Maternal Input to Twin and Singleton Children
Implications for Language Acquisition

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Differences in the conversational characteristics of mothers of two-year-old twins and mothers of two-year-old singletons with older siblings were investigated. Three maternal conversational characteristics were examined: discourse features, illocutionary force features, and style parameters. The twins' and singletons' language skills were also compared and the relationship between the maternal conversational characteristics and language development scores was explored. The mothers of twins were found to differ significantly from the mothers of singleton children in their conversational behavior. The twin children were found to score significantly lower than the singleton children on measures of language expression and comprehension. Significant correlations were found between the maternal input features and the children's language scores. It is proposed that twins receive less responsive and less conversation-eliciting maternal speech. The possibility is offered that this style of speech may play a role in their slower rate of language development.

The role of the environment in the acquisition of language is being debated in the field of child language development (e.g., Barnes, Getfieund, Satterly, & Wells, 1983; Bloom & Lahey, 1978; Furrow, Nelson, & Benedict, 1979; Gleitman, Newport, & Gleitman, 1984; Newport, Gleitman, & Gleitman, 1977). Clearly, one aspect of the environment salient to communication scholars is the communication provided by the primary caretaker. Given the growing interest in action and intention in the communication process, the

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The purpose of this investigation is to explore the illocutionary force, as well as conversational style features of maternal speech, which may influence language acquisition.

A social interactionist or communication-based approach to language acquisition holds that the child learns language through active interaction with his or her environment (Shatz, 1982; Snow, 1979) and the most crucial aspect of the environment is the adult who acts as a guide in the language learning process (Bruner, 1977, 1983; Snow, 1972). Many social interactionists point to “the special nature of the speech directed to children... which may simply facilitate, or even be required for, normal language development” (Gleason, 1985, p. 193). This special speech is known as motherese, and this position is known as the motherese hypothesis (Gleitman et al., 1984). One emphasis of the social interactionist approach is that the adult caregiver supplies speech input that is adapted to the child’s level, thus facilitating language acquisition (Bruner, 1983; Haslett, 1984). The term special nature refers to such features as short, clearly enunciated maternal utterances, few grammatical errors, and simple syntax, as well as conversational features that respond to or extend the child’s speech. This approach is congruent with the major thrust of the motherese research that is to determine the relationship between mothers’ speech and language acquisition.

Exploration of twin children versus singleton children directly confronts the issue of the role of maternal input in language acquisition. Twin children have been identified historically as having delayed speech. If twins’ language development is behind that of other children and if the input twins receive is different from the input singletons receive, a social interactionist approach may be strengthened and insight on important maternal speech features may be gained. Thus the importance of this investigation is not just in the examination of factors related to the language development of twins, but also in the examination of factors that may facilitate or hinder language acquisition in general.

In order to provide a perspective for this study, it is necessary to review the evidence concerning twins’ language development, including proposed reasons for twins’ slower rate of language acquisition, and the evidence concerning the role of maternal speech in language acquisition.

Language Development of Twins

Twins appear to be inferior to singletons in language development. Areas of delay include time of beginning to talk, mean length of
utterance, functional use, structural complexity, vocabulary, articulation, amount of talk to parents and others, and language scores on standardized tests such as the Primary Mental Abilities (PMA) and the Illinois Test of Psycholinguistic Ability (ITPA) (Davis, 1937; Day, 1932; Douglas & Sutton, 1978; Koch, 1966; Lubbe, 1974; Luria & Yudovitch, 1959; Lytton, Conway, & Suave, 1977; Mittler, 1970, 1971). Differences between twins and singletons seem to grow from ages two to five. Some differences disappear (e.g., articulation) by the age of five, while others persist to at least nine and one-half.¹

The first hypothesis in this study, then, is one to confirm previous research.

(H1) Twins will score lower on language acquisition measures than singletons.

Several studies suggest that the language problems of twins may be due more to environmental factors than to biological ones. In Mittler’s (1970) study, there was only a weak association between biological variables and language skills at the time the children were four, and complications of delivery and pregnancy had no relationship to ITPA scores. Conway, Lytton, and Pysh (1980) also found no relationship between prematurity, apgar score, or birthweight, and the twins’ language abilities at age two and one-half. However, twins whose fellow twins had died before the age of one month had average verbal reasoning scores (Record, McKeown, & Edwards, 1970).

Historically, the most important environmental factors are thought to be aspects of the “twin situation,” that is, the lack of need to communicate with others due to isolation from others and to the readily available twin-twin communication (Luria & Yudovitch, 1959). An alternative factor that is now believed to play an influential role and has received some empirical support is the lack of, or differential quality of, parental involvement (e.g., Conway et al., 1980; Costello, 1978). Parents of twins have been found to give them less attention (Costello, 1978) and engage in less talk with them (Conway et al., 1980; Lytton et al., 1977). In addition, when parents do interact with twins, the interaction may be qualitatively different. There is some evidence that mothers of twins are not as affectionate (Lytton et al., 1977), do not give as much positive feedback (Betton & Koester, 1983), and use shorter and grammatically simpler utterances (Lytton et al., 1977). Mothers of twins also must operate within the complex constraints of triadic situations (Savic, 1980). Overall, these studies suggest that maternal
input may be an important factor in twins' language development. Consequently, attention is turned to the relationship between maternal input and language acquisition.

The Role of Maternal Input
In Language Acquisition

There is currently little doubt about the existence of motherese as a distinct style of speech. The speech used by adults when talking to children is different from the style used by adults to address other adults. In general, motherese is characterized by speech that is simple and redundant. It contains many questions and imperatives, few past tenses, and few disfluencies. It is relatively high pitched and is characterized by exaggerated intonation patterns. According to Snow (1977), who gives a summary and review of the empirical studies analyzing motherese, these basic characteristics are quite well documented.

Broadly speaking, motherese consists of two major types of input, conversational devices and syntactic features (e.g., maternal mean length of utterance, certain grammatical forms, and so on). Conversational devices are used by the adult to ensure conversational continuity. They include measures of illocutionary force, such as asking questions or giving positive acknowledgments, and discourse features, such as imitating or expanding what the child says. For example, if the child says, "brown doggie" and the mother says, "yes, I see the brown doggie" she is positively acknowledging the child's utterance, while at the same time expanding the child's utterance to a grammatically complete form. A third conversational feature refers to style parameters, such as the amount mother and child equally participate in the conversation, or how much the mother talks. Thus the examination of conversational input (as opposed to syntactic input) recognizes, but does not directly explore, the interactional nature of conversation. Maternal use of discourse features, illocutionary force features, and style are explored here.

Discourse features. Discourse features were chosen as one focus of this investigation because the relation between maternal use of discourse features and language acquisition is the most strongly supported influential aspect of the environment in the language acquisition literature (see Stafford, 1987). Therefore, it is the logical theoretical starting place for exploration of influences on twin language delay.
Studies have been quite consistent in the variables found to be influential in language acquisition. These include maternal expansions, extensions, imitations, and few unintelligible and disfluent utterances (Barnes, et al., 1983; Cross, 1977, 1978; Ellis & Wells, 1980; Evans, 1977). Cross (1977) also found maternal reliance on stock expressions to be negatively associated with language abilities. The conclusion drawn is that discourse adjustments “provide the child with ideal opportunities to learn the structure of his language” (Cross, 1977, p. 171). “The input to rapidly developing children is graded quite continuously in tune with their linguistic and communicative abilities” (Cross, 1977, p. 163).

