Maternal Speech Style with Prelinguistic Twin Infants

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The mother–infant communicative speech of a group of mothers of 4-month-old first-born twin infants was compared to the speech of a group of mothers of first-born singleton infants. Maternal groups were matched on age, education level, mother–infant attachment status and infant gender, and maternal depression was assessed as a control variable. Maternal speech was coded for focus, content, complexity and syntax of mothers’ utterances. The findings of earlier studies with toddler age twins, that maternal speech style was more directive and less infant-focused, were replicated in this prelinguistic period of infancy. Compared to mothers of singletons, mothers of twins used less infant-focused speech, were less responsive to their infants’ cues, and attributed less agency to their infants. Mothers of twins also used fewer questions and requests but did not differ from mothers of singletons in their use of negatives and imperatives. These early differences in the language learning environments of twin and singleton infants may be due to the reduced opportunities that mothers of twins have to establish dyadic communicative routines with their infants and to familiarize themselves with their infants as interactive partners, and may have implications for the early language development of twins. Copyright © 2002 John Wiley & Sons, Ltd.

Key words: maternal speech; twins; motherese; language development

Language development has been found to differ for twins and singletons in a number of areas, including age of first use of language, language complexity, articulation, vocabulary and verbal reasoning (see Tomblin and Buckwalter, 1998; Tremblay-Leveau \textit{et al.}, 1999 for summaries of relevant studies). The verbal performance of twins in these areas has been shown to be delayed compared to that of singletons, although some studies also report that twins catch up by the
time they reach pre-school age (Lytton et al., 1987; Wilson, 1983). Genetic factors and prematurity in twins have not been found to play a direct part in this developmental lag (Record et al., 1970). Rather, the main influence appears to be the language environment of twins, which has been shown to differ in some aspects of maternal speech that may facilitate language development in young children. However, most studies identifying differences in the language environments of twins and singletons have focused on children of at least toddler age (e.g. Lytton et al., 1977; Tomasello et al., 1986), and little is known about the quality of language input to younger twin infants in the preverbal period.

The purpose of this research was to conduct a detailed assessment of mothers’ speech in dyadic interaction with twin infants at 4 months of age to determine whether characteristics that might contribute to developmental language differences could be identified in this early preverbal period. While we acknowledge that a focus on dyadic interactions alone may fail to tap other important contexts for language learning for twins (e.g. triadic interaction, see Tomasello et al., 1989; Trembley-Leveau et al., 1999), it is nonetheless an important context for early language development and one that may differ for twin and singleton infants.

MATERNAL SPEECH STYLE WITH INFANTS AND LANGUAGE DEVELOPMENT

The way mothers speak to young infants is strikingly different from the way they speak to adults. This maternal speech style, which is sometimes referred to as ‘motherese’ or the ‘child-directed speech register’, is simpler (more repetition and shorter utterances), infant-focused (attends to what is meaningful or of interest to the infant), and marked by a higher frequency of questions and fewer declarative utterances (statements or assertions) than speech used between adults (Gleitman et al., 1984; Tomasello et al., 1986). Mothers also tend to engage in routines with their prelinguistic infants where the infant’s non-intentional actions and vocalizations are responded to as if they were attempts to communicate (Holzman, 1977). Mothers impose a conversational pattern on such interactions by enacting the roles of ‘speaker’ and ‘listener’, often filling in gaps in the flow of the ‘conversation’ by taking the infant’s speaking ‘turn’ until the infant is capable of filling this role on his or her own (Snow, 1977). These simplified speech patterns and communicative routines that mothers use with prelinguistic infants, combined with exaggerated maternal intonation and facial gestures, are thought to form the basic scaffolding for language development by facilitating the infant’s learning of the structure and content of language as well as its communicative function (Fernald and Simon, 1984; Papousek and Juergens, 1992; Tomasello et al., 1986).

