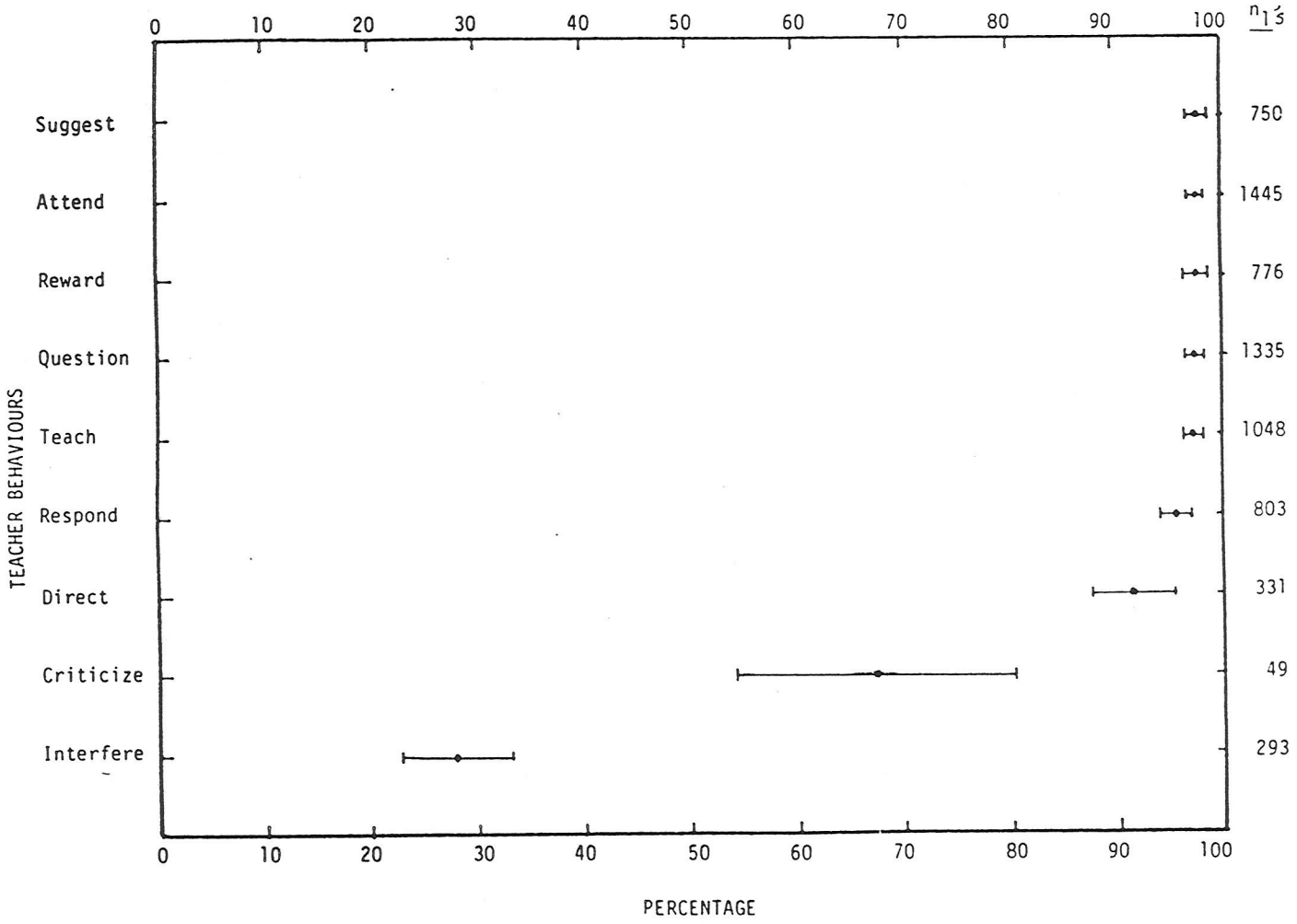

Figure 1. Ninety-five percent confidence intervals (⊢—⊣) for percentages of children's continuing on-task behaviour following the teacher behaviours.

Note. The dot (—•—) represents the observed percentage.

also listed at the right of the figures, because they account for the range of the upper and lower confidence limits for the behaviours, that is, the smaller the n_1, the wider the range.

The suggesting, attending, rewarding, questioning and teaching behaviours were similar and were most frequently followed by children continuing on-task behaviour. Their confidence intervals overlap and they all lie above the 95th percentile. The confidence interval for responding also overlaps the previous five behaviours, but its lower limit is slightly below the 95th percentile. As for directing, over 85% of the time, the children continued to stay on-task, and directing overlaps only with responding. The range of the confidence interval for criticism is very wide because of its low frequency (n_1 = 49), but more than 50% of the time, criticism was still related to children continuing on-task behaviour. Interference is the only behaviour whose confidence interval lies below the 50th percentile, in other words, we are 95% confident that whenever it while used, only 23-33% of the time children continued to stay on-task.

Hypothesis 1b: Frequencies of children's consequent task behaviours are not related to specific teacher behaviours when the children's antecedent task behaviours are off-task. The Hypothesis 1b is also rejected. Table 3 illustrates that there were significant differences among the teacher behaviours which were followed by children continuing off-task behaviours and those which were followed by them changing to on-task, $\chi^2(8, \underline{N} = 2320) = 409.6$, $\underline{p} < .0001$.

An examination of the rounded percentages of children's task behaviours after the teacher behaviours (see Table 4) reveals that a

Table 3

Frequencies and Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours[b]

Children's	Teacher behaviours									
task behaviours	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	Mean
Non-task--on-task										
Frequency	57	4	41	17	75	52	13	344	81	76
Column %	(12.64)	(8.33)	(27.15)	(10.97)	(18.84)	(18.57)	(15.12)	(56.77)	(55.86)	(29.5)
Off-task--off-task										
Frequency	394	44	110	138	323	228	73	262	64	182
Column %	(87.36)	(91.67)	(72.85)	(89.03)	(81.16)	(81.43)	(84.88)	(43.23)	(44.14)	(70.5)

Note.

[a]Children's antecedent task behaviour = off-task. [b]$\chi^2(8, N = 2320) = 409.6, p < .0001$.

Table 4

Rounded Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours

Children's	Teacher behaviours									
task behaviours	Criticize	Interfere	Attend	Reward	Respond	Question	Direct	Teach	Suggest	Mean
Off-task--on-task	8	11	13	15	19	19	27	56	57	30
Off-task--off-task	92	89	87	85	81	81	73	44	43	70

Note. Table re-organized according to method recommended by Ehrenberg (1975, 1977).

[a]Children's antecedent task behaviour = off-task.

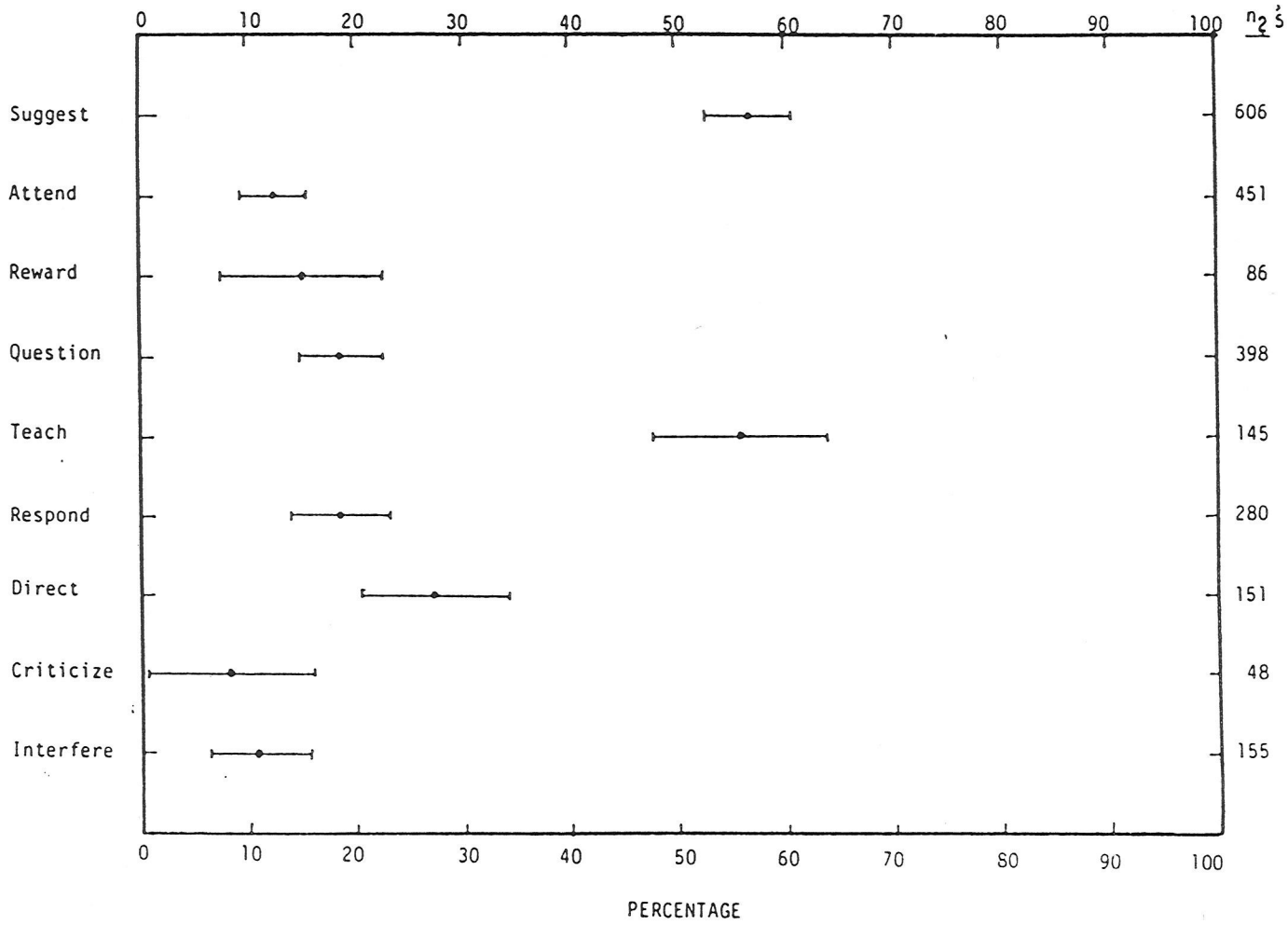

Figure 2. Ninety-five percent confidence intervals (⊢—⊣) for percentages of children's changing to on-task behaviour following the teacher behaviours.

Note. The dot (—•—) represents the observed percentage.

majority of the teacher behaviours were not followed by children changing to on-task. The mean percentage of children going on-task approximately equals 30%. The 95 percent confidence intervals were also calculated for each of the percentages (see Table E-2) and are plotted in Figure 2. The n_2's in the figure represents the total frequencies of the behaviours when the children's antecedent task behaviours were off-task. The teacher behaviours are again listed in descending order in their effectiveness to continuing children's on-task behaviours, but the patterns are very different from Figure 1.

In comparing Figure 2 to Figure 1, all the confidence intervals are shifted to the lower percentile area. It was only the suggesting and teaching behaviours that were followed by slightly higher percentages of children going on-task than staying off-task. The atending, rewarding, questioning, and responding behaviours were frequently followed by children continuing on-task behaviour (see Figure 1), but when the children antecedent task behaviours were off-task, these behaviours were followed by continuation of off-task behaviours more than 75% of the time (see Figure 3). The directing behaviours were followed by a lower percentage of children continuing on-task than the attending, rewarding, questioning, and responding behaviours (see Figure 1), but when it came to children changing from off-task to on-task, directing was followed by a higher percentage of children going on-task than the attending, rewarding, questioning and responding behaviours (see Figure 3). Interference was still highly related to children's off-task behaviour (see

figure 4), and criticism was related to having the least percentage of children changing to on-task behaviour (see figure 3).

Section II

Hypothesis 2: Frequencies of Use of Specific Teacher Behaviours are not Related to Individual Teacher

Overall, the most frequently used behaviours by the teachers were attending and questioning behaviours. The teachers also used suggestion, teaching, responding, and rewarding behaviours fairly often. Interference and directing behaviours were less frequently used and criticism was seldom employed by the teachers (see Table 5). The mean percentages of use of different behaviours by the five teachers were calculated (see Table E-3) and are plotted in Figure 5.

There were, however, significant differences in the frequencies of use of different behaviours by the different teachers (see Table 5). The chi-square value obtained is 240.9 (df = 32, N = 9386), significant at $p < .0001$ level, so hypothesis 2 is rejected.

Some teachers interacted more with the children than others, as illustrated by the far right column of Table 5. In order to compare the teachers and to determine where the differences were in their use of the different behaviours, all the frequencies were changed to percentages (see Table E-4). It is then possible to see the percentage of times that a teacher uses a particular behaviour among the total frequencies of interactive behaviours he or she exhibited with the children. It seems more valid to compare the teachers' percentage of use of different behaviours than their frequencies.