Many studies of the relationship between maternal speech and language acquisition have simply investigated numerous syntactic and discourse features without much reason given for the variables explored. Recently, however, scholars have noted that the discourse features found to be important are representative of the quality of mother/child interaction. Evans (1977) argues that discourse features such as expansions and extensions are representative of a responsive parental speech environment. She found that children in such an environment reach a higher stage of linguistic development earlier than children whose parents do not provide such a responsive conversational environment.

If twins develop language more slowly than singletons, and the parents of children with differing rates of language acquisition have been found to differ on discourse features, then it seems reasonable that mothers of twins may converse differently with their children than mothers of singletons do. Additional evidence for this proposition is that the variables thought to influence language acquisition seem to be representative of the quality of interaction, and this is congruent with the evidence from the twin literature that mothers of twins are less responsive to their children than are mothers of singletons.

A social interactionist position, emphasizing parental input, is highly congruent with the suggested aspects of the twin situation and studies that have investigated parental interaction with twins. Putting together descriptions of twins’ mothers with such discourse features representative of a nonfacilitative environment, we would expect the maternal input twins receive to be reflected in a relative lack of conversationally responsive features such as imitations, expansions, and extensions. In addition, mothers of twins should engage in more semantically unrelated utterances, stock expressions, and unintelligible remarks than mothers of singletons.
Thus the following hypotheses are explored:

(H2) Mothers of singletons will engage in more discourse features that are representative of a facilitative environment than will mothers of twins, who will engage in more nonfacilitative features. Specifically,

(H2a) mothers of singletons will use more semantically related utterances (i.e., imitations, expansions, extensions, topic continuations, and synergistic sequences) as well as more items related to the child's actions than mothers of singletons.

(H2b) Mothers of twins will use more semantically unrelated utterances, stock expressions, and unintelligible remarks than mothers of singletons.

Illocutionary force. The exploration of illocutionary force was chosen as another focus of this study due to the importance placed upon the mother's interactional intentions in conversation (Hartmann & Haavind, 1981; McDonald & Pien, 1982; Schieffelin & Ochs, 1983). This intention is only indirectly explored in the investigation of discourse features. The study of the mother's basic orientation toward the use of language is, of course, not new. Bernstein has argued that "differential emphasis on the use of language . . . [may] affect the self-concept of the child" (Bernstein & Henderson, 1973, p. 43). Bernstein's work (see, e.g., Bernstein, 1959, 1962) has been primarily concerned with the differences in orientation toward language use in differing social classes. Similarly, McDonald and Pien (1982) have proposed that the mother's underlying intent in interacting with the child is discernible from the illocutionary acts in which she engages. Basically, an illocution refers to the function or force of a speech act, for example, a command (Austin, 1962).

McDonald and Pien (1982) were solely interested in the illocutionary force of maternal utterances. They found that mothers could be classified into two groups with incompatible intents, those with a desire to control their children and those with a desire to converse with their children. The conversing mothers engaged in frequent questions and positive acknowledgments and infrequent commands, repairs, and spontaneous declaratives (utterances that do not provide feedback for preceding utterances or actions and do provide new information). The controlling mothers used frequent commands, negative acknowledgments, spontaneous declaratives, and infrequent questions and had a greater inequality of participation.

Although McDonald and Pien (1982) did not compare the children of these two groups of mothers on language scores, their implications are
that mothers who elicit conversation may aid their children’s development while the controlling mothers may negatively influence it. Their findings and implications are compatible with social interactionist approaches to language acquisition with a similar emphasis on responsive conversational interaction for language acquisition (e.g., Bruner, 1977, 1983; Ellis & Wells, 1980; Evans, 1977).

The Bristol studies have also helped to support the claim that the illocutionary force of maternal speech influences language acquisition. Specifically, Evans (1977) and Ellis and Wells (1980) found that children with rapid language growth had parents who were more responsive to them. These parents produced more acknowledgments and asked their children more questions. As McDonald and Pien (1982) note, even studies that have not specifically explored illocutionary force have found support for the importance of maternal illocutionary force. For example, Newport et al. (1977) found evidence of a reinforcement effect and several studies have found maternal questions to be positively correlated with language development (e.g., Furrow et al., 1979).

The importance of parental involvement in conversation with the child, as opposed to an intent to control the child, is a concept that connects many of the illocutionary force features that have been found to be important in language acquisition. Again, a social interactionist position with its emphasis on parental input and on a responsive versus directive environment is highly congruent with the suggested retarding aspects of the twin situation and with studies that have investigated parental interaction with twins.

Combining descriptions of twins’ mothers with nonfacilitative conversation, we might expect that the maternal input given twins will be less responsive and less conversation eliciting than the input singletons receive. This should be evidenced by a lack of conversationally responsive features, such as positive acknowledgments, and a lack of conversation-eliciting features, such as questions on the part of mothers of twins. On the other hand, these mothers should use an abundance of nonconversation-eliciting features and directive features such as command, spontaneous declaratives, and repairs that are characterized by high constraint. Thus the following hypotheses are proposed:

\[(H3) \text{Mothers of singletons will use more illocutionary force features reflective of a conversation-eliciting orientation, and mothers of twins will use more features reflective of a controlling orientation. Specifically,}\]
(H3a) mothers of singletons will ask more questions and offer more positive acknowledgments than mothers of twins.

(H3b) Mothers of twins will use more commands, negative acknowledgments, repairs, and spontaneous declaratives than the mothers of singletons.

Conversational style. The third type of input explored is conversational style (Cross, 1977, 1978). Style refers to features such as the total amount of speech in which a mother engages, the amount directed to the child, and measures of participation such as monologuing and equality of talk ratios. Although studies have found support for the contention that overall amount of maternal speech is related to language acquisition (Bates, Bretherton, Beeghly-Smith, & McNew, 1981; Clarke-Stewart, 1973; Ellis & Wells, 1980), others have questioned whether the sheer amount is as important as the quality of the interactions. There does seem to be support for the notion that providing opportunities for the child to talk may be facilitative. Cross (1977) found that mothers who had children with accelerated language acquisition actually talked less per conversation; that is, the mothers did not monologue but allowed their children to participate equally in the conversation. She hypothesized that the equality of turn taking may have a beneficial effect on language acquisition. If the mother says several utterances in a row before the child is provided a turn, the "processing of the original utterance would be interfered with" (Cross, 1977, p. 171) and the child would not be allowed to practice his or her linguistic capabilities. It is hypothesized that due to the complex nature of triadic interaction in the twin situation (Savic, 1980), twins will not be given as much opportunity to participate in the conversation. Given the available data on conversational style, the following is hypothesized:

(H4) Mothers of twins and singletons will differ on conversational style features in that the interactions of mothers of singletons will reflect more equality of participation.

There is also, of course, interest in the relationship between all three sets of the above features and child language measures. The final hypotheses concern this association:

(H5) Input features reflective of a responsive orientation will be positively correlated with language development scores while input features reflective of a nonresponsive/controlling orientation will be negatively correlated with language development scores.
(H5a) Maternal use of imitations, expansions, extensions, and topic continuations will be positively associated with child language scores.

(H5b) Maternal use of semantically unrelated utterances, stock expressions, and unintelligible remarks will be negatively associated with child language scores.

(H5c) Maternal use of questions and positive acknowledgments will be positively correlated with child language scores.

(H5d) Maternal use of commands and spontaneous declaratives will be negatively associated with child language scores.

(H5e) Inequality of participation by the child in the conversation will be negatively associated with language scores.