Specific aspects of ‘motherese’ that facilitate language development in infants have been identified. Mothers who are sensitive and responsive to their infant’s cues in communicative interactions appear to provide an optimal language learning environment for their infants by focusing on the infant’s experience rather than trying to control or direct the course of the interaction (Cazden, 1972; Nelson, 1973; Snow, 1976; Tomasello and Farrar, 1986). Such infant-focused communication with older infants has been shown to facilitate experiences of joint attention where both mother and child simultaneously attend to the same object or activity. This facilitates language learning by enabling the child to reference the mother’s words to the object of their shared attention (Bruner, 1985).
In contrast, less responsive, mother-focused styles of interaction, which are marked by greater use of directive speech and where there is an attempt by the mother to control the direction of the interaction, have been shown to have a negative impact on children’s acquisition of language (Murray et al., 1993; Tomasello and Farrar, 1986). There is some evidence to suggest that mothers of twins are more likely to engage in such mother-focused and controlling communicative interactions with their infants, in part because of the more directive role they may take to ensure communicative success in triadic interactions with their children (Lytton et al., 1977; Tomasello et al., 1986). For example, Tomasello et al. (1986) reported that mothers of twin children of language learning age (15 months and older) used more controlling and directive speech and fewer comments and questions than did mothers of singletons. In addition, they noted that mothers of twins produced fewer utterances and a lower proportion of topic continuations when responding to their children’s utterances than did mothers of singletons. Twins experienced fewer episodes of joint attentional focus with their mothers, compared with singletons, and mothers of twins tended to use more directive speech when referring to objects within these episodes. Whether comparable differences in maternal speech also exist in the preverbal infancy period is yet to be determined.

POTENTIAL CONFOUNDING INFLUENCES ON MATERNAL SPEECH STYLE

An assessment of maternal speech style to twin infants must take account of a range of potential confounding factors, so that any impact of twinship can be isolated from other factors that may influence the quality of maternal speech. Factors such as low socioeconomic status (Hoff-Ginsberg, 1998; Snow, 1976), depression (Breznitz and Sherman, 1987; Murray et al., 1993), and maternal stress (Murray and Trevarthen, 1986), have been shown to detract from optimal maternal speech style and may, thereby, contribute to poorer infant language development. Snow (1976) reported that mothers from lower socioeconomic groups used a more directive and less interrogative speech style than middle class mothers, and Hoff-Ginsberg (1998) summarized several studies that reported that mothers with higher socioeconomic status talked more, demonstrated a higher level of contingent responding, used a richer vocabulary and spanned more conversational topics than mothers from lower socioeconomic groups.

Maternal depression has also been linked to less infant-focused maternal speech (Bettes, 1988; Cohn et al., 1990; Radke-Yarrow et al., 1990; Murray et al., 1993). Mothers of twins are exposed to high levels of stress and fatigue, particularly in the first few months postpartum (Chang, 1990). This may increase their vulnerability to depression or may at least negatively impact on their maternal speech style, due to symptom overlap between chronic tiredness and depression (Armstrong et al., 1998).

Two additional factors, mother–infant attachment quality and child gender, have not been extensively researched in relation to ‘motherese’ speech, but there is evidence to suggest that these factors may be worth considering. Mothers of insecure infants have been described as less able to consider their child’s perspective in interactions (Fonagy and Target, 1997), and it is possible that this may be associated with more difficulty in generating infant-focused speech. Child gender has also been frequently linked to differences in maternal speech
style with infants, but whether these differences have an impact on language learning has not been clearly established. The findings in this area are complex and at times inconsistent. A meta-analysis by Leaper et al. (1998) revealed that mothers are more talkative and more likely to use directive speech with daughters than with sons. However, Leaper et al. (1998) also commented that many studies reveal no gender effects at all upon maternal speech in some contexts.

THE CURRENT RESEARCH

It was hypothesized that differences in maternal speech style in dyadic interaction would be evident in mothers of twins compared to mothers of singletons in the first few months postpartum. The burden of caring for two infants may lead mothers of twins to focus on managing more directed triadic interactions, and they may thus have fewer opportunities than mothers of singletons to practice and become fluent in the ‘motherese’ speech typically observed in dyadic mother–infant exchanges (Robin et al., 1998). They may also be experiencing higher levels of stress and fatigue.