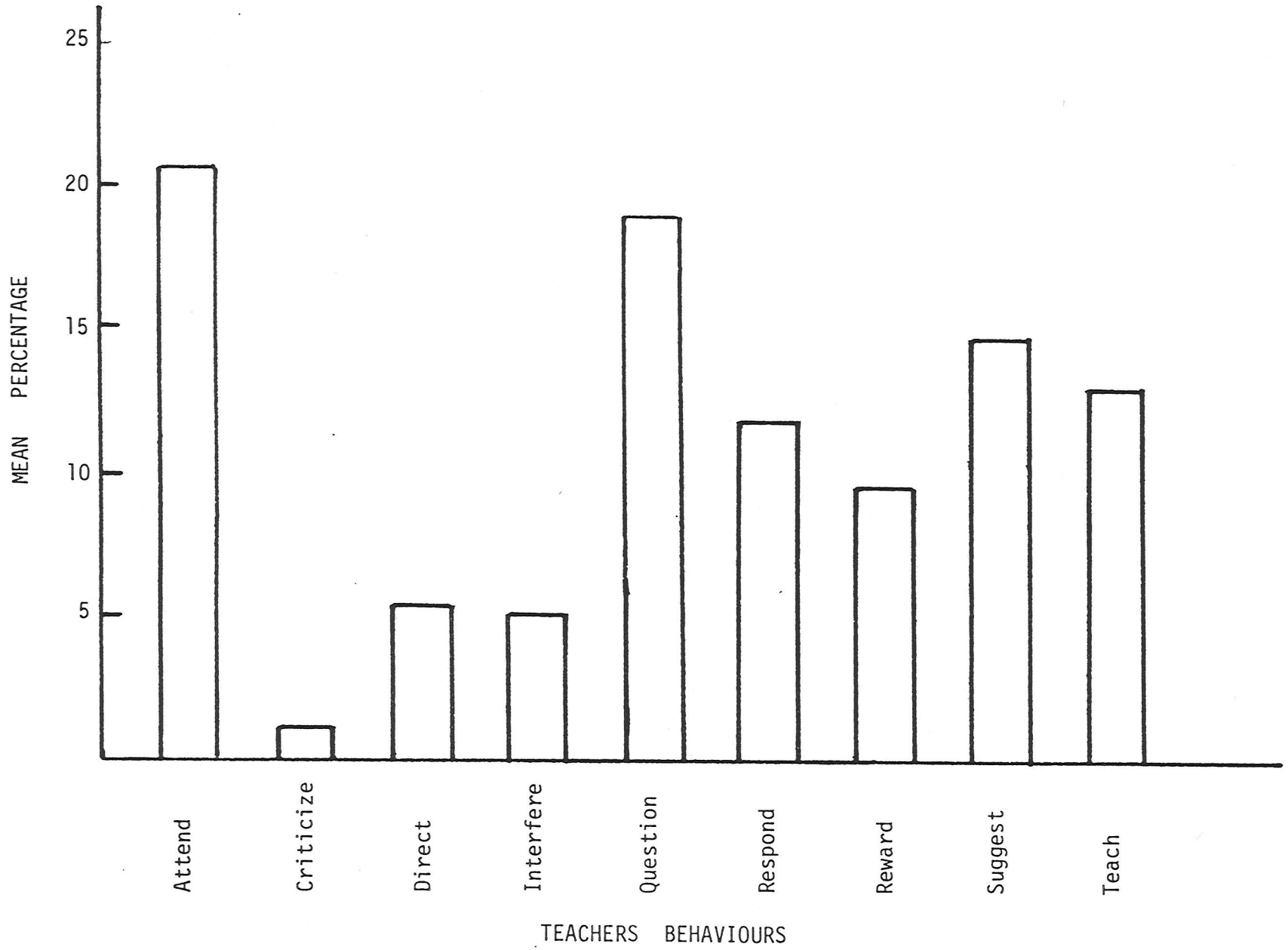

Figure 3. Mean percentage of use of different behaviours by all the teachers.

Table 5

Frequency of Use of Different Behaviours by Different Teachers[a]

	Teacher behaviours									
Teachers	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	Total
T_A	412	26	129	151	338	205	193	320	290	2064
T_B	307	19	114	72	311	213	140	248	176	1601
T_C	413	17	74	99	422	197	168	273	275	1938
T_D	338	33	80	91	256	208	82	260	192	1540
T_E	460	8	100	58	446	281	306	282	285	2226
Total	1930	103	497	471	1773	1104	889	1383	1218	9368
Mean	386	20.6	99.4	94.2	354.6	220.8	177.8	276.6	243.6	

Note.

[a] $\chi^2(32, N = 9368) = 240.9, p < .0001$.

In order to more easily visualize the pattern of interaction, the percentages were rounded and reorganized according to the method recommended by Ehrenberg (1977) (see Table 6). Teacher A exhibited the highest percentage of use of interfering behaviours and the lowest percentage of responding and questioning behaviours. Teacher B, on the other hand, used the most directing behaviour and the least teaching and attending. Teacher C had the highest percentage of use of questioning and teaching, but lowest of directing. Teacher D exhibited the highest percentage of use of criticism, responding, suggesting, and attending behaviours, but lowest of rewarding. Lastly, Teacher E had the lowest percentage of use of criticism, interference and suggestions, but the highest percentage of use of rewarding behaviour.

Relationship Between Children's Task Behaviours and Individual Teachers

When the children's antecedent task behaviours were on-task, over 90% of the time they continued to stay on-task following the teacher behaviours for all of the five teachers (see Table 7). However, the chi-square test result indicated a significant difference among the different teachers in the frequencies of children continuing on-task and frequencies of children changing to off-task. $\chi^2(4, N = 7205) = 66.4$, $p < .0001$. Teacher E was found to have the highest percentage of children who continued to stay on-task (96.78%), whereas, Teacher B had the lowest percentage of children continuing on-task behaviours (90.18%).

When the children's antecedent task behaviours were off-task (see Table 8), a majority of the time children still continued to

Table 6

Rounded Percentage of Use of Different Behaviours by Different Teachers

Teachers	Teacher Behaviours								
	Criticize	Interfere	Direct	Reward	Respond	Teach	Suggest	Question	Attend
T_A	1	7^H	6	9	10^L	14	16	16^L	20
T_B	1	5	7^H	9	13	11^L	15	19	19^L
T_C	1	5	4^L	9	10	14^H	14	22^H	21
T_D	2^H	6	5	5^L	14^H	12	17^H	17	22^H
T_E	0^L	3^L	5	14^H	13	13	13^L	20	21

Note. Table re-organized according to method recommended by Ehrenberg (1975, 1977). H = the highest percentage of use of the behaviour among the teachers. L = the lowest percentage of use of the behaviour among the teachers.

Table 7

Frequencies and Percentage of Children's Task Behaviours[a] by Teachers[b]

Children's task behaviours	Teachers					Total
	T_A	T_B	T_C	T_D	T_E	
On-task -- on task						
Frequency	1438	1094	1445	996	1745	6718
Column %	(92.06)	(90.19)	(94.14)	(91.21)	(96.78)	
On-task -- off-task						
Frequency	124	119	90	96	58	487
Column %	(7.94)	(9.81)	(5.86)	(8.79)	(3.22)	
Total frequency	1562	1213	1535	1092	1803	7205

Note.

[a]Children's antecedent task behaviour = on-task. [b]$\chi^2(4, N = 7205) = 66.4, p < .0001$.

Table 8

Frequencies and Percentage of Children's Task Behaviours[a] by Teachers[b]

Children's task behaviours	Teachers					Total
	T_A	T_B	T_C	T_D	T_E	
Off-task -- on task						
Frequency	178[L]	84	120	128	184	694
Column %	(29.52)	(16.37)	(26.26)	(23.36)	(36.15)	
Off-task -- off-task						
Frequency	425	429	337	420	325	1936
Column %	(70.48)	(83.63)	(73.74)	(76.64)	(63.85)	
Total frequency	603	513	457	548	509	2630

Note.

[a]Children's antecedent task behaviour = off-task. [b]$\chi^2(4, N = 2630) = 57.1, p < .0001$.

stay off-task ($\underline{M}$ = 73.61% for all the teachers). There was again a significant difference among the teachers in the frequencies of children staying off-task and in their changing to on-task behaviours, $\chi^2(4, \underline{N} = 2630) = 57.1$, $\underline{p} < .0001$. Teacher E also had the highest percentage of children changing to on-task behaviour (36.15%) and Teacher B's behaviours were followed by the lowest percentage of children changing to on-task behaviour (16.37%).

Hypothesis 3: Frequencies of Children's Task Behaviours Consequent to Specific Teacher Behaviours are Not Dependent upon Individual Teacher

There are three factors involved in this hypothesis: the children's task behaviour, the teacher behaviour and the teacher. In order to examine whether or not interaction among the three factors occurred and the patterns of that interaction, an interval estimation for each of the percentages of children's task behaviours by the teachers was calculated and plotted in graphs. The equation for calculating the confidence intervals is also Equation 1. However, for cases when the total number of observations ($\underline{n}$) were so small that they did not meet the criteria of: $n\hat{p} \geqslant .5$ when $\hat{p} \leqslant .5$ or $n(1-\hat{p}) \geqslant .5$ when $\hat{p} \geqslant .5$, the large sample approximation rule no longer applies. So, their confidence limits were looked up directly from tables of exact confidence limits for the binomial distributions (Beyers, 1968). Hypothesis 3 was also examined as two hypotheses.

Hypothesis 3a: Frequencies of children's task behaviours consequent to specific teacher behaviours are not dependent upon individual teacher when the children's antecedent task behaviours are on-task. The frequencies and percentages of children's task

behaviours by teachers after the different teacher behaviours are shown in Table 9. Teacher differences were found for some behaviours but not for others when the percentages for the different teachers were compared. So, 95 percent confidence intervals for the percentages were calculated (see Table E-5) and are plotted in Figure 4 to examine whether the percentages were really different from each other. The order of the teacher behaviours in the figures are again listed in descending order in their relationship to children continuing on-task behaviour. The overall pattern for the teacher behaviours in Figure 4 is very similar to that in Figure 1, but some teacher differences are found (see Figure 4).

Figure 4 shows that the teacher behaviours that were most frequently followed by children continuing on-task behaviour, namely suggesting, attending, rewarding, questioning, teaching, and directing behaviours were those with little teacher variability. The confidence intervals of the teachers for each of these behaviours all overlap each other. It was only Teacher B whose responding behaviours were less frequently followed by children continuing on-task behaviour than Teachers A and E.

The confidence intervals are the widest for teachers using criticism. The extremely low occurence of criticism (e.g. $\underline{n} = 2$ for Teacher E) makes it hard to make judgment about its relationship to children's task behaviour, but it seems that the patterns were not very different for the teachers.

The confidence intervals for the five teachers in using interfering behaviours all overlap each other and they all lie in

Table 9
Frequencies and Percentage of Children's Task Behaviours[a] by Teachers Following the Different Teacher Behaviours

Children's Task Behaviours	Teacher				
	T_A	T_B	T_C	T_D	T_E
Attending Behaviour					
On-task -- on-task					
Frequency	285	216	315	229	268
Column %	(98.62)	(96.00)	(97.83)	(96.22)	(99.19)
On-task -- off-task					
Frequency	4	9	7	9	3
Column %	(1.38)	(4.00)	(2.17)	(3.78)	(0.81)
Criticism					
On-task -- on-task					
Frequency	8	6	8	9	2
Column %	(57.00)	(60.00)	(100.00)	(60.00)	(100.00)
On-task -- off-task					
Frequency	6	4	0	6	0
Column %	(43.00)	(40.00)	(0)	(40.00)	(0)
Directing Behaviour					
On-task -- on-task					
Frequency	85	62	53	35	68
Column %	(96.59)	(82.67)	(94.64)	(83.33)	(97.14)
On-task -- off-task					
Frequency	3	13	3	7	2
Column %	(3.41)	(17.33)	(5.36)	(16.67)	(2.86)
Interference					
On-task -- on-task					
Frequency	20	13	17	20	12
Column %	(20.00)	(30.95)	(26.15)	(39.22)	(34.28)
On-task -- off-task					
Frequency	80	29	48	31	23
Column %	(80.00)	(69.05)	(73.85)	(60.78)	(65.72)
Question					
On-task -- on-task					
Frequency	244	218	327	159	356
Column %	(98.39)	(96.04)	(97.32)	(96.36)	(98.89)
On-task -- off-task					
Frequency	4	9	9	6	4
Column %	(1.61)	(3.96)	(2.68)	(3.64)	(1.11)

Note. [a]Children's antecedent task behaviours = on-task.

Table 9 (cont'd.)

Children's task behaviours	Teacher				
	T_A	T_B	T_C	T_D	T_E
Responding Behaviour					
On-task -- on-task					
Frequency	150	142	132	146	198
Column %	(98.04)	(88.20)	(97.78)	(96.05)	(98.02)
On-task -- off-task					
Frequency	3	19	3	6	4
Column %	(1.96)	(11.80)	(2.22)	(3.95)	(1.98)
Reward					
On-task -- on-task					
Frequency	162	115	142	73	266
Column %	(95.86)	(97.46)	(97.26)	(100.00)	(98.52)
On-task -- off-task					
Frequency	7	3	4	0	4
Column %	(4.14)	(2.15)	(2.74)	(0.00)	(1.48)
Suggestion					
On-task -- on-task					
Frequency	163	125	164	129	153
Column %	(98.19)	(93.28)	(99.39)	(98.47)	(99.35)
On-task -- off-task					
Frequency	3	9	1	2	1
Column %	(1.81)	(6.72)	(0.61)	(1.53)	(0.65)
Teaching Behaviour					
On-task -- on-task					
Frequency	260	142	241	146	232
Column %	(98.86)	(94.04)	(97.97)	(94.81)	(99.15)
On-task -- off-task					
Frequency	3	9	5	8	2
Column %	(1.14)	(5.96)	(2.03)	(5.19)	(0.85)