METHOD

Subjects

Voluntary participants were 44 mothers, including 22 mothers of twins and 22 mothers of singletons with older siblings. The twins and the younger singletons were between the ages of 24 and 36 months. The participant families formed a middle class, relatively well educated (over one-half of the mothers reported having at least an undergraduate degree), homogeneous sample. All of the families except one were two-parent homes and the mean income was in a middle-class range. During recruitment, potential participants were told the study concerned language development and that they would be given a general assessment of their children’s language abilities and general development in return for their participation in the study. The mothers of twins were recruited through the area Mothers of Twins Club. After expressing interest in the study, potential participants completed a questionnaire and were later selected on the basis of the information contained therein (e.g., appropriate age of children). The mothers of singletons were recruited through area mothers’ morning-out programs. They also completed the questionnaire. The singleton families were chosen in order to create a matched sample for the twins; that is, each younger sibling was matched on the basis of age (within two weeks) and sex with one twin from each set. The ages ranged from 23 months 29 days to 35 months 29 days for the singletons and from 23 months 27 days to 36 months 11 days for the twins. The mean ages were 28 months 15 days for the singletons and 28 months 16 days for the twins (t = .02, ns).

Mothers selected as participants also completed the Minnesota Child Development Inventory (MCDI) prior to arriving at the labora-
tory. The MCDI is an index of caregivers' perceptions of their children's development. Three scales from the MCDI were utilized in this study, general development (reliability .90), expressive language (reliability .88), and language comprehension (reliability .89). Although scores are based upon the mothers' reports, scores have been strongly correlated with behavioral measures in previous studies (Ireton, 1977; Ireton, Thwing, & Currier, 1977).

The child measures were based upon 22 of the twins, one randomly selected from each twin pair, and the 22 singleton two year olds. These 44 children will hence be referred to as the target children. Both the twin and singleton children were equally divided in gender with 11 males and 11 females. Based upon the reports of the mothers, the twins consisted of 11 sets of fraternal and 10 sets of identical twins. One mother reported not knowing whether her twins were identical or fraternal.

Procedure

The situation studied was that of conversational interaction between mothers and their children. Each interaction included a play and a snack situation with a mother and her two children. Exploring twins versus singleton siblings in this manner was undertaken in order to control for the mothers' behavior that is a function of having twins versus simply having two children of different ages. Using siblings instead of single children for a control also allows for a less biased comparison of language skills, since single children are thought to have more advanced language development than those with siblings (Davis, 1937).

Upon arrival at the laboratory, each mother and child group was taken to a play laboratory furnished with a child-size table and chairs and some toys. Next, the mothers were read a standardized set of instructions, informing them that they were to play and talk together as naturally as possible, as they would in their playroom at home, and that their interactions would be videotaped. The video camera was clearly visible to the subjects. After reading the instructions, the experimenter left the room and turned on the video tape recorder. About fifteen minutes later, the experimenter returned with a snack for the children and then left again. Interactions lasted approximately 30 minutes.

Following the video taping session, the mothers were informed that one purpose of the study was to analyze mother-child interactions and that their behavior would be studied. Mothers then signed a permission form.
Data for Analysis

Ten minutes from each videotape was transcribed, five minutes from the play situation (minutes three-seven), and the first five minutes after the snack began. The transcripts were divided into utterances according to Cross's (1977) definition. An utterance is generally defined by intonation and contour and, except in the case of run-on sentences, by the presence of a discernible pause between it and the surrounding utterances in the text. The maternal utterances were then coded for illocutionary force features, discourse features, and conversational style parameters. A research assistant (blind to the experimental conditions) was trained, working from a coding manual with subsequent discussions with the author. After reliability had been achieved, a random 15% of the sample was coded by both coders. Disagreements were resolved in favor of the researcher.

Discourse categories. A discourse category system developed by Cross (1977, 1978) was used with slight modification. The categories were imitations, expansions, extensions, items related to action, topic continuations, semantically unrelated utterances, yes-no answers, synergistic sequences, maternal self-answers, unintelligible remarks, fragments, and unclassified utterances. Discourse features (with the exception of maternal self-answers, unintelligible remarks and fragments) were coded in terms of whom they were directed toward (or responsive to), that is, the target child, the other child, or both children simultaneously. Total frequency of utterances in each category regardless of direction was also computed. The reliability for the coding of the discourse features was computed by measuring the extent of agreement between the two coders on 15% of the sample. Guetzkow's (1950) p was .79 (p < .01). Although this was by no means ideal, it was considered sufficient.

Illocutionary categories. An illocutionary force category system developed by McDonald and Pien (1982) was used with slight modifications. Although there are other illocutionary force category systems (e.g., Cook-Gumprez, 1973; Dore, 1973; Halliday, 1975), this system was chosen because its rationale is most closely congruent with the one here. This study explores maternal force in two basic areas: conversational responsiveness/eliciting and controlling/directing. Also, this category scheme has demonstrated the stable characteristics of mothers' basic intentions across time (Olsen-Fulero, 1982). The categories were commands (direct and indirect), repairs, questions (including real, test, tag, and reflection, but not including repairs and
indirect commands that may be in question form), positive acknowledgments, negative acknowledgments, prompts, attention devices, spontaneous declaratives, and unclassified utterances. As in the discourse category, each illocutionary force feature was coded in terms of whom it was directed toward (or responsive to), that is, the target child, the other child, or both children simultaneously. Total frequency of utterances in each category regardless of direction was also computed. The overall reliability for the coding of the interactions were computed by measuring the extent of agreement between the researcher and an assistant on 15% of the sample. Guetzkow's (1950) \( p \) for intercoder reliability was .91 \( (p < .01) \). This was also considered to be sufficient reliability.

**Conversational style.** Eight conversational style parameters were coded. These include the number of utterances produced by both the mother and the children, the total number of maternal utterances, the numbers of utterances directed toward the target child individually and toward both children simultaneously, maternal self-utterances, the number of utterances produced by the target child, the number of utterances produced by both children, and the ratio of maternal utterance to the number of utterances produced by both children. Three of these variables were computed as proportions of total maternal talk as well as raw frequencies. They were the proportion of utterances directed toward the target child, the proportion directed toward both children simultaneously, and the proportion of self-talk. The determination of the direction of the mother's utterance was made by two coders working independently, the experimenter and a research assistant who was blind to the hypotheses of the study. Both coded 100% of the sample. The coders relied primarily on nonverbal cues, such as body orientation and eye gaze, in making their determination. Only those utterances that both coders agreed upon as being directed solely toward one child or the other, or to self, were included in those categories. Discrepancies were considered to be directed toward both children. It was reasoned that if the coders could not agree that the utterance was being directed toward one child individually, then there might be some ambiguity in the situation and both children might be being addressed. Discrepancies were always of the kind in which one coder thought an utterance was being directed toward both children and the other coder thought it was being addressed toward one child individually. Guetzkow's (1950) \( p \) was .94 \( (p < .01) \).

**Child measures.** The child measures used in the analysis included three scores for the children based upon the MCDI: a score of general
development, expressive language, and language comprehension. Other child measures consisted of the conversational style indices discussed earlier.

Other data collected and included in the analyses were from the questionnaire concerning family income, education level, early birth of the child, mothers’ work outside the home, and history of the target children’s ear infections.