Following the research on ‘motherese’ and the work of Tomasello et al. (1986) with mothers of toddler-aged twins, we predicted that mothers of twin infants compared to mothers of singletons would be less likely to use different aspects of ‘motherese’ and that they would be more controlling in communicative interactions with their infant. Thus, the speech style of mothers of prelinguistic twin infants in dyadic interaction should be more complex (use less repetition), more directive (contain more commands and assertions and fewer questions), less infant-focused, and less responsive to infant cues than that of mothers of singletons. Mothers of twins were also expected to make fewer attempts to take the infant’s conversational ‘speaking turn’ and to impute less intentionality to infant behaviour.

We adapted the categorization system developed by Murray and her colleagues (Murray and Trevarthen, 1986; Murray et al., 1993), which drew on the features that typify the content and structure of the ‘motherese’ speech register, to code maternal speech patterns. Thus, we categorized maternal utterances according to their focus (e.g. infant, mother and other), specific content (e.g. description, response, prompt), complexity (e.g. simple and semantic repetition) and syntactic form (e.g. interrogative, imperative, declarative). We hoped that this detailed analysis of maternal speech would provide some insight into the language environment experienced by twins in the prelinguistic period.

METHOD

Participants

Participants were 21 mothers of twins and a control group of 21 mothers of singletons who were participating in a larger, longitudinal study of the transition to parenthood in families with infants conceived through in vitro fertilization (IVF). Both twin and singleton groups included naturally conceived infants as well as infants conceived through IVF. All infants were the first children to be born to their parents; there were no older siblings.
The groups were matched retrospectively on maternal age, maternal education, child gender, and infant–mother attachment status (secure versus insecure) assessed at infant age 12 months using the Strange Situation procedure (Ainsworth et al., 1978). The mean age of the mothers of twins was 32.14 years (S.D. = 3.29, range = 26–40 years) and of the mothers of singletons was 32.81 years (S.D. = 2.52, range = 28–39 years). The educational level of the mothers varied broadly but was skewed toward higher levels (high school degree or less: twin 14.3%, singleton 19%; professional certificate: twin 28.6%, singleton 38.1%; university degree: twin 57.1%, singleton 42.9%). There were 11 male infants and 10 female infants in each group, and 57% of infants in each group were classified as having secure attachment relationships with their mothers. The proportion of IVF infants was higher for the twin than the singleton group (71% versus 57%, respectively). However, mothers of IVF infants in the larger sample were found not to differ from mothers of naturally conceived infants on a variety of observational measures of parenting and parent–child relationships when infants were 4 months (McMahon et al., 1997) and 12 months of age (Gibson et al., 2000).

**Procedure**

Mothers and their infants were assessed in a laboratory setting when the infants were 4 months of age, adjusted for prematurity. Four twin infants and two singleton infants were born at less than 37 weeks gestation. Mothers first completed the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987), and then participated in the videotaped Still-Face procedure (Tronick et al., 1978) with their infants. Maternal speech from the first 2 min of this procedure was transcribed and analysed for this report. In this initial free play segment, mothers sit directly opposite their infant who is strapped in an infant seat, and the mothers are instructed to play normally with their infant but without using any toys. To eliminate practice effects on the interactions of twin mothers, only the interaction with the first infant (in order of testing) from each set of twins was used.

**Measures**

*Maternal depression:* The EPDS is a 10-item self-report scale validated in British and Australian samples (Boyce et al., 1993). Scores above 12 on this scale indicate mothers who are likely to meet diagnostic criteria for a major depressive disorder.

*Maternal speech:* Maternal speech from the 2 min of mother–infant free play was transcribed and divided into utterances. Grammatically incomplete sentences or phrases were counted as utterances if intonational cues or pauses indicated a completion (Murray and Trevarthen, 1986).