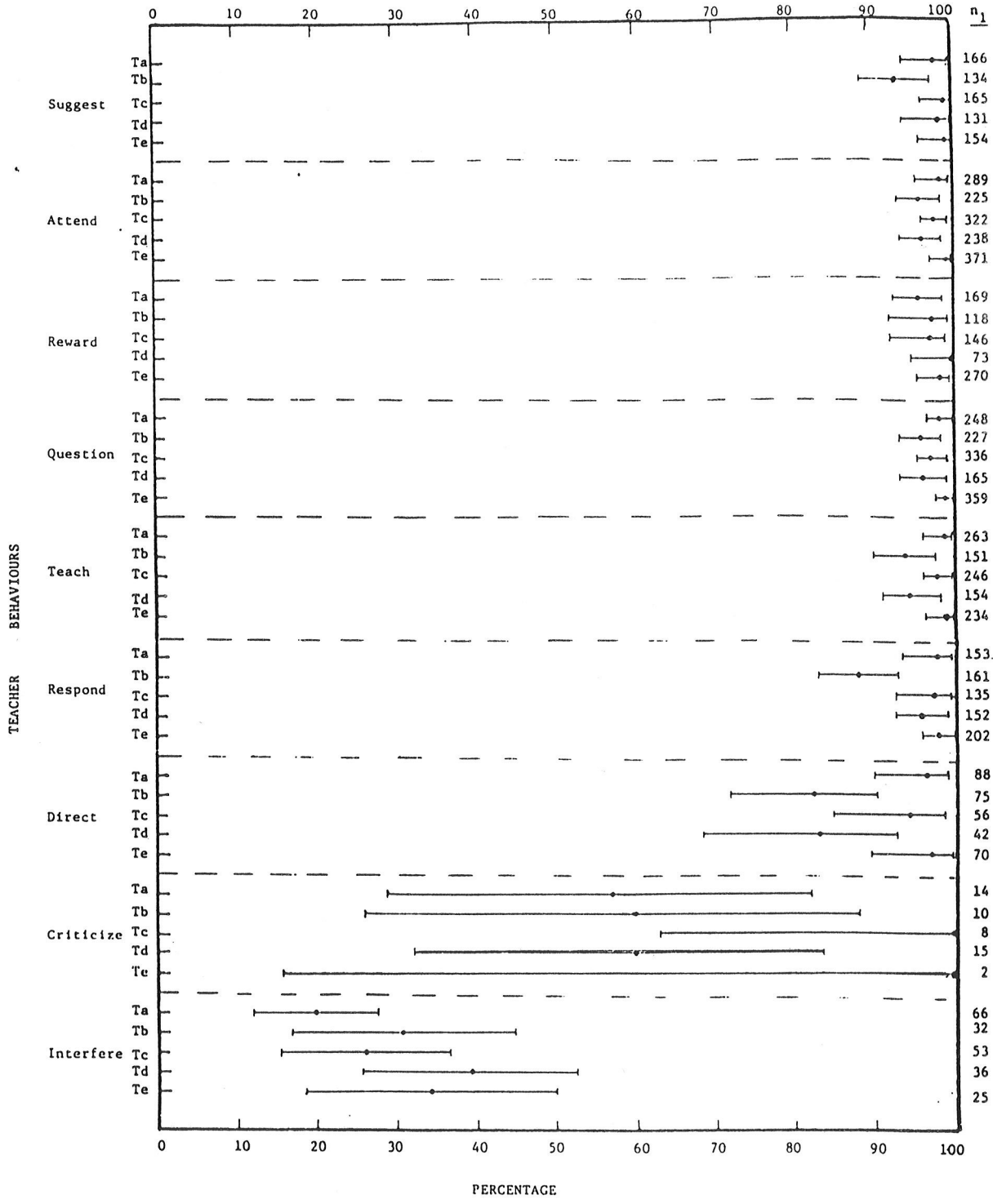

Figure 4. Ninety-five percent confidence intervals (|——|) for percentages of children's continuing on-task behaviour following the behaviours of different teachers.

Note. Ta, Tb, Tc, Td, and Te represent teachers A, B, C, D and E respectively. The dot (—●—) represent the observed percentage.

the lower percentiles. In other words, no matter which teacher used interfering behaviour, it was more frequently followed by children going off-task than staying on-task.

Hypothesis 3b: Frequencies of children's task behaviours consequent to specific teacher behaviours are not dependent on individual teacher when the children's antecedent task behaviours are off-task. The frequencies and percentage of children's task behaviours following the behaviours of the different teachers are shown in Table 10. Ninety-five percent confidence intervals for each of the percentages were calculated (see Table E-6) and plotted in Figure 5. The pattern of the teacher behaviours' relationship to children's changing to on-task behaviour of Figure 5 is fairly similar to that in Figure 2 but teacher differences are found. Suggestion and teaching were still the teacher behaviours that were followed by comparatively more children changing to on-task behaviour. When examining the patterns of Figure 5 in more detail, the confidence intervals of the different teachers for attending, rewarding, teaching, responding, directing, criticism and interference all overlap each other at some point, in other words, not many teacher differences were found for these teacher behaviours. However, a lower percentage of children changed to on-task behaviours when Teachers B and D gave suggestions, whereas, a higher percentage of children changed to on-task when Teacher E asked questions.

Table 10
Frequencies and Percentage of Children's Task Behaviours[a] by Teachers Following the Different Teacher Behaviours

Children's task behaviours	Teacher				
	T_A	T_B	T_C	T_D	T_E
Attending Behaviour					
Off-task -- on-task					
Frequency	16	5	11	10	15
Column %	(13.79)	(6.33)	(13.58)	(10.53)	(18.75)
Off-task -- off-task					
Frequency	100	74	70	85	65
Column %	(86.21)	(93.67)	(86.42)	(89.47)	(81.25)
Criticism					
Off-task -- on-task					
Frequency	1	0	0	2	1
Column %	(10)	(0)	(0)	(12.50)	(20)
Off-task -- off-task					
Frequency	9	8	9	14	4
Column %	(43)	(100)	(100)	(87.50)	(80)
Directing Behaviour					
Off-task -- on-task					
Frequency	10	5	4	14	8
Column %	(27.03)	(13.89)	(23.53)	(37.84)	(33.33)
Off-task -- off-task					
Frequency	27	31	13	23	16
Column %	(72.97)	(86.11)	(76.47)	(62.16)	(66.67)
Interference					
Off-task -- on-task					
Frequency	8	0	4	3	2
Column %	(17.02)	(0)	(16.00)	(7.89)	(11.11)
Off-task -- off-task					
Frequency	39	25	21	35	16
Column %	(82.98)	(100)	(84.00)	(92.11)	(88.89)
Question					
Off-task -- on-task					
Frequency	12	8	15	13	27
Column %	(14.12)	(10.53)	(19.23)	(15.48)	(36.00)
Off-task -- off-task					
Frequency	73	68	63	71	48
Column %	(85.88)	(89.47)	(80.77)	(84.52)	(64.00)

Note.

[a]Children's task behaviours = on-task.

Table 10 (cont'd.)

Children's task behaviours	Teacher				
	T_A	T_B	T_C	T_D	T_E
Responding Behaviour					
Off-task -- on-task					
Frequency	13	4	9	10	16
Column %	(27.08)	(8.00)	(15.25)	(18.52)	(23.19)
Off-task -- off-task					
Frequency	35	46	50	44	53
Column %	(72.92)	(92.00)	(84.75)	(81.48)	(76.81)
Reward					
Off-task -- on-task					
Frequency	2	1	2	0	8
Column %	(11.11)	(5.56)	(11.11)	(0)	(33.33)
Off-task -- off-task					
Frequency	16	17	16	8	16
Column %	(88.89)	(94.44)	(88.89)	(100)	(66.67)
Suggestion					
Off-task -- on-task					
Frequency	98	53	58	56	79
Column %	(67.12)	(49.07)	(58.00)	(44.44)	(62.70)
Off-task -- off-task					
Frequency	48	55	42	70	47
Column %	(32.88)	(50.93)	(42.00)	(55.56)	(37.30)
Teaching Behaviour					
Off-task -- on-task					
Frequency	15	7	17	17	25
Column %	(62.50)	(30.43)	(73.91)	(47.22)	(64.10)
Off-task -- off-task					
Frequency	9	16	6	19	14
Column %	(37.50)	(69.57)	(26.09)	(52.78)	(35.90)

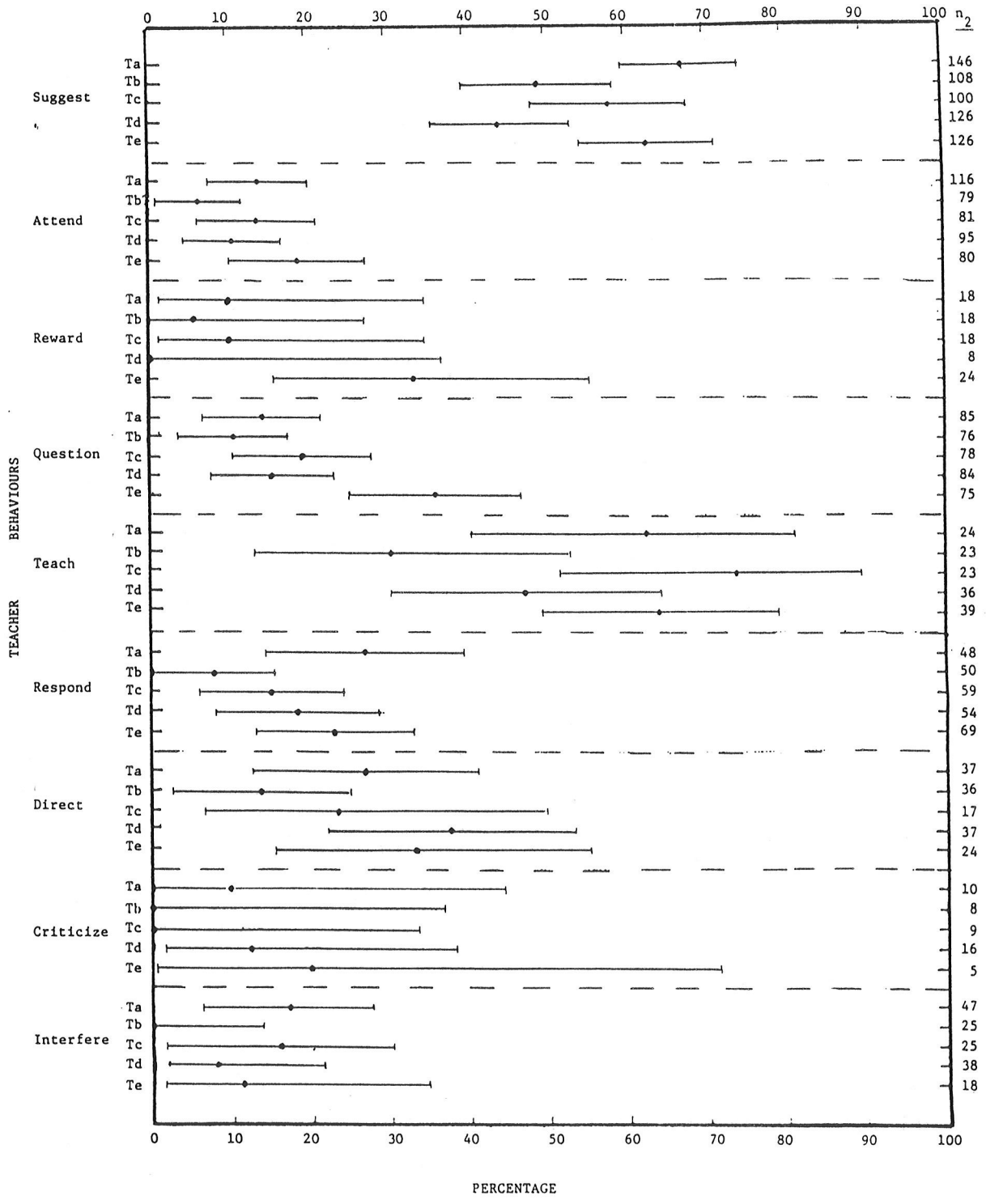

Figure 5. Ninety-five percent confidence intervals (⟷) for percentages of children's changing to on-task behaviour following the behaviours of different teachers.

Note. Ta, Tb, Tc, Td, and Te represent teachers A, B, C, D, and E respectively. The dot (—•—) represent the observed percentage.

Section III

Relationship Between Children's Task Behaviours and Activities Before and After the Teacher Behaviours

The frequencies and percentages of children's antecedent on-task and off-task behaviours in different activities are listed in Table 11. The absence of on-task behaviour in the non-activity category is logical because by definition, non-activity is coded only when a child is not engaged or has not been engaging in any activity and thereby, no on-task behaviour would occur. However, a child may change to on-task after the teacher behaviour and this would be considered when the children's consequent task behaviours in different activities are examined.

On the whole, the children were mostly on-task (see far right column of Table 11) in the nursery school. However, there were significant differences among the different activities in the frequencies of children's antecedent on-task and off-task behaviours, $\chi^2(6, N = 9835) = 3737.8$, $p < .0001$. The non-activity category contributed most to this large chi-square value. The chi-square value drops to 508.2 $(5, N = 8656)$, $p < .0001$, when the non-activity category is excluded.

In viewing the percentages of on-task to off-task behaviours in the different activities (except non-activity), the percentages of children's antecedent on-task behaviours before the teachers interacted with the children was highest in cognitive activity (86.95%) and dramatic play (86.41%) and lowest in self-help activity (73.79%).

Table 11

Frequencies and Percentages of Children's Antecedent Task Behaviours in Different Activities[a]

Children's antecedent task behaviours	Activities							Mean % of all activities
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor play	Self-help activity	Non-activity	
On-task								
Frequency	2361	1189	1732	1142	322	459	0	
Column %	(80.36)	(86.41)	(86.95)	(85.93)	(80.70)	(73.79)	(0)	(73.76)
Off-task								
Frequency	577	187	260	187	77	163	1179	
Column %	(19.64)	(13.59)	(13.05)	(14.07)	(19.30)	(26.21)	(100)	(26.74)

Note.

[a] $\chi^2(6, N = 9835) = 3737.9, p < .0001$.

A significant difference was also found among the different activities in the frequencies of children's consequent task behaviours (see Table 12), $\chi^2(6, N = 9835) = 3743.7$, $p < .0001$. But now the highest percentage of on-task behaviours was in dramatic play (89.39%) and lowest in non-activity (3.73%).

Overall, the mean percentage of children's on-task behaviours slightly increased by 2.1% (see last row of Table 13). With the exception of cognitive and gross-motor activity, teacher behaviours were followed by an increase in the percentages of on-task behaviours in all the other activities (see Table 13). For self-help activity, there occurred the largest increase in percentage of on-task behaviours (9.81%) following the teacher behaviours.

Relationship Between Frequency of Dyadic Teacher-child Interaction Episodes and Activities for Different Teachers

Overall, all the teachers had the most dyadic teacher-child interactions in creative play and cognitive activity, moderate amount in dramatic play, exploratory play, and non-activity, and the least in gross-motor and self-help activities (see the last row of Table 14). Additionally, when all the activities are grouped, and frequencies of dyadic teacher-child interaction for individual teachers are examined, Teacher E and Teacher A had the highest frequencies of interactions with individual children, whereas, Teacher C had moderate amount of interactions and Teacher B and D interacted least with the children (see far right column of Table 14).