Statistical Analysis

Several different analyses were undertaken. Briefly, these analyses included t-tests on the differences between the target twins’ and singletons’ language scores and multivariate analyses of variance exploring the differences between the mothers of twins and the mothers of singletons on the illocutionary force and discourse features. The independent variable was the type of mother (of twins or of singletons), and the dependent variables included the proportion of maternal utterances in each discourse and the illocutionary force categories. For all analyses involving proportions, arcsin transformations were used. Power for a large effect size was .98, .81 for a moderate effect, and .20 for a small effect (Cohen, 1977). In addition, t-tests on the style parameters were conducted. Finally, a correlational analysis was undertaken to determine associations between the mothers’ speech variables and the children’s language scores.

RESULTS

Twin-Singleton Language Differences
(Hypothesis 1)

Before comparing the children’s language scores or maternal speech characteristics, it was necessary to determine any possible differences in the general family environment or characteristics of the children that might affect language acquisition. Several analyses were undertaken in order to assure that the two samples were comparable and to determine possible influences of sex, twin type, income, education, ear infections, maternal employment outside of the home, and early birth.

The analyses showed the two subject samples to be similar. There were no significant differences between the males and females on any of the child scores: general development ($t = .84$, ns), expressive language ($t = 1.21$, ns), and comprehension ($t = .72$, ns). Comparison of the target twins on the scores yielded no significant differences between the
fraternal and the identical twins: general development ($t = .65$, ns), expressive language ($t = .28$, ns), and comprehension ($t = .22$, ns). The twin sample was treated as a single group for subsequent analysis.

There were no significant differences between the families in terms of income ($t = 1.4$, ns). A chi-squared analysis based on six categories of parental education level yielded no significant differences in the education levels between the two groups of mothers. Mothers: ($\chi^2 = 5.62$, $df = 5$, ns) and fathers: ($\chi^2 = 7.27$, $df = 5$, ns). No significant correlations were found between income or education levels of mother and father and the child scores of general development, comprehension, and expression. A chi-squared analysis comparing the number of mothers of twins and mothers of singletons who worked full time outside of the home, part time, or did not work outside of the home, found no significant difference between the groups ($\chi^2 = 1.07$, $df = 3$, ns). A chi-squared analysis found that history of ear infections was unrelated to twinship ($\chi^2 = 0.00$, $df = 1$, ns). Nineteen of the singletons and twenty-five of the twins were classified as having a history of ear infections. In addition, computation of eta-squared showed that history of ear infection was not related to either language score (eta$^2 = .05$ for expressive language, eta$^2 = .02$ for language comprehension).

According to Koch (1966), about 52%-58% of twin births are premature while only 6% to 7% of singleton births are premature. All the mothers in this study were asked to indicate how many, if any, weeks before a full-term due date their child (children) was born. Fourteen sets of twins were reported to be born before their full-term due date and the range of early birth was two to ten weeks before due date. Only two of the singletons were reported to be born early, one, two weeks before due date, and one, three weeks before due date. On the average, the twins were reported to be 2.6 weeks early and the singletons 0.2 weeks early ($t = 4.05$, $p < .001$). (Two weeks before due date would not be considered premature). Thus, though not large, this difference was significant. This variable of early birth was then correlated with the child language scores for the twin subjects. Early birth was not associated with general development, expressive language, or language comprehension.

The twins and the singletons were compared on their general development, language comprehension, and expressive language ability through the use of the MCDI. The MCDI was scored to give each child a general development score, a language comprehension score, and an expressive language score in terms of the number of months the child was ahead or behind the norms for the MCDI. The twins and singletons
were then compared on these three measures. There was no reason to suspect differences in the general development scores and no significant difference between the twins and singletons were found. Means on general development were 2.0 months above the norm for the singletons and 0.05 months above norm for the twins ($t = 1.78, p < .08$, two-tailed). For comprehension and expression, the singletons scored significantly higher than the twins. For comprehension, the means were 3.1 months ahead of MCDI norms for the singletons and 0.59 months ahead for the twins ($t = 2.46, p < .02$, one-tailed). For expression, the means were 3.1 months ahead of the MCDI norms for singletons and 0.64 months behind for twins ($t = 2.46, p < .01$, one-tailed).

Thus the first hypothesis was supported; the twins seem to be operating on language comprehension and language expression levels a few months behind the singletons. This difference does not seem to be attributable to differences in general development. It must be noted, however, that even though the twins showed lower levels of expressive and comprehensive language skills than the singletons, the twins, as a group, still did not score below the norms published for the MCDI and would not be considered linguistically retarded.

Discourse Features (Hypothesis 2)

**Discourse features and the target child.** The multivariate analysis of variance yielded a significant main effect ($F[14,29] = 5.98, p < .00003$, Wilk’s value = .26). Univariate analyses showed that the mothers of singletons produced more imitations ($F[1,42] = 8.5$, $p < .005$), expansions ($F[1,42] = 3.83, p < .05$), extensions ($F[1,42] = 25.58, p < .00001$), items related to actions ($F[1,42] = 26.67, p < .00001$), and maternal self-repetitions ($F[1,42] = 14.96, p < .001$) than did the mothers of twins. Mothers of singletons also produced more topic continuations, but this difference just failed to reach significance ($F[1,42] = 2.72, 10 p < .10$).

Means and standard deviations are reported in Table 1.

**Discourse features and both children.** The multivariate main effect for this category was significant ($F[14,29] = 6.57, p < .00001$, Wilk’s value = .24). The univariate analyses showed that the mothers of twins produced significantly more imitations ($F[1,42] = 4.50, p < .05$), extensions ($F[1,42] = 4.04, p < .05$), utterances related to actions ($F[1,42] = 13.00, p < .008$), topic continuations ($F[1,42] = 5.88, p < .01$), semantically unrelated utterances ($F[1,42] = 32.23, p < .00001$), maternal self-repetitions ($F[1,42] = 7.83, p < .007$), yes/no answers ($F[1,42] = 12.46, p < .001$), and stock expressions ($F[1,42] = 20.77, p <$
Means and Standard Deviations for Percentage of Total Maternal Utterances in Each Discourse Category as Directed Toward the Target Child

<table>
<thead>
<tr>
<th>Group</th>
<th>Singleton</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imitations***</td>
<td>3.67</td>
<td>2.46</td>
</tr>
<tr>
<td>Expansions**</td>
<td>4.89</td>
<td>2.86</td>
</tr>
<tr>
<td>Extensions***</td>
<td>13.02</td>
<td>5.89</td>
</tr>
<tr>
<td>Related to Action***</td>
<td>10.34</td>
<td>4.83</td>
</tr>
<tr>
<td>Topic Continuations*</td>
<td>3.45</td>
<td>3.14</td>
</tr>
<tr>
<td>Semantically Unrelated</td>
<td>9.64</td>
<td>3.98</td>
</tr>
<tr>
<td>Maternal Self-Repetition***</td>
<td>6.61</td>
<td>4.24</td>
</tr>
<tr>
<td>Yes-No Answers</td>
<td>2.51</td>
<td>2.04</td>
</tr>
<tr>
<td>Synergistic Sequences</td>
<td>2.08</td>
<td>2.82</td>
</tr>
<tr>
<td>Stock Expressions</td>
<td>0.36</td>
<td>0.28</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.
*p < .10; **p < .05; ***p < .01.

.00004) addressed to both children simultaneously than did the mothers of singletons. Mothers of twins also produced more expansions directed toward both children simultaneously than did mothers of singletons, but this difference failed to be significant (F[1,42] = 2.88, p < .09). Means and standard deviations are reported in Table 2.