All transcripts were coded by the senior author (S.B.), who was blind to the singleton/twin status of the mothers. Each utterance was coded for its content, complexity and syntactical form according to categories adapted from the coding system of Murray et al. (1993). Reference to the videotapes was made whenever necessary to assist coding decisions. Inter-rater reliability statistics, using Cohen’s kappa, were computed from a minimum of ten transcripts coded independently by the second author (C.M.). A description of the coding categories and corresponding inter-rater reliability statistics follows.

Maternal utterances were initially coded into three focus categories: Infant-Focus, Mother-Focus, and Other-Focus (Cohen’s kappa = 0.82). Each utterance
was then coded into a content/complexity subcategory, a syntax subcategory, and coded for the presence versus absence of negativity. An individual utterance could receive up to six different category codes.

**Infant-Focus**

Infant-Focus indicates an attempt by the mother to describe the infant or to follow the infant’s vocal or non-vocal cues (e.g. ‘You’re a good boy’; ‘You’re looking around the room’). There were six content/complexity subcategories of Infant-Focus utterances defined below. Each Infant-Focus utterance was initially assigned to one of three mutually exclusive subcategories: (1) Description, (2) Responsive, or (3) Conversation (Cohen’s kappa = 0.75). Each utterance was then further categorized as to whether or not it was part of a run of utterances which contained either (4) Simple Repetition or (5) Semantic Repetition (Cohen’s kappa = 0.85) and whether or not it ascribed (6) Agency to the infant (Cohen’s kappa = 0.90). Thus, subcategories (4)–(6) overlap with Infant-Focus subcategories (1)–(3). For example, an Infant-Focus utterance could be a Description which is part of a Repetitive run and which also ascribes Agency to the infant.

1. **Description**: refers to the infant’s appearance and non-interactive behaviour (e.g. ‘You’re a gorgeous girl’; ‘You’re dribbling’).
2. **Responsive**: refers to contingent responses to the infant’s non-vocal behaviour or inferred internal state (e.g. ‘What can you see over there?’; ‘Oh, you’re tired!’).
3. **Conversation**: refers to contingent responses to the infant’s vocal behaviour that indicate an attempt to engage the infant in a turn-taking conversation and/or to respond to the infant’s vocalizations as though they were meaningful (e.g. ‘Agoo to you too!’; ‘Do you really think so?’).
4. **Simple repetition**: refers to two or more consecutive utterances that are identical or nearly so (e.g. ‘Are you a funny one? Yes, you’re a funny one!’).
5. **Semantic repetition**: refers to two or more consecutive utterances that differ in content but refer to the same topic and give added meaning (e.g. ‘What are you looking at? Are you looking at your feet? They’re beautiful feet aren’t they?’).
6. **Agency**: describes the infant as performing an action or as actively perceiving a stimulus (e.g. ‘You are kicking mummy’; ‘You’re looking at mummy’s bracelet’).

**Mother-Focus**

Mother-Focus indicates either an attempt by the mother to elicit or redirect the infant’s attention via a prompt, or a comment about the interaction from the mother’s perspective. Games and songs were also included in this category because they also serve an attention eliciting function. There were five mutually exclusive content subcategories of Mother-Focus utterances defined below (Cohen’s kappa = 0.80)

1. **Prompt**: utterances intended to attract attention, to redirect the infant’s attention, or to elicit particular behaviours from the infant (e.g. ‘Do you wanna do baby aerobics?’; ‘Are you going to look at mummy?’).
2. **Game:** stereotyped games and rituals performed to engage and to entertain the infant, that also include an element of surprise for the infant (e.g. ‘This little piggy, etc.’; ‘Round and round the garden like a teddy bear, etc.’).

3. **Song:** songs, nursery rhymes and rituals that do not include an element of surprise for the infant (e.g. ‘Twinkle twinkle little star’; ‘When you’re happy and you know it clap your hands’).

4. **Description:** refers to the infant from the mother’s perspective, usually in a way that draws attention to a perceived lack of positive engagement (e.g. ‘You are not looking at me’; ‘You’re more interested in the camera than me’).