There were, however, significant differences in the frequency of

Table 12

Frequencies and Percentages of Children's Consequent Task Behaviours in Different Activities[a]

Children's consequent task behaviours	Activities							Mean % of all activities
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor play	Self-help activity	Non-activity	
On-task								
Frequency	2407	1230	1729	1161	321	520	44	
Column %	(81.93)	(89.39)	(86.80)	(87.36)	(80.45)	(83.60)	(3.73)	(75.36)
Off-task								
Frequency	531	146	263	168	78	102	1135	
Column %	(18.07)	(10.61)	(13.20)	(12.64)	(19.55)	(16.40)	(96.27)	(24.64)

Note. [a] $\chi^2(6, N = 9835) = 3743.7$, $p < .0001$.

Table 13

Percentage of Increase of On-task Behaviours in Different Activities Before and Following the Teacher Behaviours

Children's on-task behaviours	Activity							
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity	Mean
Consequent								
Frequency	2407	1230	1729	1161	321	520	44	
Column %	(81.93)	(89.39)	(86.80)	(87.36)	(80.45)	(83.60)	(3.73)	(75.36)
Antecedent								
Frequency	2361	1189	1732	1142	322	459	0	
Column %	(80.36)	(86.41)	(86.95)	(85.93)	(80.70)	(73.79)	(0)	(73.26)
% of increase	1.57	2.98	- 0.15	1.43	- 0.25	9.81	3.73	2.10

Table 14

Frequencies of Dyadic Teacher-Child Interaction Episodes in Different Activities for Different Teachers[a]

Teachers	Activities							Total
	Creative Play	Dramatic Play	Cognitive Activity	Exploratory Play	Gross-motor Play	Self-help Activity	Non-Activity	
T_A	749	396	343	336	53	104	252	2233
T_B	655	152	418	58	75	128	300	1786
T_C	560	348	366	390	108	106	192	2070
T_D	427	237	414	162	55	181	228	1704
T_E	679	293	520	435	125	138	232	2422
Total	3070	1426	2061	1381	416	657	1204	10215

Note.

[a] $\chi^2(24, N = 10215) = 599.8$, $p < .0001$.

dyadic teacher-child interaction in different activities for the different teachers (see Table 14). The chi-square value obtained was 599.8 (d.f. = 24, $\underline{N}$ = 10215), significant at $\underline{p} < .0001$.

To determine where the differences were, the frequencies were also changed to percentages (see Table E-7) because of the differences in the total frequencies of interactions by the teachers (see far right column of Table 14). After re-organizing Table E-7 according to the method recommended by Ehrenberg (1977), Table 15 indicates that Teacher A had the highest percentage of dyadic teacher-child interaction in dramatic play but lowest in cognitive, gross-motor, and self-help activities. Teacher B had the lowest percentage of interaction in exploratory and dramatic play, but the highest percentage of interaction in cognitive activity, creative play and non-activity. Teacher C showed the lowest percentage of interaction with individual children in non-activity, but the highest percentage in gross-motor activity and exploratory play. Teacher D had the lowest percentage of dyadic teacher-child interaction in creative play, but the highest percentage of interaction in self-help activity. As for Teacher E, his or her percentage of interaction with the children in different activities were generally close to the mean percentages (see Table 15).

Hypothesis 4: Frequencies of Specific Teacher Behaviours are Not Related to the Activities in which They Occurred

The frequencies of the different teacher behaviours in different activities are listed in Table 16. The chi-square test was used to test Hypothesis 4 and significant differences were found, χ^2(48,

Table 15

Rounded Percentages of Dyadic Teacher-Child Interaction Episodes in Different Activites for Different Teachers

Teachers	Activities						
	Gross-motor activity	Self-help activity	Non-activity	Exploratory play	Dramatic play	Cognitive activity	Creative play
T_A	2^L	$^b5^L$	11	15	18^H	15^L	34
T_B	4	7	17^H	3^L	9^L	23	37^H
T_C	$^a5^H$	$^b5$	9^L	19^H	17	18	27
T_D	3	11^H	13	10	14	24^H	25^L
T_E	$^a5$	6	10	18	12	21	28
MEAN	4	6	12	14	14	20	30

Note. Table re-organized according to method recommended by Ehrenberg (1977). H = the highest percentage. L = the lowest percentage.

[a]The observed percentages for Teacher C and Teacher E are 5.22% and 5.16%, respectively. [b]The observed percentages for Teacher A and C are 4.66% and 5.12% respectively.

Table 16

Frequencies of Different Teacher Behaviours in Different Activities[a]

Activities	Teacher behaviours									Total
	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	
Creative play	610	9	121	123	528	350	259	397	341	2852
Dramatic play	332	16	37	43	317	120	106	194	169	1334
Cognitive activity	303	24	113	74	345	239	204	265	378	1945
Exploratory play	271	17	59	74	250	152	139	169	167	1304
Gross-Motor activity	91	7	29	33	47	30	53	53	39	382
Self-help activity	73	8	62	10	60	69	69	139	101	591
Non-activity	244	22	76	0	226	144	59	166	23	960
Mean	276	15	71	67	253	158	127	198	174	
TOTAL	1930	103	497	471	1773	1104	889	1383	1218	9368

Note:

a $\chi^2(48, N = 9368) = 631.7, p < .0001$.

$N = 9368) = 631.7$, $p < .0001$, so Hypothesis 4 is rejected and it appears that the frequency of use of the different teacher behaviours is related to the activities.

Since the total frequencies of use of all the teacher behaviours differed for the activities (see far right column of Table 16), in order to examine which were the behaviours that were used more often in some activities than others, all the frequencies were changed to percentages (see Table E-8) and were rounded and re-organized according to Ehrenberg's (1977) method (see Table 17).

As shown in Table 17, creative play was the activity where the lowest percentage of criticism was used. The highest percentage of use of questioning but the lowest percentage of directing behaviour was used in dramatic play, whereas, in cognitive activity, the most teaching and least attending occurred. Suggestion was used least in exploratory play. The highest percentage of use of both interference and rewarding behaviour and the lowest percentage of responding behaviours was used in gross-motor activity. In self-help activity, the most directing and suggestion occurred, but the least interference and questioning. When children were in non-activity, the highest percentage of criticism, responding and attending behaviours were used, but teaching and rewarding behaviour rarely occurred.

Hypothesis 5: Frequencies of Children's Task Behaviours Consequent to Specific Teacher Behaviours are Not Related to the Activities in which They Occur

Similar to Hypothesis 3, there are three factors involved in this hypothesis: the children's task behaviour, the teacher behaviour,

Table 17

Rounded Percentages of Use of Different Teacher Behaviours in Different Activities[a]

Activities	Teacher Behaviours									Total[b]
	Criticize	Interfere	Direct	Reward	Respond	Teach	Suggest	Question	Attend	
Creative play	$b_0{}^L$	8	4	9	12	12	14	19	21	100
Dramatic play	1	3	3^L	8	9	13	15	$^c24^H$	25	100
Cognitive activity	1	4	6	11	12	19^H	14	18	16^L	100
Exploratory play	1	6	5	11	12	13	13^L	19	21	100
Gross-Motor activity	2	9^H	8	14^H	8^L	10	14	12	24	100
Self-help activity	1	2^L	11^H	12	12	17	24^H	10^L	12	100
non-activity	2^H	0	8	6^L	15	2	17	$^c24$	25^H	100

Note. Table re-organized according to method recommended by Ehrenberg (1975, 1977). L = the lowest percentage of use of the behaviour among all the activities. H = the highest percentage of use of the behaviour.

[a]The 100% total is an approximate figure. [b]The observed percentage was 0.3. [c]The observed percentages for dramatic play and non-activity were 23.8 and 23.5, respectively.

and the activity. To examine whether or not interactions among these three factors occurred and the pattern of that interaction, an interval estimation for each of the percentages of the children's task behaviours was calculated. Hypothesis 5 is also examined as two subhypotheses.

Hypothesis 5a: Frequencies of children's task behaviours consequent to specific teacher behaviours are not related to the activities when the children's antecedent task behaviours are on-task. The frequencies and percentages of children's task behaviour following the teacher behaviours in different activities are listed in Table 18, and the 95 percent confidence intervals for each of the percentages may be found in Table E-9 and in Figure 6. The non-activity data was not included because none of the children's antecedent task behaviours in non-activity could be considered on-task.

The overall pattern in Figure 6 is similar to that in Figure 1, but activity differences were found for some teacher behaviours. The confidence intervals for the percentages of children's continuing on-task behaviours in gross-motor and self-help activities are generally wider, they can be explained by the less frequent occurrence of dyadic teacher-child interaction in these two activities.

There appears to be no difference in the percentages of children continuing to be on-task among the different activities for suggesting, attending, rewarding, questioning, teaching, responding, and interference (see Figure 6). For each of these behaviours, the confidence intervals of all the six activities overlap each other and they all lie around the same percentiles.

Table 18

Frequencies and Percentages of Children's Task Behaviours[a] Following Different Teacher Behaviours in Different Activities

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Attending Behaviour							
On-task -- on-task							
Frequency	482	299	257	243	76	56	0
Column %	(97.57)	(99.67)	(96.62)	(97.20)	(97.44)	(98.25)	(0)
On-task -- off-task							
Frequency	12	1	9	7	2	1	0
Column %	(2.43)	(0.33)	(3.38)	(2.80)	(2.56)	(1.75)	(0)
Criticism							
On-task -- on-task							
Frequency	2	4	14	9	4	0	0
Column %	(50.00)	(57.14)	(77.78)	(75.00)	(80.00)	(0.00)	(0)
On-task -- off-task							
Frequency	2	3	4	3	1	3	0
Column %	(50.00)	(42.86)	(22.22)	(25.00)	(20.00)	(100.00)	(0)
Directing							
On-task -- on-task							
Frequency	84	26	84	46	15	48	0
Column %	(86.60)	(96.30)	(92.31)	(95.83)	(75.00)	(100.00)	(0)
On-task -- off-task							
Frequency	13	1	7	2	5	0	0
Column %	(13.40)	(3.70)	(7.69)	(4.17)	(25.00)	(0.00)	(0)

Note.

[a]Children's antecedent task behaviours = on-task.

Table 18 (cont'd.)

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Inteference							
On-task -- on-task							
Frequency	41	12	12	13	3	1	0
Column %	(28.28)	(37.50)	(27.91)	(26.53)	(15.79)	(20.00)	(0)
On-task -- off-task							
Frequency	104	20	31	36	16	4	0
Column %	(71.72)	(62.50)	(72.09)	(73.47)	(84.21)	(80.00)	(0)
Questioning							
On-task -- on-task							
Frequency	428	277	305	215	37	41	0
Column %	(98.17)	(37.54)	(96.21)	(99.08)	(100.00)	(93.18)	(0)
On-task -- off-task							
Frequency	8	7	12	2	0	3	0
Column %	(1.83)	(2.46)	(3.79)	(0.92)	(0.00)	(6.82)	(0)
Responding							
On-task -- on-task							
Frequency	272	96	202	119	25	54	0
Colunn %	(94.44)	(96.00)	(97.58)	(98.35)	(96.15)	(88.52)	(0)
On-task -- off-task							
Frequency	16	4	5	2	1	7	0
Column %	(5.56)	(4.00)	(2.42)	(1.65)	(3.85)	(11.48)	(0)

Table 18 (cont'd.)

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Rewarding							
On-task -- on-task							
Frequency	226	101	189	132	48	62	0
Column %	(97.41)	(99.02)	(96.92)	(98.51)	(97.96)	(96.88)	(0)
On-task -- off-task							
Frequency	6	1	6	2	1	2	0
Column %	(2.59)	(0.98)	(3.08)	(1.49)	(2.04)	(3.13)	(0)
Suggestion							
On-task -- on-task							
Frequency	230	122	178	115	33	56	0
Column %	(97.05)	(98.39)	(97.80)	(99.14)	(97.06)	(98.25)	(0)
On-task -- off-task							
Frequency	7	2	4	1	1	1	0
Column %	(2.95)	(1.61)	(2.20)	(0.86)	(2.94)	(1.75)	(0)
Teaching							
On-task -- on-task							
Frequency	287	153	316	148	32	85	0
Column %	(97.62)	(98.71)	(96.05)	(98.01)	(100.00)	(97.70)	(0)
On-task -- off-task							
Frequency	7	2	13	3	0	2	0
Column %	(2.38)	(1.29)	(3.95)	(1.99)	(0.00)	(2.30)	(0)

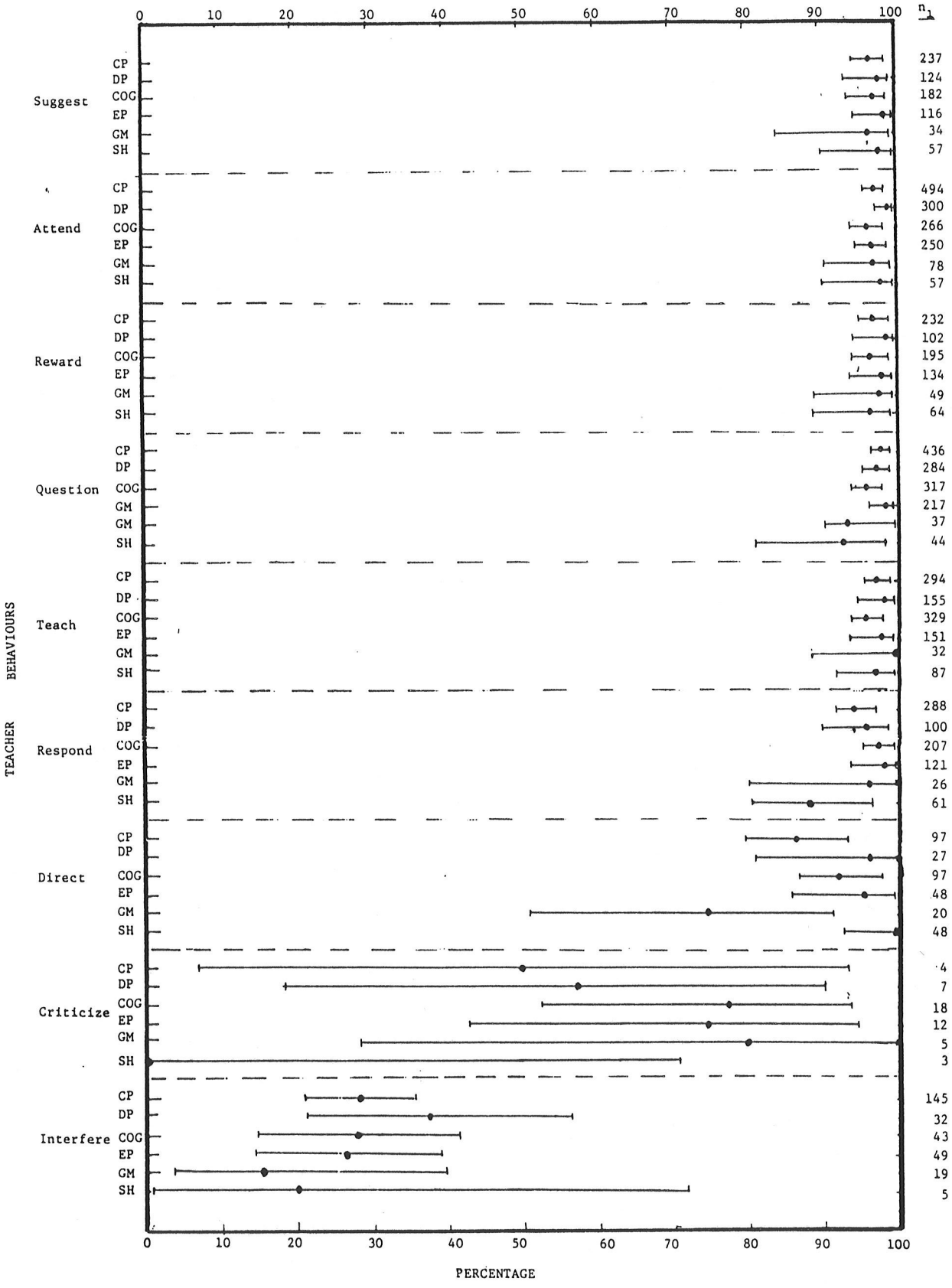

Figure 6. Ninety-five percent confidence intervals (⊢—⊣) for percentages of children's continuing on-task behaviour following the teacher behaviours in different activities.