Discourse features and the total environment. The total numbers of maternal utterances in each discourse feature category, regardless of direction, were also subjected to multivariate analysis of variance. The multivariate main effect was significant (F[14,29] = 12.59, p < .0001, Wilk's value = .14). Univariate analysis showed that the mothers of singletons produced significantly more expansions (F[1,42] = 47.03, p < .00001), utterances related to actions (F[1,42] = 56.95, p < .00001), and stock expressions (F[1,42] = 11.22, p < .001) than the mothers of singletons. Mothers of twins produced a greater number of maternal self-answers, but this difference failed to be significant (F[1,42] = 3.75, p < .06). Means and standard deviations are reported in Table 3.

Summary. Hypotheses 2a and 2b were generally supported. When examining the discourse features directed toward the target child, mothers of singletons did use more imitations, expansions, extensions, and items related to action as hypothesized. The differences in use of topic continuations and synergistic sequences failed to reach significance although the differences were in the expected direction. Failure to
TABLE 2
Means and Standard Deviations for Percentage of Total Maternal Utterances in Each Discourse Category as Directed Toward Both Children

<table>
<thead>
<tr>
<th>Variable</th>
<th>Singleton</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Imitations**</td>
<td>0.04</td>
<td>0.19</td>
</tr>
<tr>
<td>Expansions*</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Extensions**</td>
<td>0.22</td>
<td>0.55</td>
</tr>
<tr>
<td>Related to Action***</td>
<td>0.45</td>
<td>0.58</td>
</tr>
<tr>
<td>Topic Continuations***</td>
<td>0.09</td>
<td>0.29</td>
</tr>
<tr>
<td>Semantically Unrelated***</td>
<td>4.57</td>
<td>2.80</td>
</tr>
<tr>
<td>Maternal Self-Repetition***</td>
<td>0.92</td>
<td>1.62</td>
</tr>
<tr>
<td>Yes-No Answers***</td>
<td>0.10</td>
<td>0.33</td>
</tr>
<tr>
<td>Synergistic Sequences</td>
<td>0.03</td>
<td>0.13</td>
</tr>
<tr>
<td>Stock Expressions***</td>
<td>0.26</td>
<td>0.53</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.
*p < .10; **p < .05; ***p < .01.

reach significance could be due to the low power for a small effect. When the discourse features available to the child in the total environment are examined the pattern for use of extensions, items related to actions, and topic continuations, remains the same. In regard to hypothesis 2b, unintelligible remarks were only computed in the total environment category and the mothers of twins did use more of these features as hypothesized. The hypothesized difference in the use of stock expressions and semantically unrelated remarks was not supported in remarks directed toward the target child. However, support for this hypothesis is found in the total environment. This difference can be explained by examining Table 2. Many of the remarks by mothers of twins in this category are offered to both children simultaneously, thereby reducing the number of remarks directed toward the target child. Therefore, maternal use of semantically unrelated features appears to be greater in mother-twin interaction than in mother-singleton interaction. No hypotheses were offered concerning maternal repetitions, yes-no answers, maternal self-answers or fragments.

Illocutionary Force Features (Hypothesis 3)

Illocutionary features and the target child. The multivariate main effect for illocutionary force features directed to or responsive to the
TABLE 3
Means and Standard Deviations of Percentage of Total Maternal Utterances in Each Discourse Category in the Total Environment

<table>
<thead>
<tr>
<th>Groupa</th>
<th>Singleton</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Imitations</td>
<td>5.02</td>
<td>3.37</td>
</tr>
<tr>
<td>Expansions</td>
<td>7.81</td>
<td>4.14</td>
</tr>
<tr>
<td>Extensions***</td>
<td>25.73</td>
<td>7.85</td>
</tr>
<tr>
<td>Related to Action***</td>
<td>15.00</td>
<td>5.80</td>
</tr>
<tr>
<td>Topic Continuations***</td>
<td>7.88</td>
<td>3.38</td>
</tr>
<tr>
<td>Semantically Unrelated***</td>
<td>18.62</td>
<td>6.36</td>
</tr>
<tr>
<td>Maternal Self-Repetitions</td>
<td>9.23</td>
<td>4.61</td>
</tr>
<tr>
<td>Yes-No Answers</td>
<td>4.56</td>
<td>2.57</td>
</tr>
<tr>
<td>Synergistic Sequences</td>
<td>3.36</td>
<td>3.65</td>
</tr>
<tr>
<td>Stock Expressions***</td>
<td>0.09</td>
<td>0.81</td>
</tr>
<tr>
<td>Maternal Self-Answers*</td>
<td>0.66</td>
<td>1.45</td>
</tr>
<tr>
<td>Unintelligible***</td>
<td>0.54</td>
<td>0.53</td>
</tr>
<tr>
<td>Fragments</td>
<td>0.60</td>
<td>0.80</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.
*p < .10; **p < .05; ***p < .01.

target child was significant ($F[9,34] = 11.05, p < .00001$, Wilk's value = .25). The univariate F-tests yielded several significant differences between the twins' and singletons' mothers. The mothers of singletons produced significantly more questions ($F[1,42] = 47.67, p < .0001$), positive acknowledgments ($F[1,42] = 9.25, p < .004$), attention devices ($F[1,42] = 4.44, p < .04$), and spontaneous declaratives ($F[1,42] = 14.61, p < .0004$). Means and standard deviations for these categories are reported in Table 4.

Illocutionary features and both children. There was a significant multivariate effect for the illocutionary force features that were directed toward both children simultaneously ($F[9,34] = 11.28, p < .00001$, Wilk's value = .25). The univariate analysis showed that mothers of twins produced significantly more commands ($F[1,42] = 18.28, p < .00009$), questions ($F[1,42] = 32.04, p < .00001$), positive acknowledgments ($F[1,42] = 7.75, p < .009$), attention devices ($F[1,42] = 7.04, p < .01$), and spontaneous declaratives ($F[1,42] = 25.56, p < .00001$) that were directed toward both children simultaneously than did the mothers of singletons. There was a greater use of negative acknowledgments and prompts by the mothers of twins and a greater use of repairs by the mothers of singletons, but these differences failed to reach significance
Means and standard deviations for this analysis are reported in Table 5.

Illocutionary features and the total environment. The final measures concerning the total number of illocutionary force features spoken by the mother, regardless of whom the utterance was directed toward or was in response to. Thus the measure examines the overall linguistic environment. The multivariate effect for illocutionary force features in the total environment was significant ($F[9,34] = 5.66, p < .00009$). Univariate analysis showed the mothers of twins to produce significantly more commands ($F[1,42] = 12.93, p < .0008$), more repairs ($F[1,42] = 4.96, p < .03$), and more unclassified remarks ($F[1,42] = 15.57, p < .0003$). Mothers of twins also produced more spontaneous declaratives than mothers of singletons, but this difference failed to reach significance ($F[1,42] = 3.30, p < .07$). Mothers of singletons produced significantly more questions in the total environment ($F[1,42] = 36.01, p < .00001$). Means and standard deviations for this analysis are reported in Table 6.