Note. CP, DP, COG, EP, GM, and SH represent creative play, dramatic play, cognitive activity, exploratory play, gross-motor activity, and self-help activity respectively. The dot (—•—) represent the observed percentage.

The extremely low occurence of criticism in all activities made it hard to judge the relationship of criticism and children's task behaviour, and whether or not there were differences among the activities. Yet, it seems that a comparatively high percentage of children continued on-task after the teachers' criticism when the children were involved in cognitive activity.

Activity difference was most apparent when the directing behaviour was used. A comparatively lower percentage of children continued on-task when the children were engaged in gross-motor activity than when they were engaged in self-help activity.

Hypothesis 5b: Frequencies of children's task behaviours consequent to specific teacher behaviours are not related to the activities when the children's antecedent task behaviour is off-task. The frequencies and percentages of children's task behaviours after the teacher behaviours in different activities were listed in Table 19. Ninety-five percent confidence intervals for each of the percentages were calculated (see Table E-10) and plotted in Figure 7.

With the exception of non-activity (NA), the confidence intervals for all the other activities were generally wide (see Figure 7). The number of observations (n_2) for the non-activity category when the teachers used interference was zero because by definition, interference can be coded only when a child is engaging or has been engaging in an activity (see Appendix D for the operational definition of interference).

For most of the teacher behaviours -- suggesting, attending, rewarding, questioning, teaching, responding, and directing behaviours

Table 19

Frequencies and Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours in Different Activities

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Attending Behaviour							
Off-task -- on-task							
Frequency	25	10	12	7	1	2	0
Column %	(24.51)	(38.46)	(35.29)	(30.43)	(9.09)	(16.67)	(0.00)
Off-task -- off-task							
Frequency	77	16	22	16	10	10	243
Column %	(75.49)	(61.54)	(64.71)	(69.57)	(90.91)	(83.33)	(100.00)
Criticism							
Off-task -- on-task							
Frequency	0	2	0	0	1	0	1
Column %	(0.00)	(33.33)	(0.00)	(0.00)	(100.00)	(0.00)	(4.55)
Off-task -- off-task							
Frequency	5	4	5	5	0	4	21
Column %	(100.00)	(66.67)	(100.00)	(100.00)	(0.00)	(100.00)	(95.45)
Directing							
Off-task -- on-task							
Frequency	12	4	9	3	3	7	3
Column %	(55.54)	(44.44)	(52.94)	(37.50)	(37.50)	(53.85)	(4.05)
Off-task -- off-task							
Frequency	10	5	8	5	5	6	71
Column %	(45.45)	(55.56)	(47.06)	(62.50)	(62.50)	(46.15)	(95.95)

Note.

[a]Children's antecedent task behaviour = off-task.

Table 19 (cont'd.)

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Inteference							
Off-task -- on-task							
Frequency	11	1	1	3	1	0	0
Column %	(13.58)	(9.09)	(3.57)	(15.00)	(8.33)	(0.00)	(0.0)
Off-task -- off-task							
Frequency	70	10	27	17	11	1	0
Column %	(86.42)	(90.91)	(96.43)	(85.00)	(91.67)	(100.00)	(100.00)
Questioning							
Off-task -- on-task							
Frequency	33	13	8	9	4	4	4
Column %	(42.31)	(46.43)	(34.78)	(33.33)	(44.44)	(36.36)	(1.80)
Off-task -- off-task							
Frequency	45	15	15	18	5	7	218
Column %	(57.69)	(53.57)	(65.22)	(66.67)	(55.56)	(63.64)	(98.20)
Responding							
Off-task -- on-task							
Frequency	21	8	8	12	2	1	0
Colunn %	(37.50)	(44.44)	(30.77)	(41.38)	(66.67)	(14.29)	(0.00)
Off-task -- off-task							
Frequency	35	10	18	17	1	6	141
Column %	(62.50)	(55.56)	(69.23)	(58.62)	(33.33)	(85.71)	(100.00)

Table 19 (cont'd.)

Children's task behaviours	Activities						
	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor activity	Self-help activity	Non-activity
Rewarding							
Off-task -- on-task							
Frequency	5	0	1	4	2	1	0
Column %	(35.71)	(0.00)	(25.00)	(100.00)	(100.00)	(100.00)	(0.00)
Off-task -- off-task							
Frequency	9	2	3	0	0	0	59
Column %	(64.21)	(100.00)	(75.00)	(0.00)	(0.00)	(0.00)	(100.00)
Suggestion							
Off-task -- on-task							
Frequency	106	44	48	38	9	64	35
Column %	(71.14)	(67.69)	(60.76)	(74.51)	(52.94)	(79.01)	(21.34)
Off-task -- off-task							
Frequency	43	21	31	13	8	17	129
Column %	(28.86)	(32.31)	(39.24)	(25.49)	(47.06)	(20.99)	(78.66)
Teaching							
Off-task -- on-task							
Frequency	29	7	22	11	2	9	1
Column %	(69.05)	(53.85)	(61.11)	(84.62)	(28.57)	(81.82)	(4.35)
Off-task -- off-task							
Frequency	13	6	14	2	5	2	22
Column %	(30.95)	(46.15)	(38.89)	(15.38)	(71.43)	(18.18)	(95.65)

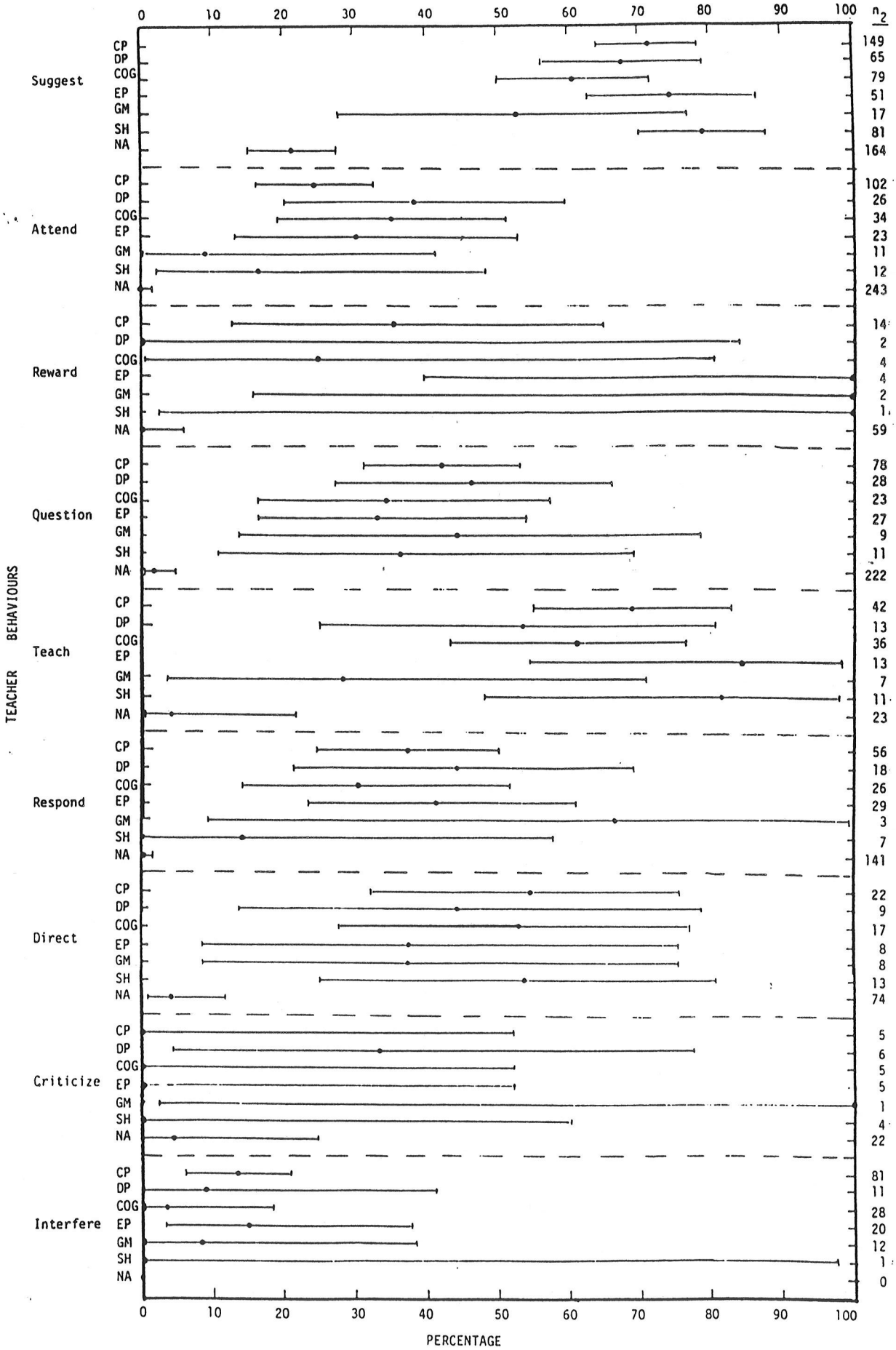

Figure 7 . Ninety-five percent confidence intervals (⊢⊣) for percentages of children's changing to on-task behaviour following the teacher behaviours in different activities.

(see Figure 7), the major source of difference occurred for the non-activity category. Indeed, when non-activity is excluded, all the other activities do not seem to be different from each other in the percentages of children changing to on-task behaviours. Their confidence intervals all overlap. Moreover, the trend was that there was a significantly lower percentage of children changed to on-task when the children were in non-activity.

Lastly, no difference was found among the activities in the percentages of children changing to on-task behaviour when the teachers used criticism and interference.

CHAPTER VI

Discussion

The present study proposed to identify those teacher behaviours that are related to an increase of children's task behaviour, specifically, those that are frequently followed by children's continuing on-task behaviour and those that are frequently followed by children's changing from off-task to on-task behaviour.

As predicted, there were significant differences among the nine teacher behaviours investigated in their relationship to children's task behaviours. However, the overall mean percentage of children's continuing on-task behaviour following the teacher behaviours (93.9%) was much higher than the overall mean percentage of children's changing from off- to on-task behaviour (29.5%). It appears that the children who were on-task were more likely to stay on-task, and children who were off-task were more likely to stay off-task. It seems more difficult for the teachers to alter children's task behaviour although some teacher behaviours were found to be more effective than others. Indeed, the teacher behaviours that were more frequently followed by children continuing on-task were not necessarily those more frequently followed by children's changing from off- to on-task behaviour.

Over 94% of the time, children continued to stay on-task following the teachers' suggestion, rewarding, responding, attending, questioning and teaching behaviours. Certainly these results support previous research findings that related these behaviours to students' task involvement or task persistence (L. W. Anderson et al., 1976; L. W.

Anderson et al., 1981; Brophy & Evertson, 1977; Fagot, 1973; Hamilton & Gordon, 1978; Krantz & Scarth, 1978; Stallings, 1975; Swan & Pittman, 1977; Tafel et al., 1974). However, of these six behaviours, only suggestion and teaching behaviours were more frequently followed by children changing from off- to on-task behaviour than staying off-task.

The underlying reason for this phenomena may be that when teachers suggest, they play an active role in posing alternatives and in challenging children to try things out. On the other hand, when teachers teach, they present new information, give new ideas that would probably catch children's interest and curiosity. Thus, suggestion and teaching are more likely to stimulate children's thinking and direct their attention back to the task.

In contrast, attending behaviours are mostly sustaining statements which add no new information to what the children have already known or done. Rewarding the children who are off-task is more likely to make the children feel content and it seems that it is not challenging enough to inspire the children to go back to task. In fact, behaviourists would say the child is being rewarded for being off-task, so is more likely to continue that behaviour. Teachers' responding behaviours are not task related when the children are off-task except for those cases when the teachers are answering their own task-related questions, so it is unlikely that the teachers' non-task related responses to the children's non-task related questions would

encourage the children to go from off- to on-task behaviour.

As for questioning behaviour, though it has the potential to stimulate children's thinking as in the case of suggestion, it was found in the present study that questioning was not frequently followed by children's changing from off- to on-task behaviour. In search of some possible explanations of these results, the investigator looked at the possible influence of individual teachers and activities. There were differences among the teachers and the activities in their relationship to children's task behaviour consequent to the teacher behaviours. It was found that when children were at non-activity, the percentage of children's changing from off- to on-task following teacher's question was much lower than for those in the other activities (see Table 19). This seems logical because according to the operational definition, a non-task related question would be coded as interference. Yet, when the children were at non-activity, there were often cases when teachers asked a question that was not related to any task, and it would still be coded as a question and not interference because the children were not or had not been engaging in any task. Because of this, an attempt was made to examine questions excluding cases when children were at non-activity. In other words, only questions that were related to some kind of task. The percentage of children continuing on-task following teachers' questions stays the same as no children's antecedent task behaviour would be considered on-task when children were at non-activity. Yet, the percentage of children changing from off- to on-

task increases from 18.8% to 40.3% when non-activity data are excluded. Furthermore, examination of individual teacher data shows that the percentage of children changing from off-to on-task following Teacher E's questions (65.8%) was much higher than for those of the other teachers (see Table E-11). The differences found may be due to the quality of the questions asked. Indeed, H. Wood & D. Wood (1983) and Tizard, Hughes; Pinkerton and Carmichael (1982) pointed out that many preschool questions are not challenging, interesting or stimulating (e.g. "What colour is your crayon?", "Are you playing with the puzzle?"). The present study has not examined the quality of the questions asked, particularly those used by Teacher E. On the other hand, questioning was found to be one of the most frequently used behaviours in this study as well as in those reported by Gall (1972) and H. Wood & D. Wood (1983). It surely has, therefore, the potential to increase children's on-task behaviours and deserves further research.

Directing behaviours are similar to the use of suggestion in that both behaviours attempt to request children to act. Directing, however, was less frequently followed by children continuing on-task or changing from off- to on-task behaviour than were suggesting behaviours. This has confirmed the results of Fagot (1973) and Hamilton and Gordon (1978). A possible explanation for these findings is that when directing behaviours are used, they seldom encourage children to think and practice independent decision-making which may conflict with children's strivings for autonomy. Hamilton and Gordon (1978) suggested that more frequent use of directing behaviour may discourage children's development of internal controls and automous behaviours which are important factors in children's persistence

on-task. On the other hand, teacher's suggesting behaviours recognize children's autonomy and would seem to foster independent, persistent task behaviours. This might explain why directing behaviours seemed less effective than the use of suggestion in encouraging children's on-task behaviour.

Previous research has reported inconsistent findings regarding the influence of criticism on student's learning. In the present study the low occurrence of criticism created difficulty in making any definitive statement regarding the effect of criticism. It seems that over half of the time, children still continued on-task behaviour even following teachers' criticism. However, when the children's antecedent task behaviours were off-task, criticism had the lowest percentage of children going from off- to on-task. When a child is off-task, if criticism is not followed by a more positive interaction, there may not be an incentive to return to on-task behaviours.

Interference on the other hand, seems most successful in altering children's task behaviour but in the direction of putting children off-task. Farnham-Diggory and Ramsey (1977) reported similar findings. It appears that interference has the opposite effect to suggestion and teaching behaviour. Teachers' non-task related questions, suggestions or information are very likely to interrupt the children's chain of thought or even carry their thinking further away from the tasks. This may explain why interference was consistently followed by children changing to or continuing off-task behaviours.

The trend is clear that some teacher behaviours are more effective than others in increasing children's on-task behaviour. It was hypothesized that although teachers differ in their frequency of use

of different behaviours, the preschoolers' task behaviour consequent to the specific teacher behaviour does not depend upon the teachers. Teacher differences for some teacher behaviours were found. These results echo Anderson & Scott's (1978) findings that different teachers used different teaching methods for different amounts of time, but that the high school students' task involvement differed with different teachers even when the same teaching method was used.

If there are teacher differences, it is important to examine why some teachers are more effective than others. Among the teachers participating in this study, teachers B and E seem to be the ones that were most different from the others. Indeed, teacher E had the highest percentage of children coniinuing on-task (96.8%) and changing from off- to on-task (36.2%), whereas, teacher B had the lowest percentage of children continuing on-task (90.2%) and changing from off- to on-task (16.4%). Furthermore, in comparison with the other teachers, teacher E's questioning and suggesting behaviours seem more effective in changing children from off- to on-task, and teacher E's responding behaviours also seem more effective in conitnuing children's on-task behaviour. On the other hand, teacher B's responding behaviour seems less effective in continuing children on-task, and teacher B's questioning and suggestion also seem less effective in changing children from off- to on-task. In the search for some possible explanations of why teacher E seems more effective than teacher B, these two teachers' interactive pattern with the children was examined. Firstly, it was found that teacher E used the most rewarding behaviours and the least criticism and interference, whereas teacher B had the highest

percentage of use of directing behaviours, and lowest of teaching and attending behaviours. These data suggest that Teacher E seems to be a comparatively more positive teacher who often approved and acknowledged the children and rarely found fault in them. Teacher E also seems to be a sensitive teacher in his or her interaction with children. Teacher E's infrequent use of interference suggests that s/he seldom broke in upon the children when they were engaging in tasks. Teacher E also seldom asked questions or presented information that were irrelevant to what the children were doing. Teacher B, on the other hand, was comparatively high in her use of directing behaviour. This might incite resistance in the children and thereby impede the development of a good relationship between Teacher B and the children. Some studies (Flanders, 1965; McCoy & Zigler, 1965; Ryans, 1961) reported the importance of a good interpersonal relationsihp between teacher and student in order for the teacher to influence the student's behaviour. Differences in interpersonal relationship may possibly explain why Teacher E seems more effective in encouraging children's on-task behaviours.

Secondly, Teacher E had the highest frequency of interaction with individual children (2422 times) while Teacher B had the second lowest frequency of interaction with individual children (1786 times). Indeed, routine behaviour was used most frequently by Teacher B, and the least by Teacher E (see Table E-12). These seem to support Johnson and Scriven's (1979) observation that it was only the presence of a responsible and interactive adult that exerted a positive influence on children's engagement in play. Moreover, Teacher E's

frequent interaction with the children may imply that s/he was more enthusiastic and studies have reported that teacher's enthusiasm and taking initiative in interaction had positive influence on student participation in task (Bettencourt, Gillett, Gall & Hull, 1983; Ryan, 1961).

Another factor that the present study proposed to investigate was the influence of the activities. In other words, to examine if certain behaviours are more effective or less effective in different contexts. A fair number of studies (Berliner, 1979; Soar, 1979) suggested that the relationship between teacher behaviour and student learning depends also on the subject taught; in essence, the nature of the learning tasks. As predicted, not only were there significant differences in the frequencies of use of different teacher behaviours in different activities, activity differences were also found for some behaviours in their relationship to children's task behaviours. For continuing children's on-task behaviours, the use of directing behaviours seem more effective when children were at self-help activity than when they were at gross-motor activity. A possible explanation may be that in self-help activity, children's creativity is usually kept to a minimum, it seems to be more of an adult activity than a child's activity (preparing snack, learning basic self-help skills, etc.). As a result, it would require the teachers to give many directions with regard to what the children should do. This is supported by the present study because direction was found to occur most often when children were at self-help activity. On the other hand, children would more likely follow the teachers' direction and

continue on-task. However, in gross-motor activity, children are usually very excited and involved in their play. The very nature of the activity itself creates a situation where teachers' directing behaviours may create resentment or frustration and, thereby, children may be more likely to go off-task.

A consistently lower percentage of children changed from off- to on-task behaviours when children were at non-activity. These data seem to echo the previous results in that not only was it more difficult to alter children's task behaviour, it was even more so when children were not or had not been engaging in any activity.

Limitation and Recommendations for Future Research

It would seem that the limitation of the present study is the small sample size, and that the subjects were not randomly selected. Although the number of teachers participating in the study was few, the total number of interaction episodes collected amounted to 12,150 observational units. So it can still give a relatively accurate representation of what happened in the two nursery classes. On the other hand, though the sample was not randomly selected, the general characteristics of the teachers, the children, and the setting are known. This acts as a control for situation and type of program. So it is still legitimate to compare the findings with groups of similar characteristics. The difficulty of obtaining a random sample is not limited to the present study. Indeed, true random sampling is very hard to achieve even in experimental or quantitative studies (LeCompte & Goetz, 1982).

After the collection of data, the investigator has some suggestions

regarding refining the observational instrument to increase its sensitivity to the things that could happen in a nursery school. Firstly, according to the rule of coding, the investigator started to code whenever the target teacher responded to or initiated contact with a child. This coding system, however, did not account for situations when teachers ignored or paid no attention to a child's request or behaviour. The investigator's personal observation is that those are important behaviours to consider and they seem to have an effect on the children's task behaviours.

Secondly, the tone of voice should also be considered when delineating suggestion from directing behaviour. There were times when teachers seemed to use a suggestive statement, but his/her tone of voice was actually stern and firm and clearly expected the child to comply. It would be more accurate if other non-verbal behaviours like tone of voice and facial gestures were also considered in judging the behaviours.

Thirdly, this study was carried out to investigate the influence of teacher behaviours, individual teachers, and activities on children's task behaviours, but it has not taken into consideration the children's influence on the teachers. An increasing amount of research has noted the importance of considering the bidirectionality of influence in teacher-student interaction (Bourdeau & Ryan, 1978; Brophy & Evertson, 1981; Natriello & Dornbusch, 1983; Noble & Nolan, 1976; Friedler, 1975; Winne & Marx, 1977; Yarrow, Waxler & Scott, 1971).

In order to delineate as much as possible the factors that would influence children's task behaviour, the investigator recommends that

two parallel studies be undertaken simultaneously, with one observing the teachers and their interaction with children and the other observing the children. This would also give information about children's task behaviour in the presence and absence of teachers and peers. These data might clarify the interaction of factors that are involved in influencing children's task behaviours.

Implications

A fair amount of research has been carried out in search of the best teaching strategies. The present study suggests that there may be other factors involved in the complex act of teaching. The teacher differences found implies that there is a human element involved. In this computer era, students can learn their subjects through the computer. The computer can give corrective feedback or suggestions or ask questions. Some educators even declare that someday computers can replace the teachers and can do an even better job. However, what the computer lacks is human sensitivity, enthusiasm and the ability to build a relationship with the students they teach. We, as educators of future teachers, should not only impart the best teaching strategies, but also cultivate in the student teachers an interest and sensitivity in working with children and a willingness to establish a good relationship with them.

If the data obtained in the present study are verified by further research, they provide information of use in teacher pre- and in-service training and evaluation. Teachers could be made aware of the influence of specific behaviours on children's task behaviours, and trained to use those most effective in keeping children on-task.

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Appendix A

Operational definitions of teacher behaviours, child behaviours and activities

Operational Definition of Teacher Behaviour

Attending (A)

Teacher attends to child by verbally describing child's activity or behaviour; repeating what child says or does; using sustaining phrase like "Umm-umm.", "Yeah." or greeting the child. A rhetorical phrases (such as isn't it, doesn't it) at the end of a describing statement is not scored as a question. Instead, the whole statement is scored as attending.

Examples: Now you're washing the doll's hair, aren't you?

Hi, Myra.

Child: It's a circle!

Teacher: A circle.

Criticising (Cs or Cg)

A negative comment expressing disapproval, judgment, analysis of qualities of evaluation of comparative worth of child or child's activity. It may or may not include ridicule, blaming or condemning.

It is scored as a specific criticism (Cs) when teacher specified clearly what fault or inappropriate behaviour the child has done.

Examples: No, you are not allowed to climb on there because you don't have your shoes on and you may fall easily.

Don't scream because it's too loud and is hurting my ears.

When the criticism is just a general disparaging remark, it is considered a general criticism (Cg).

Examples: You dumb boy.

No, don't do that.

That's not right.

Directing (D)

Teacher uses specific command or gesture to indicate specifically the course of actions he or she wants child to follow, and teacher clearly expects the child to comply.

Examples: You come and get the paper here.

You go and help teacher Teresa.

Interfering (I)

Teacher uses suggestion, direct command, order or physical movement to break in upon the child when he or she is engaging in a purposeful activity. Teacher may or may not offer alternate activity.

Examples: Can you come and help clean up? (when child is painting)

You come and look at the picture that Ron has drawn. (when child is solving a puzzle)

It also includes: teacher's description of his or her own action or activity; and situation when a child has already engaged in a task, and teacher presents information or asks question that is irrelevant to child's activity.

Examples: It's snack time. (when child starts to dress up)

How's your birthday party yesterday? (when child is playing with blocks)

Questioning (Q)

Any inquiry or request for information from the child. It is coded only when the teacher's question is specifically related to the child's activity.

Examples: What colour would you like to paint on it?

Are you building a castle?

If the teacher's question is not related to the child's activity, it is coded as interference.

Responding (R)

Teacher gives direct answer or response to question or request initiated by the child. This also includes answers to one's own question.

Rewarding (Vg, Vs or N)

Verbal reward. This includes praise or encouragement statement which expresses the teacher's approval and/or admiration of the child or his/her behaviour. This also includes the teacher's acknowledgement of the child's right attempt or response.

It can be specific verbal reward (Vs) when teacher verbally specifies what good or right act the child has performed.

Examples: Right, that's where the rectangular block should go.

Very good, you can spell your own name now!

When the teacher uses nonspecific comments of approving child's behaviour, this is categorized as a general verbal reward (Vg).

Examples: Good Boy.

That's the way.

Nonverbal reward. This includes any positive physical contact or gesture such as kissing, hugging, arm around child's shoulder, or facial expression showing friendliness, affection and approval such

as smiling. It is coded only if the child indicates recognition by looking at the teacher. If it accompanies any other behaviours (such as verbal specific reward or question, etc.) the other behaviour is coded instead.

Suggesting (S)

Teacher mentions something for the child to consider or act on. Teacher delegates the responsibility of the decision to child and child has the option of acceptance or rejection. Suggestion may be in the form of questions or indirect commands for child to do or perform an act.

Examples: Can you put this puzzle piece in?

You finish this, O.K.?

Teaching (T)

Teacher presents facts, information, explanations, and/or opinion, ideas that are related to the child's task. It also includes demonstration, guidance or help teacher gives to facilitate child to learn how to do the task.

For situation when child is not engaging in any activity (i.e. non-activity), but teacher presents information about a task, it is also counted as teaching.

Examples: See, when you blow it, there'll be bubbles coming out.