Summary. Clearly the mothers of singletons asked more questions and offered more positive acknowledgments than mothers of twins, thus supporting hypothesis 3a. It was hypothesized that mothers of twins would use more commands, negative acknowledgments. This was not supported. The difference in the use of spontaneous declaratives was supported. Although there was no significant difference in the use of repairs directed toward the target child (the means were in the
TABLE 5  
Means and Standard Deviations of Percentage of Total Maternal Utterances in Each Illocutionary Category as Directed Toward Both Children

<table>
<thead>
<tr>
<th>Group</th>
<th>Variable</th>
<th>Singleton Mean</th>
<th>Singleton SD</th>
<th>Twin Mean</th>
<th>Twin SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commands***</td>
<td>0.88</td>
<td>2.23</td>
<td>4.90</td>
<td>3.74</td>
</tr>
<tr>
<td></td>
<td>Repairs*</td>
<td>0.26</td>
<td>0.68</td>
<td>0.13</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Questions***</td>
<td>1.50</td>
<td>1.60</td>
<td>5.95</td>
<td>3.30</td>
</tr>
<tr>
<td></td>
<td>Positive Acknowledgments***</td>
<td>0.12</td>
<td>0.34</td>
<td>1.38</td>
<td>2.09</td>
</tr>
<tr>
<td></td>
<td>Negative Acknowledgments*</td>
<td>0.08</td>
<td>0.21</td>
<td>0.33</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Prompts*</td>
<td>0.14</td>
<td>0.31</td>
<td>0.38</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Attention Devices***</td>
<td>0.63</td>
<td>1.10</td>
<td>2.63</td>
<td>3.34</td>
</tr>
<tr>
<td></td>
<td>Spontaneous Declaratives***</td>
<td>4.18</td>
<td>2.92</td>
<td>15.33</td>
<td>9.93</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.  
*p < .10; **p < .05; ***p < .01.

expected direction), the difference was significant in the total environment. The same is true for commands.

Style Parameters (Hypothesis 4)

The two groups were compared on the style measures with t-tests, using both raw frequencies and, when applicable, proportions. For the three variables tested on both raw frequencies and proportions, the t-tests on the raw frequencies and the proportions yielded the same results. Therefore, only the t-values on the proportions are reported below.

No specific hypotheses were offered concerning the frequency of utterances; however, some differences were found. The numbers of total maternal utterances were not significantly different for the two groups (t = 1.54, ns, two-tailed). However, the mothers of singletons did produce significantly more utterances directed toward the target children than did the mothers of twins (t = 4.43, p < .001 two-tailed). Also, the mothers of twins used more utterances that were directed toward both children simultaneously (t = 5.72, p < .001, two-tailed) and talked to themselves more than the mothers of singletons did (t = 2.21, p < .03, two-tailed).

The next two variables concern how much the children talked in the ten-minute period. The target children did not differ significantly in the
TABLE 6
Means and Standard Deviations of Percentage of Total Maternal Utterances in Each Illocutionary Category in the Total Environment

<table>
<thead>
<tr>
<th>Group</th>
<th>Singleton</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Commands***</td>
<td>11.79</td>
<td>.07</td>
</tr>
<tr>
<td>Repairs**</td>
<td>.48</td>
<td>1.08</td>
</tr>
<tr>
<td>Questions***</td>
<td>38.74</td>
<td>12.53</td>
</tr>
<tr>
<td>Positive Acknowledgments</td>
<td>19.29</td>
<td>7.90</td>
</tr>
<tr>
<td>Negative Acknowledgments</td>
<td>6.13</td>
<td>3.46</td>
</tr>
<tr>
<td>Prompts</td>
<td>1.17</td>
<td>1.11</td>
</tr>
<tr>
<td>Attention Devices</td>
<td>3.80</td>
<td>2.59</td>
</tr>
<tr>
<td>Spontaneous Declaratives*</td>
<td>18.91</td>
<td>7.53</td>
</tr>
<tr>
<td>Unclassified***</td>
<td>1.18</td>
<td>1.06</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.
* p < .10; ** p < .05; *** p < .01.

number of utterances they produced (t = .93, ns), but the singleton-sibling pair did produce more utterances than did the twin pair (t = 2.25, p < .03, two-tailed). This suggests that the older child in the singleton pair contributed to this greater amount of talk.

The last two variables concern the equality of participation by the mother and the children and addressed the fourth hypothesis. The ratio of maternal utterances to target child utterances was approximately 3 to 1 in the singleton environment and 4.5 to 1 in the twin environment (t = 1.99, p < .03, one-tailed). The ratio of the number of maternal utterances to the number of utterances produced by both children was about 1.5 to 1 in the singleton environment and 2.3 to 1 in the twin environment (t = 3.07, p < .003, one-tailed). Thus, by either measure, the twins appeared to participate less in the conversations than the singletons, supporting hypothesis 4. The means and standard deviations for each of these eight amount parameters are reported in Table 7.

Correlations Between Maternal Speech Variables and Child Language Scores (Hypothesis 5)

To determine the associations between the mothers' conversational behaviors and the children's language scores, Pearson product moment correlations were computed. Three sets of correlations with the
children's language scores were computed, including correlations of the child language variables with the mothers' discourse features, illocutionary force features, and style parameters.

Pearson product moment correlations were computed for each of the three categories of discourse features (those directed toward the target child, those directed toward both children, and the total) with both of the children's language scores. Table 8 reports the direction and significance of correlations between the discourse and the children's language scores. As shown in Table 8, the overall pattern supports hypotheses 5a and 5b.

Pearson product moment correlations of each of the three categories of illocutionary force features, (those directed toward the target child, those directed to both children, and the total) were computed with both of the children's language scores. Table 9 reports the correlations between the illocutionary force features and the children's language scores. As can be seen from Table 9, the overall pattern supports hypotheses 5c and 5d.

Pearson product moment correlations between the style parameters and the children's language scores were computed. The only significant

**TABLE 7**  
**Style Parameters**

<table>
<thead>
<tr>
<th>Group</th>
<th>Singleton</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Total Number of Maternal Utterances</td>
<td>142.73</td>
<td>40.10</td>
</tr>
<tr>
<td>Proportion of Maternal Utterances to Target Child***</td>
<td>.60</td>
<td>.19</td>
</tr>
<tr>
<td>Proportion of Maternal Self-Utterances**</td>
<td>.02</td>
<td>.04</td>
</tr>
<tr>
<td>Proportion of Maternal Utterances Directed Toward Both Children***</td>
<td>.14</td>
<td>.09</td>
</tr>
<tr>
<td>Total Number of Utterances by Target Child</td>
<td>47.14</td>
<td>13.26</td>
</tr>
<tr>
<td>Total Number of Utterances by Both Children**</td>
<td>102.64</td>
<td>22.00</td>
</tr>
<tr>
<td>Ratio of Maternal Talk to Talk by Target Child**</td>
<td>3.37</td>
<td>1.6</td>
</tr>
<tr>
<td>Ratio of Maternal Talk to Talk by Both Children***</td>
<td>1.44</td>
<td>.47</td>
</tr>
</tbody>
</table>

a. n = 22 in each group.  
*p < .10; **p < .05; ***p < .01.
### TABLE 8
Pearson Product Moment Correlations Between Maternal Discourse Features and Child Language Scores