A triangle has three sides.

(Teacher reading story to the child.)

The following teacher behaviours are coded but are not tested in the hypotheses.

Overseeing (O)

Teacher attends to or being distracted by other events, adults when she or he is involving in a child's activity.

Facilitating (F)

Teacher makes things easier or better for child when child is in need or trouble; or warns or keeps child from danger. There is no presentation of information and does not include any element of teaching.

Examples: Watch out!

(Teacher wipes nose for child.)

Informing (M)

Teacher presents information (unrelated to any kind of task) when a child is not engaged in any activity.

Example: (A child is wandering around the room and teacher informs child of clean-up time in five minutes.)

Routine (Ro)

Teaching doing daily routine, getting things organized, preparing for activity or talking to other adults, etc. Teacher is not involved with any child.

Unable to Determine (U)

When the observer cannot see or hear what the teacher is doing or saying or can't judge the behaviour clearly, score as unable to determine rather than guessing.

Operational Definition of Child Behaviour

On-task Behaviour (✓)

Child is attending to, manipulating, examining, working on or carrying from one place to another some definable task. This includes making statements about task, engaging in task related interactions with teacher or peer. Anything positively related to ongoing task or task that child is going to engage.

Off-task Behaviour (X)

Child does not attend to any task (child can be engaging in a task before but has stopped attending to task), sets unoccupied, talks to peer or teacher unrelated to any task, wanders around, follows the teacher, cries, etc. Behaviour is unrelated to any specific task.

Unable to Determine (U)

When the observer cannot see or hear what the child is doing or saying or can't judge the child's behaviour clearly, score as unable to determine rather than guessing.

Operational Definition of Children Activity

Creative Play (CP)

Children use a variety of materials or tools to practice their eye-hand coordination and to express their feelings and ideas in a visual form. This includes drawing, all kinds of craft activities, wood-working and block building.

Dramatic Play (DP)

Children exercise their imagination to express their understanding of the home and the immediate world around them through the imitation and acting out of various roles.

Children may or may not use dress-up clothes or other toys and materials to facilitate their portrayal of the different roles they want to play.

Cognitive Activity (COG)

Children engage in language arts activity (such as stories, recognizing and learning of alphabets, numbers, shapes, sizes and colours, etc.) or science activity (such as experimenting with magnets, balancing scales, magnifying glass, buoyancy of different objects, etc.) or all kinds of matching games and problem solving tasks (for e.g. solving puzzles).

Exploratory Play (EP)

Children explore, experiment, and learn about the properties and dimensions of a variety of materials through their physical sense. Children may or may not use the material for expressing self and ideas. Exploratory activities include water or sand play, playing with clay, play-dough and plasticene, etc.

Gross Motor Activity (GM)

Children exercise, practice and extend their body movement, coordination and balance skills. Examples are climbing ropes and ladder, swimming, riding rocking boat, and skipping, etc.

Self-help Activity (SH)

Children assist in preparation of snack or engage in activity that requires self-help skills such as putting smock away after painting, tying own shoe laces, washing and wiping hands, etc.

Non-activity (NA)

Children are not engaging in any of the activities mentioned above, children may be wandering around the room or observing other children and teachers, or engaging in non-activity conversation with the teacher (such as talking about yesterday's birthday party), or crying, or other behaviours such as quarrelling or fighting with other children.

Appendix B

Letter and consent form to the teachers.

THE UNIVERSITY OF MANITOBA

FACULTY OF HUMAN ECOLOGY
Department of Family Studies

Winnipeg, Manitoba
Canada R3T 2N2

(204) 474-9225

January 7, 1983

Dear Teacher,

I am a graduate student in Human Development in the Department of Family Studies. Currently, I am working on a study for the completion of the Master of Science degree. The purpose of this study is to explore, by means of observations, the factors involved in young children's task behaviour. These observations will be conducted in the nursery school where you teach and the purpose of this letter is to request your consent to participate in this study.

Because I will be doing naturalistic observation (i.e. observing behaiours as they exist in real life, in a natural setting), it is not necessary for you to do anything out of the ordinary, you can just be the way you are. I will code on a coding sheet the observed behaviours of the children's contact with you, and I will try to remain as unobtrusive as possible. Further, in order to assure that your identity be held in strict confidence, I will randomly assign a code number to the children and to you as the sole means of identifying the data. I will be the only person who can have access to the identification of the codes.

When the study is completed, I'll be glad to send you the summary of the results of the research. Enclosed with this letter is a form on which you can indicate your agreement to participate in this study and consent to allow me to observe the children's contact with you. Your participation is voluntary.

I sincerely thank you for your interest in this project, and certainly, it is only with your participation that this study will be possible. And I believe that this study will provide information to teachers that can help them to increase children's task involvement.

Sincerely yours,

(Julia Lau)

THE UNIVERSITY OF MANITOBA

FACULTY OF HUMAN ECOLOGY
Department of Family Studies

Winnipeg, Manitoba
Canada R3T 2N2
(204) 474-9225

Factors Related to Children's Task Behavior

Conducted by Julia S. Lau
Under the supervision of Dr. L. Jackson

I have had the above research project explained to me and I understand that the children and I will be observed over a period of approximately two months for a total of eight hours.

I understand that my name will never be used. The identity of the children and teachers will not be available to anyone except the researcher, Julia Lau. Neither my advisor nor the director of the nursery school program will have access to this information. The results of this study may be published but in such a way that no individual identification will be possible.

I also understand that my participation in this project is on a voluntary basis and that I may refuse to participate or may withdraw from this study at any time without jeopardizing my involvement in the nursery school program.

With the above understanding,

I hereby agree to participate in this research project _____.

I do not wish to participate in this research project _____.

_____
Signature

_____
Date

Appendix C

Hamilton and Gordon's observational instrument

Date: _____
Class: _____
Observer: _____
Reliability check: yes___ no ___

Teacher Behaviors

Time observation starts: _____
Time observation ends: _____
Elapsed time: _____

Child	Attend	Reward	Criticize	Question	Respond to Q	Teach	Direct	Suggest	Interfere
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
rate per minute:									

Antecedent Conditions

1. On task
2. Non-task behavior
3. Asking question, asking for help
4. Interacting with teacher (non-task)
5. Talking to peer
6. Unable to determine

Appendix D

Observational instrument

Teacher: ____________________

Date: ____________________ Order of Observation: ____________________

Activity	Child	Child's Antecedent Task Beh.	Teacher Behaviour	Child's Consequent Task Beh.	Comment

Appendix E

Tables

Table E-1

Ninety-five Percent Confidence Interval for the Percentage of Children's Task Behaviours[a] Following the Different Teacher Behaviours

Teacher behaviours	Children's task behaviours	
	On-task -- on-task	On-task -- off-task
Suggest	96.84 -- 98.90	1.10 -- 3.16
Attend	97.03 -- 98.55	1.45 -- 2.97
Reward	96.62 -- 98.74	1.26 -- 3.38
Question	96.78 -- 98.42	1.58 -- 3.22
Teach	96.46 -- 98.38	1.62 -- 3.54
Respond	94.23 -- 97.05	2.95 -- 5.77
Direct	87.64 -- 95.45	4.56 -- 12.37
Criticize	54.22 -- 80.48	19.52 -- 45.78
Interfere	22.85 -- 33.13	66.87 -- 77.15

Note.

[a]Children's antecedent task behaviour = on-task.

Table E-2

Ninety-five Percent Confidence Interval for the Percentage of Children's Task Behaviours[a] According to Different Teacher Behaviours

Teacher behaviours	Children's task behaviours	
	Off-task -- on-task	Off-task -- off-task
Suggest	52.83 -- 60.71	39.29 -- 47.17
Teach	47.78 -- 63.94	36.06 -- 52.22
Direct	20.06 -- 34.24	65.76 -- 79.94
Question	15.00 -- 22.68	77.32 -- 85.00
Respond	14.01 -- 23.13	76.87 -- 85.99
Reward	7.55 -- 22.69	77.31 -- 92.45
Attend	9.57 -- 15.71	84.29 -- 90.43
Interfere	6.05 -- 15.89	84.11 -- 93.95
Criticize	0.52 -- 16.15	83.85 -- 99.49

Note.

[a]Children's antecedent task behaviour = off-task.

Table E-3

Mean Percentage of the Use of Different Behaviours by the Five Teachers

Teacher behaviours	Frequency	Mean percentage
Attend	1930	20.60
Criticize	103	1.10
Direct	497	5.30
Interfere	471	5.03
Question	1773	18.92
Respond	1104	11.78
Reward	889	9.49
Suggest	1383	14.76
Teach	1218	13.00
Total	9369	100

Table E-4

Percentage of Use of Different Behaviours by Different Teachers

Teachers	Teacher behaviours									
	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	Total
T_A	19.96	1.26	6.25	7.32	16.38	9.93	9.35	15.50	14.05	100
T_B	19.18	1.19	7.12	4.50	19.43	13.30	8.74	15.49	10.99	100
T_C	21.31	0.88	3.82	5.11	21.78	10.17	8.67	14.09	14.19	100
T_D	21.95	2.14	5.19	5.91	16.62	13.51	5.32	16.88	12.47	100
T_E	20.66	0.36	4.49	2.61	20.03	12.62	13.74	12.66	12.80	100

Table E-5

Ninety-five Percent Confidence Intervals for Percentages of Children's Task Behaviours[a] by Teachers Following the Different Teacher Behaviours

Teachers	Children's task behaviours	
	On-task -- on-task	On-task -- off-task
	Attending	
A	92.52 -- 99.58	0.42 -- 4.08
B	93.44 -- 98.56	1.44 -- 6.56
C	96.24 -- 99.42	0.58 -- 3.76
D	93.80 -- 98.64	1.36 -- 6.20
E	97.20 -- 99.80	0.20 -- 2.30
	Criticism	
A	28.90 -- 82.30	17.70 -- 71.10
B	26.20 -- 87.80	12.20 -- 73.80
C	63.10 -- 100.00	0.00 -- 36.90
D	32.30 -- 83.70	16.30 -- 67.70
E	15.80 -- 100.00	0.00 -- 84.20
	Directing	
A	90.28 -- 99.25	0.75 -- 9.73
B	74.10 -- 91.24	8.76 -- 25.90
C	85.02 -- 98.86	1.14 -- 14.98
D	72.06 -- 94.60	5.40 -- 27.94
E	89.99 -- 99.64	0.36 -- 10.12
	Interference	
A	12.16 -- 27.84	72.16 -- 87.84
B	16.97 -- 44.93	55.07 -- 83.03
C	15.47 -- 36.83	63.17 -- 84.53
D	25.82 -- 52.62	47.38 -- 74.18
E	18.55 -- 50.01	49.99 -- 81.45
	Question	
A	96.82 -- 99.96	0.04 -- 3.18
B	93.50 -- 98.58	1.42 -- 6.50
C	95.59 -- 99.05	0.95 -- 4.41
D	93.50 -- 99.22	0.78 -- 6.50
E	97.81 -- 99.97	0.03 -- 2.19

Note.

[a]Children's antecedent task behaviours were on-task.

Table E-5 (cont'd.)

Teachers	Children's Task Behaviours	
	On-task -- on-task	On-task -- off-task
	Responding Behaviour	
A	93.70 -- 99.55	0.45 -- 6.30
B	83.22 -- 93.18	6.82 -- 16.78
C	92.98 -- 99.50	0.50 -- 7.02
D	92.95 -- 99.15	0.85 -- 7.05
E	96.10 -- 99.94	0.06 -- 3.90
	Reward	
A	92.86 -- 98.86	1.14 -- 7.14
B	92.30 -- 99.45	0.56 -- 7.70
C	92.37 -- 99.15	0.85 -- 7.63
D	95.00 -- 100.00	0.00 -- 5.00
E	95.74 -- 99.57	0.43 -- 4.26
	Suggestion	
A	94.22 -- 99.59	0.41 -- 5.78
B	89.04 -- 97.52	2.48 -- 10.96
C	96.33 -- 100.00	0.00 -- 3.67
D	94.09 -- 99.83	0.17 -- 5.91
E	96.03 -- 100.00	0.00 -- 3.97
	Teaching Behaviour	
A	96.22 -- 99.74	0.28 -- 3.78
B	90.26 -- 97.82	2.18 -- 9.74
C	96.21 -- 99.73	0.27 -- 3.79
D	91.31 -- 98.31	1.69 -- 8.69
E	96.61 -- 99.91	0.09 -- 3.28

Table E-6

Ninety-five Percent Confidence Intervals for Percentages of Children's Task Behaviours by Teachers Following the Different Teacher Behaviours

Teachers	n_1's	Children's task behaviours	
		Off-task -- on-task	Off-task -- off-task
		Attending	
A	116	7.51 -- 20.07	79.93 -- 92.49
B	79	0.96 -- 11.70	88.30 -- 99.04
C	81	6.12 -- 21.04	78.96 -- 93.88
D	95	4.36 -- 16.70	83.30 -- 95.64
E	80	10.20 -- 27.30	72.70 -- 89.80
		Criticism	
A	10	0.30 -- 44.50	55.50 -- 99.70
B	8	0.00 -- 36.90	63.10 -- 100.00
C	9	0.00 -- 33.60	16.40 -- 100.00
D	16	1.60 -- 38.3	61.70 -- 98.40
E	5	0.50 -- 71.60	28.40 -- 99.50
		Directing	
A	37	12.72 -- 41.34	58.66 -- 87.28
B	36	2.59 -- 25.19	74.81 -- 97.41
C	17	6.80 -- 49.90	50.1 -- 93.20
D	37	22.21 -- 53.47	46.53 -- 77.79
E	24	15.60 -- 55.30	44.70 -- 84.40
		Interference	
A	47	6.28 -- 27.76	72.24 -- 93.72
B	25	0.00 -- 13.70	86.30 -- 100.00
C	25	1.63 -- 30.37	69.63 -- 98.37
D	38	1.7 -- 21.40	78.60 -- 98.30
E	18	1.40 -- 34.70	65.30 -- 98.60
		Question	
A	85	6.72 -- 21.52	78.48 -- 93.28
B	76	3.63 -- 17.43	82.57 -- 96.37
C	78	10.48 -- 27.98	72.02 -- 89.52
D	84	7.74 -- 23.22	76.78 -- 92.26
E	75	25.14 -- 46.86	53.14 -- 74.86

Table E-6 (cont'd.)

Teachers	n_1's	Children's task behaviours	
		Off-task -- on-task	Off-task -- off-task
		Responding	
A	48	14.51 -- 39.65	60.35 -- 85.49
B	50	0.48 -- 15.52	84.48 -- 99.52
C	59	6.08 -- 24.42	75.58 -- 93.92
D	54	8.16 -- 28.88	71.12 -- 91.84
E	69	73.23 -- 33.15	66.85 -- 86.77
		Reward	
A	18	1.40 -- 34.70	65.30 -- 98.60
B	18	0.10 -- 27.30	72.70 -- 99.90
C	18	1.40 -- 34.70	65.30 -- 98.60
D	8	0.00 -- 36.90	13.10 -- 100.00
E	24	15.60 -- 55.30	44.70 -- 84.40
		Suggestion	
A	146	59.50 -- 74.74	25.26 -- 40.50
B	108	39.64 -- 58.50	41.50 -- 60.36
C	100	48.33 -- 67.67	32.33 -- 51.67
D	126	35.76 -- 53.12	46.88 -- 64.24
E	126	54.26 -- 71.14	28.86 -- 45.74
		Teaching	
A	24	40.60 -- 81.20	18.80 -- 59.40
B	23	13.20 -- 52.90	47.10 -- 86.80
C	23	51.60 -- 89.80	10.20 -- 48.40
D	36	30.40 -- 64.50	35.50 -- 69.60
E	39	49.04 -- 79.16	20.84 -- 50.96

Table E-7

Frequencies of Dyadic Teacher-Child Interaction Episodes in Different Activities for Different Teachers

	Activities							
Teachers	Creative play	Dramatic play	Cognitive activity	Exploratory play	Gross-motor play	Self-help activity	Non-activity	Total
T_A	33.54	17.73	15.36	15.05	2.37	4.66	11.29	100
T_B	36.67	8.51	23.40	3.25	4.20	7.17	16.80	100
T_C	27.05	16.81	17.68	18.84	5.22	5.12	9.28	100
T_D	25.06	13.91	24.30	9.51	3.23	10.62	13.38	100
T_E	28.03	12.10	21.47	17.96	5.16	5.70	9.58	100
[a]Mean	30.05	13.96	20.18	13.52	4.07	6.43	11.79	100

Note.

[a]The mean percentages were calculated by dividing the total frequencies of teacher-child interaction in an activity by the overall total for all the activities.

Table E-8

Percentages of Use of Different Teacher Behaviours in Different Activities

	Teacher behaviours									
Activities	Attend	Criticize	Direct	Interfere	Question	Respond	Reward	Suggest	Teach	Total
Creative play	21.39	0.32	4.24	8.31	18.51	12.27	9.0	13.92	11.96	100
Dramatic play	24.89	1.20	2.77	3.22	23.76	9.00	7.95	14.54	12.67	100
Cognitive activity	15.58	1.23	5.81	3.80	17.74	12.29	10.49	13.62	19.43	100
Exploratory play	21.24	1.30	4.52	5.67	19.17	11.66	10.66	12.96	12.81	100
Gross-motor activity	23.82	1.83	7.59	8.64	12.30	7.85	13.87	13.87	10.21	100
Self-help activity	12.35	1.35	10.49	1.69	10.15	11.68	11.68	23.52	17.09	100
non-activity	25.42	2.29	7.92	0.00	23.54	15.00	6.15	17.29	2.40	100

Table E-9

Ninety-five Percent Confidence Intervals for Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours in Different Activities

Activities	n_1's	Children's task behaviours	
		On-task -- on-task	On-task -- off-Task
		Attending Behaviour	
Creative play	494	96.21 -- 98.93	1.09 -- 3.79
Dramatic play	300	97.8 -- 100	0 -- 2.17
Cognitive activity	266	94.45 -- 98.79	1.21 -- 5.55
Exploratory play	250	95.15 -- 99.25	0.75 -- 5.09
Gross-motor activity	78	91.0 -- 99.68	0.38 -- 9.04
Self-help activity	57	90.56 -- 100	0.06 -- 9.44
		Criticism	
Creative play	4	6.8 -- 93.20	6.8 -- 93.20
Dramatic play	7	18.40 -- 90.1	9.9 -- 81.6
Cognitive activity	18	52.4 -- 93.6	6.4 -- 47.6
Exploratory play	12	42.8 -- 94.5	5.5 -- 57.2
Gross-motor activity	5	28.4 -- 99.5	0.5 -- 71.6
Self-helf activity	3	0 -- 70.8	29.2 -- 100
		Directing Behaviour	
Creative play	97	79.82 -- 93.38	6.2 -- 20.18
Dramatic play	27	81.00 -- 99.9	0.1 -- 19.0
Cognitive activity	91	86.84 -- 97.78	2.22 -- 13.16
Exploratory play	48	85.80 -- 99.50	0.5 -- 14.20
Gross-motor activity	20	50.90 -- 91.30	8.70 -- 49.10
Self-help activity	48	92.60 -- 100	0 -- 7.40
		Interference	
Creative play	145	20.95 -- 35.61	64.39 -- 79.05
Dramatic play	32	21.10 -- 56.30	43.70 -- 78.90
Cognitive activity	43	14.50 -- 41.32	58.68 -- 85.50
Exploratory play	49	14.17 -- 38.90	61.11 -- 85.83
Gross-motor activity	19	3.4 -- 39.60	60.4 -- 96.6
Self-help activity	5	0.5 -- 71.6	28.4 -- 99.5

Note.

[a]Children's antecedent task behaviours = on-task.

Table E-9 (cont'd.)

Activities	n_1's	Children's task behaviours	
		On-task -- on-task	On-task -- off-Task
		Question	
Creative play	436	96.91 -- 99.43	0.57 -- 3.09
Dramatic play	284	95.74 -- 99.34	0.66 -- 4.26
Cognitive activity	317	94.11 -- 98.31	1.69 -- 5.89
Exploratory play	217	96.60 -- 99.90	0.10 -- 3.50
Gross-motor activity	37	90.50 -- 100	0 -- 9.50
Self-help activity	44	81.30 -- 98.54	1.46 -- 18.70
		Responding Behaviour	
Creative play	288	91.79 -- 97.10	2.91 -- 8.21
Dramatic play	100	89.96 -- 98.90	1.14 -- 10.04
Cognitive activity	207	95.50 -- 99.67	0.33 -- 4.51
Exploratory play	121	93.75 -- 99.82	0.18 -- 6.25
Gross-motor activity	26	80.35 -- 99.90	0.10 -- 19.65
Self-help activity	61	80.52 -- 96.52	3.48 -- 19.50
		Reward	
Creative play	232	95.37 -- 99.45	0.55 -- 4.63
Dramatic play	102	94.60 -- 100	0 -- 5.40
Cognitive activity	195	94.49 -- 99.35	0.65 -- 5.51
Exploratory play	134	94.20 -- 99.83	0.17 -- 5.80
Gross-motor activity	49	89.20 -- 99.96	0.10 -- 10.84
Self-help activity	64	89.00 -- 99.60	0.40 -- 11.20
		Suggestion	
Creative play	237	94.90 -- 99.20	0.8 -- 5.10
Dramatic play	124	93.85 -- 99.82	1.8 -- 6.15
Cognitive activity	182	94.10 -- 99.37	0.63 -- 5.93
Exploratory play	116	95 -- 100	0 -- 5
Gross-motor activity	34	84.62 -- 99.90	0.1 -- 15.38
Self-help activity	57	90.56 -- 100	0.04 -- 9.44
		Teaching Behaviour	
Creative play	294	95.88 -- 99.36	0.64 -- 4.12
Dramatic play	155	94.90 -- 99.85	0.15 -- 51.00
Exploratory play	151	93.62 -- 99.54	0.46 -- 6.38
Gross-motor activity	32	88.64 -- 100	0 -- 11.36
Self-help activity	87	91.90 -- 99.73	0.28 -- 8.10

Table E-10

Ninety-five Percent Confidence Intervals for Percentages of Children's Task Behaviours[a] Following the Teacher Behaviours in Different Activities

Activities	n_2's	Children's task behaviours: Off-task -- on-task	Children's task behaviours: Off-task -- off-Task
Attending Behaviour			
Creative play	102	16.17 -- 32.85	67.15 -- 83.83
Dramatic play	26	20.00 -- 59.50	40.50 -- 79.80
Cognitive activity	34	19.23 -- 51.35	48.65 -- 80.77
Exploratory play	23	13.20 -- 52.90	47.10 -- 86.80
Gross-motor activity	11	0.20 -- 41.30	58.70 -- 99.80
Self-help activity	12	2.10 -- 48.40	51.60 -- 97.90
Non-activity	243	0 -- 1.6	98.40 -- 100
Criticism			
Creative play	5	0 -- 52.20	47.80 -- 100
Dramatic play	6	4.30 -- 77.70	22.3 -- 95.7
Cognitive activity	5	0 -- 52.2	47.80 -- 100
Exploratory play	5	0 -- 52.2	47.80 -- 100
Gross-motor activity	1	2.5 -- 100	0 -- 97.5
Self-helf activity	4	0 -- 60.2	39.8 -- 100
Non-activity	22	0.1 -- 24.7	77.1 -- 99.9
Directing Behaviour			
Creative play	22	32.2 -- 75.6	24.4 -- 67.8
Dramatic play	9	13.7 -- 78.8	21.2 -- 86.3
Cognitive activity	17	27.8 -- 77.0	23.0 -- 72.2
Exploratory play	8	8.5 -- 75.5	24.5 -- 91.5
Gross-motor activity	8	8.5 -- 75.5	24.5 -- 91.5
Self-help activity	13	25.1 -- 80.8	19.2 -- 74.9
Non-activity	74	0.9 -- 11.7	88.2 -- 99.1
Interference			
Creative play	81	6.1 -- 21.0	79 -- 93.9
Dramatic play	11	0.2 -- 41.3	58.7 -- 99.8
Cognitive activity	28	0.1 -- 18.4	81.6 -- 99.9
Exploratory play	20	3.2 -- 37.9	62.1 -- 96.8
Gross-motor activity	12	0.2 -- 38.5	61.5 -- 99.8
Self-help activity	1	0 -- 97.5	2.5 -- 100
Non-activity	0	0	0

Note.

[a]Children's antecedent task behaviours = off-task.

Table E-10 (cont'd.)

Activities	n_2's	Children's task behaviours	
		Off-task -- on-task	Off-task -- off-Task
Question			
Creative play	78	31.4 -- 53.3	46.7 -- 68.7
Dramatic play	28	27.5 -- 66.1	33.9 -- 72.5
Cognitive activity	23	16.4 -- 57.3	42.7 -- 83.6
Exploratory play	27	16.5 -- 54.0	46.0 -- 83.5
Gross-motor activity	9	13.7 -- 78.8	21.2 -- 86.3
Self-help activity	11	10.9 -- 69.2	30.8 -- 89.1
Non-activity	222	0.5 -- 4.9	95.1 -- 99.5
Responding Behaviour			
Creative play	56	24.8 -- 50.2	49.8 -- 75.2
Dramatic play	18	21.5 -- 69.2	30.8 -- 78.5
Cognitive activity	26	14.3 -- 51.8	48.2 -- 85.7
Exploratory play	29	23.5 -- 61.1	38.9 -- 76.5
Gross-motor activity	3	9.4 -- 99.2	0.8 -- 90.6
Self-help activity	7	0.4 -- 57.9	42.1 -- 99.6
Non-activity	141	0 -- 2.5	97.5 -- 100
Reward			
Creative play	14	12.8 -- 64.9	35.1 -- 87.2
Dramatic play	2	0 -- 84.2	15.8 -- 100
Cognitive activity	4	0.6 -- 80.6	19.4 -- 99.4
Exploratory play	4	39.8 -- 100	0 -- 60.2
Gross-motor activity	2	15.8 -- 100	0 -- 84.2
Self-help activity	1	2.5 -- 100	0 -- 97.5
Non-activity	59	0 -- 6.1	93.9 -- 100
Suggestion			
Creative play	149	63.9 -- 78.4	21.6 -- 36.1
Dramatic play	65	56.3 -- 79.1	20.9 -- 43.7
Cognitive activity	79	50.0 -- 71.5	28.5 -- 50.0
Exploratory play	51	52.6 -- 86.5	13.5 -- 37.5
Gross-motor activity	17	27.8 -- 77.0	23.0 -- 72.2
Self-help activity	81	70.1 -- 87.9	12.1 -- 29.9
Non-activity	164	15.1 -- 27.6	72.4 -- 84.9
Teaching Behaviour			
Creative play	42	55.1 -- 83.0	17 -- 44.9
Dramatic play	13	25.1 -- 80.8	19.2 -- 74.9
Cognitive activity	36	43.4 -- 76.8	23.2 -- 56.6
Exploratory play	13	54.6 -- 98.1	1.9 -- 45.4
Gross-motor activity	7	3.7 -- 71.0	29 -- 96.3
Self-help activity	11	48.2 -- 97.7	2.3 -- 51.8
Non-activity	23	0.1 -- 21.9	78.1 -- 99.9

Table E-11

Frequencies and Percentages of Children's Task Behaviours[a] Following the Questioning Behaviours of Different Teachers

Children's task behaviour	Teachers				
	T_A	T_B	T_C	T_D	T_E
Off-task -- on-task					
Frequency	11	8	15	12	25
Column %	(29.73)	(33.33)	(38.46)	(31.58)	(65.79)
Off-task -- off-task					
Frequency	26	16	24	26	13
Column %	(70.27)	(66.67)	(61.54)	(68.42)	(34.21)

Note. Data when children were at non-activity are not included in the table.

[a]Children's antecedent task behaviour = off-task.

Table E-12

Frequencies of Use of Different Behaviours[a] by Teachers

Teacher behaviour	Teachers				
	T_A	T_B	T_C	T_D	T_E
Facilitate	86	67	56	59	80
Inform	37	57	28	26	23
Oversee	34	45	28	60	70
Routine	150	212	152	200	114
Unable to determine	44	53	43	53	45

Note.

[a]Behaviours listed are those that were not tested in the hypotheses.