<table>
<thead>
<tr>
<th>Group Variables</th>
<th>To Target Child</th>
<th>To Both Children</th>
<th>Total Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E^b$</td>
<td>$C^c$</td>
<td>$E$</td>
</tr>
<tr>
<td>Imitations</td>
<td>.34***</td>
<td>.35***</td>
<td>.06</td>
</tr>
<tr>
<td>Expansions</td>
<td>.20*</td>
<td>.22*</td>
<td>-.22*</td>
</tr>
<tr>
<td>Extensions</td>
<td>.31**</td>
<td>.21*</td>
<td>-.15</td>
</tr>
<tr>
<td>Action Related</td>
<td>.21*</td>
<td>.06</td>
<td>-.21*</td>
</tr>
<tr>
<td>Topic Continuations</td>
<td>.18</td>
<td>.14*</td>
<td>.04</td>
</tr>
<tr>
<td>Semantically Unrelated</td>
<td>-.16</td>
<td>-.12</td>
<td>-.25**</td>
</tr>
<tr>
<td>Maternal Self-Repetitions</td>
<td>.15</td>
<td>.04</td>
<td>-.14</td>
</tr>
<tr>
<td>Yes-No Answers</td>
<td>.26**</td>
<td>.20*</td>
<td>-.17</td>
</tr>
<tr>
<td>Synergistic Sequences</td>
<td>-.11</td>
<td>-.21*</td>
<td>-.16</td>
</tr>
<tr>
<td>Stock Expressions</td>
<td>-.14</td>
<td>-.26**</td>
<td>-.27**</td>
</tr>
<tr>
<td>Maternal Self-Answers</td>
<td>-.29**</td>
<td>-.30**</td>
<td>-.25**</td>
</tr>
<tr>
<td>unintelligible</td>
<td>-.25**</td>
<td>.13</td>
<td>.04</td>
</tr>
<tr>
<td>Unclassified</td>
<td>.04</td>
<td>.04</td>
<td>.04</td>
</tr>
</tbody>
</table>

---

a. $n = 44$.
b. $E = Expression$.
c. $C = Comprehension$.

*p < .10; **p < .05; ***p < .01.
<table>
<thead>
<tr>
<th>Group Variables</th>
<th>To Target Child</th>
<th>To Both Children</th>
<th>Total Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E^b$</td>
<td>$C^c$</td>
<td>$E$</td>
</tr>
<tr>
<td>Commands</td>
<td>-.21</td>
<td>-.13</td>
<td>-.15**</td>
</tr>
<tr>
<td>Repairs</td>
<td>.14</td>
<td>.24**</td>
<td>-.32**</td>
</tr>
<tr>
<td>Questions</td>
<td>.35**</td>
<td>.24**</td>
<td>-.07</td>
</tr>
<tr>
<td>Positive Acknowledgments</td>
<td>.40***</td>
<td>.28**</td>
<td>.09</td>
</tr>
<tr>
<td>Negative Acknowledgments</td>
<td>.05</td>
<td>-.10</td>
<td>.18*</td>
</tr>
<tr>
<td>Prompts</td>
<td>.26**</td>
<td>.22*</td>
<td>.08</td>
</tr>
<tr>
<td>Attention Devices</td>
<td>.09</td>
<td>.09</td>
<td>-.35***</td>
</tr>
<tr>
<td>Spontaneous Declaratives</td>
<td>.05</td>
<td>.06</td>
<td>-.27**</td>
</tr>
<tr>
<td>Unclassified</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. n = 44.
b. E = Expression.
c. C = Comprehension.
*p < .10; **p < .05; ***p < .01.
relationships were between the proportion of utterances directed toward the target child and the child's expressive language scores. An association approaching significance between the proportion of maternal utterances directed toward both children simultaneously and expression was found. Hypothesis 5e, then, was not supported. Although the trend was in the expected direction, the negative correlations between inequality ratios and child language scores failed to reach significance. Table 10 presents these correlations.

DISCUSSION

Based upon previous research and the results of this study, twins appear to be delayed in language development compared to singletons, but not to the point of developmental retardation.

Given the lower abilities credited twins in previous research, it was reasoned that mothers of twins may not engage in properties that play a facilitative role; thus twins may not acquire language as quickly as singletons. It was hypothesized that if the differences in the twin and singleton language development scores were related to the differences in maternal speech, then certain maternal speech variables would differ between the two groups. Differences were found in the maternal speech of the two groups.

It was hypothesized that the mothers of singletons engage in more conversation-eliciting devices and more responsive behaviors than the mothers of twins, who would be more likely to engage in less responsive behaviors. The results generally support these predictions. In regard to discourse features, the most notable difference concerns semantically related remarks. The mothers of twins produced about half as many semantically related remarks (imitations, expansions, extensions, and topic continuations) as did the mothers of singletons. Extensions, expansions, and imitations provide the child with informative feedback and additional opportunities for learning, are responsive to the child's conversational attempts, and may help account for rapid language acquisition (see Brown, Cazden, & Bellugi, 1968; Cazden, 1965; Cross, 1977; Ellis & Wells; 1980). Relying upon stock expressions and answering one's own questions are indications of a lack of maternal responsiveness and involvement. The mothers of twins produced more of these features in the total environment as well.

The correlational analysis supports these claims. Extensions, expansions, and imitations, both directed toward the child individually and in
the total environment, were positively associated with the children's language scores. Semantically unrelated utterances, stock expressions, self-answers, and unintelligible remarks in the total environment were negatively associated with language measures.

It was also proposed that differences would be found in the use of illocutionary force features between mothers of twins and mothers of singletons. Positive acknowledgments and questions, both directed toward the child and in the total environment, were positively associated with language expression and comprehension. As Ellis and Wells (1980) have pointed out, acknowledgments that express approval may help the child to discover salient relationships in the real world and to feel more confident in attempts to communicate. The twins did not receive as many of these acknowledgments. Questions serve to give the child the opportunity to practice his or her linguistic skills and thus may facilitate language acquisition (Cross, 1977). Given that singleton children were individually asked nearly four times as many questions as the twin children, it appears that the twins are not given this opportunity as often.

As predicted, spontaneous declaratives and commands were negatively associated with both expression and comprehension. Spontaneous declaratives are also thought to have a nonfacilitative effect since they provide no feedback or response, do not actively return the turn to the child, and are not even related to a child's previous utterance
or action. In the total environment, mothers of twins produced significantly more spontaneous declaratives.

Twins received more than twice as many commands in the total environment. Commands appear to reflect a desire to control and do not express an interest in talking with the child (McDonald & Pien, 1982; Olsen-Fulero, 1982). Repairs were also thought to be a nonfacilitative feature due to the high constraint characteristic of repairs (McDonald & Pien, 1982). In the total environment, mothers of twins produced more of these.

It has been hypothesized that the opportunity to participate in conversation may play an important role in language acquisition by allowing children to practice growing linguistic skills (Cross, 1977; Rutter, 1972). In the interactions between the mothers and the children no difference between mothers of twins and mothers of singletons was found in the total number of maternal utterances. However, a comparison of the utterances directed toward the target child showed that the mothers of singletons talked more to each child individually and the twins' mothers talked to themselves more and more to the children as a unit. Also, the twin children engaged less in the conversation. In the correlational analysis the amount of talk directed toward the child individually was positively related to expressive language ability while the total maternal talk was not. In addition, questions in the total environment and questions and expansions directed toward the target child were positively associated with language expression. When examining the questions and expansions directed toward the children simultaneously, we find that this association no longer exists. Questions directed at both children showed a nonsignificant, negative correlation with expressive language ability, and expansions showed a nonsignificant negative association with comprehension. Many other features in the "directed to both" categories showed nonsignificant, negative correlations with language scores as well. This suggests that addressing children as a unit may not facilitate language acquisition to the same degree as being addressed as an individual. This is of concern because even when mothers of twins do engage in conversation-eliciting behaviors they are frequently directed toward the twins simultaneously.

Although some exceptions to the pattern were found (e.g., there was no difference in use of negative acknowledgments, and some variables were found to differ in the total environment, but not in the speech to an individual child and vice versa), the speech of the mothers of twins can generally be characterized as having a relative lack of responsive and
conversation-eliciting features and a relative abundance of nonresponsive features. The implications of this research are clear; it is possible the delayed speech that appears to be characteristic of twins is related to a less conversationally responsive linguistic environment. This statement must be made cautiously however. As in all correlational studies, only association, not cause and effect, can be determined. Also, it is possible that the maternal input differs due to the children's differing linguistic levels, rather than being their cause (Cross, 1981). However, the above implication is congruent with Wells's (1985) investigations that found that children of parents who provide responsive conversational interactions acquire language more rapidly. It is also congruent with and supportive of the social interactionist position discussed earlier.

It is open to question why the mothers of twins engage in this type of interaction. It has been proposed that the conversational environment of the triadic interaction is more complex and therefore more difficult to draw a linguistic system from (Savic, 1980; Stafford, 1984). This same complexity may place constraints upon the mother, making it more difficult to respond to each child individually. The twin interactions appeared to contain more interruptions, simultaneous speech, and generally more breakdowns in the turn-taking structures. This is supported by the fact that mothers of twins used more repairs and unintelligible remarks.

It is possible that a relative lack of maternal conversational involvement is an extension of nonresponsive behavior that the mothers may have engaged in when the twins were infants. One important focus of early mother-infant interaction is responsiveness or sensitivity (Ainsworth & Bell, 1976; Ainsworth, Bell, & Slayton, 1971). It has been argued that responsiveness in the early months lays the foundations for an interactional communication process and may play an influential role in language acquisition (Bryen, 1982; Snow, 1981). This may be where twins are at an initial disadvantage. Maccoby (1980) cites an "extreme case: One mother of premature twins reports that for several weeks the infants became hungry every two hours. It took an hour to feed each child—the round-the-clock demands on the exhausted parents defy imagining" (Maccoby, 1980, p. 86). Such a case, which may interfere with responsiveness due to physical exhaustion, is dismissed as out of the realm of concern of most researchers. However, the extreme case is the normal case for twins. Indeed, Costello (1974) did find mothers of twins to be less responsive than mothers of singletons when their
children were infants. Based upon his survey of mothers of twins, Ainslie (1985) discusses the overwhelming feelings many mothers of twins encounter. He proposes that the "presence of two infants, faced with the same developmental needs and tasks, profoundly alters a child's usual environment" (p. x). It is the manner in which the parents are able to accommodate to this unusual context that determines the extent to which twins are affected by their twinship.

Although this study attempts to examine natural conversational interaction between mothers and children, some limitations must be recognized. First, the interactions took place in a naturalistic play laboratory with an obvious video tape camera present, not in a completely natural setting such as the homes of the families. Nevertheless, the interactions generally seemed to follow predictable mother-child interaction patterns containing the preponderance of questions characteristic of mother-child interactions.

A related limitation is that only ten minutes of interaction from each group was analyzed. There may be some question raised as to how representative any one ten-minute segment is of a mother's conversational style. Although there are sure to be temporal and situational variations, McDonald and Pien (1982) and Olsen-Fullero (1982) have shown that mothers' basic styles of conversing remain relatively constant.

Finally, the language measure was a report completed by the mothers and therefore was dependent upon the awareness of the mothers. More formal and in-depth linguistic testing would have been advantageous. However, given the abundance of previous research supporting twin's lower language development scores, the MCDI was considered only to be a check of this premise for this particular sample.

In spite of these limitations, differences in the language scores of the twins and singletons were obtained and the maternal speech provided by the mothers of twins and singletons was found to differ significantly. There is no reason to suspect that any of the limitations of the study would have affected the two groups differently or in ways that would account for the differences in their behaviors.

Maternal speech is offered as an aspect of the twin situation that has not often been considered in previous work on twins. Typically, what is emphasized is the notion that twins do not need to communicate with others due to their close twin-twin communication. Although such issues were not explored here, there was no evidence of "twin language" in any of the speech samples. Moreover, the twins appeared
to engage in much more twin-to-mother interaction than twin-to-twin interaction. This is not to say that the often proposed close tie between twins does not influence the mother. This closeness between the twins may be what influences the mother to talk less to her children individually and more as a unit.

In order to further understand the influences on the language acquisition of twins, future research should continue to explore the differences in maternal speech input found here. A larger corpus of discourse from each family should be collected in home environments and more standardized linguistic testing of the children should be undertaken at several points in time. In addition, other conversational facets of mother-twin interactions should be investigated. Here interest has been rather one-sided. The focus has been solely on maternal characteristics as they may reflect maternal orientations. Other aspects of the twin situation that focus more directly upon the interactional nature of conversation and that directly explore a conversing versus a controlling orientation should be examined.

NOTES

1. Although the terms delayed and retarded are frequently used to describe the speech of twins, such terms imply much more of a delay than is usually found. Evidence for severely retarded speech comes from a few case studies (e.g., Douglas & Sutton, 1978; Luria & Yudovitch, 1959), but it is also possible to find individual sets of twins with accelerated speech (Maxwell & Stafford, 1985). Careful examination of the measures and scores obtained in investigations claiming to have found twins to be delayed or retarded shows that on most of the language measures twins place in the lowest ranges of normal development (Day, 1932; Mittler, 1970). However, the authors of such studies fail to make this distinction clear. (See Stafford, 1985, for a complete discussion.) In this study, the term delay is used to refer to this typical slower rate of acquisition, not to imply retardation.

2. An alternative to examining the mothers of twins interacting with both children simultaneously would have been to have the mother interact with each twin individually. If this were done, it would be possible to assess whether the mothers' behaviors were characteristic of the mothers or due to the presence of two children. This approach was not chosen because interest here is in the twin situation, which typically means the triadic situation (Savic, 1980). Also, Betton and Koester (1983) found that mothers of twins talked more to each twin and gave more positive feedback to each twin when interacting with each separately than when with both twins together. Thus there is reason to suspect that the characteristics of the twins' mothers are artifacts of the twin situation and not habits of individual mothers.

3. Unitizing reliability was not computed as it is not considered to be an issue in motherese. Definitionally, motherese consists of short, simple utterances. The demarcation of an utterance is clearly discernible; most utterances are single turns. For example,
when mothers address their children the mothers MLU is approximately 4. However, when the same mothers address adults their MLU is approximately 12 (Cross 1978; Snow 1977; Newport et al., 1977; Phillips, 1973).

4. Cross's original system did not contain the categories of related to action or topic continuation. The "related-to-action" category was added after personal communication with C. Cazden (1985) who suggested that an utterance may be semantically unrelated to the verbal discourse but be related to the child's actions or nonverbal activity and thus be a responsive speech feature. The topic continuation category was developed during the piloting of the coding system as a necessary addition for instances when the mother continues to talk about a topic the child introduces. Thus it is semantically related, but the utterance does not meet the requirements for the extensions category.

5. It is generally thought that premature children have caught up in their language skills by the age of around 18 months so that prematurity is no longer adjusted for past that age by most clinicians (M. Maxwell, personal communication, January 1987; L. Nelson, personal communication, 1987). Psychologists generally do not correct for gestational age past 24 months (Marantz, Henig, & Fletcher, 1983). Conway et al. (1980) found no relationship between prematurity, apgar score, or birth weight and language skills of two-year-old twins and Mittler (1970) found no association between prematurity and language skills as measured by low birth rate and found gestational age only to play a significant factor if less than 37 weeks. Only two of the twins sets were under this gestational age, it seems reasonable to conclude that the variable of early birth plays a minor role in this study.

REFERENCES