5. **Self-Reference:** refers to the mother alone (e.g. ‘I’ve forgotten my nursery rhymes, haven’t I?’; ‘Mummy didn’t bring any tissues, did she?’).

**Other-Focus**
Other-Focus refers to persons, places or events/experiences that are removed spatially or temporally from the current interaction (e.g. ‘What does Daddy say to you?’; ‘Where are we going for lunch today?’).

**Syntax**
Each utterance was classified in one of three mutually exclusive syntactic categories. Other utterances that could not be assigned to a syntactic category, because they consisted of strings of noises, laughter, tones, etc., were coded as Contentless (Cohen’s kappa = 0.90).

1. **Interrogative:** to ask a question/make a request (e.g. ‘What can you see over there?’).
2. **Declarative:** to assert/describe (e.g. ‘You’re playing with your shoe’).
3. **Imperative:** to direct (e.g. ‘Grab my finger!’).
4. **Contentless:** (e.g. ‘aaa gooo, brrr’).

**Negative**
Each utterance was classified according to whether or not it conveyed a meaning that was negative about or critical/corrective of the infant (e.g. ‘You’re supposed to play with me, not your feet!’; ‘You’re not going to be cranky are you?’) (Cohen’s kappa = 0.83).

The four Syntax subcategories as well as the Negative subcategory overlap with all other content subcategories. Thus, a single utterance could be categorized as a Mother-Focus Prompt which is also Interrogative and Negative.

Those utterances that could not be fitted to a focus category either because they were inaudible or because their meaning could not be clearly understood (e.g. some expressions of maternal laughter) were excluded from the analysis. All maternal references to the infant seat used in the interaction procedure were also excluded because, due to the momentary position of the mother in some cases, it was not possible to see the infant clearly enough to confirm whether the utterance was a Response or a Prompt. These exclusions made up only 2.1% of the total number of utterances.
RESULTS

The major objective of this paper was to compare mothers of twins with mothers of singletons with respect to the style of speech they use with their infants during free play. In recognition of the possible influence of maternal age, maternal education level, birth order, infant gender and security of attachment on maternal language, groups were matched on these variables. Comparison of mothers of twins and mothers of singletons on the matched variables using t-test or chi square statistics as appropriate yielded no significant differences (p > 0.05).

In order to achieve an acceptable sample size, groups were not initially matched on maternal depression (EPDS) scores. When the groups were compared on mothers’ EPDS scores, there was a trend towards a higher mean score for mothers of twins (twins: $M = 6.86$, S.D. = 4.40; singletons: $M = 4.90$, S.D. = 2.96, $t(40) = 1.69$, $p = 0.10$). This difference was largely due to the presence of three mothers in the twin group whose scores were above the clinical cut-off score of 12. When these mothers and their matched singleton controls were removed from the sample, the trend toward higher depression scores for mothers of twins was not sustained (twins: $M = 5.50$, S.D. = 3.0; singletons: $M = 5.00$, S.D. = 3.2, $t(34) = 0.49$, $p = 0.63$). Consequently, all analyses were conducted excluding the three twin mothers with high EPDS scores and their matched controls, reducing the sample size from 21 to 18 sets of twins and singletons.

Group Comparisons

Groups were compared on the total number of utterances to determine whether analyses should be based on frequency or percentage scores. The groups differed significantly, with mothers of singletons producing more utterances than mothers of twins (singleton: $M = 50.78$, S.D. = 11.10, range=34–74; twin: $M = 42.39$, S.D. = 11.70, range=20–63, $t(34) = 2.21$, $p = 0.03$). Consequently, it was decided to compare groups based on percentage scores using Mann-Whitney $U$ tests, a non-parametric statistic appropriate for the analysis of percentage data. The alpha level for all analyses was set at $p < 0.05$ (see Tables 1 and 2 for mean percentage data).

Focus of utterance

Mothers of singletons had a significantly higher proportion of Infant-Focus utterances than did mothers of twins, $U = 96.50$, $p = 0.04$. The groups did not differ on Mother-Focus or Other-Focus utterances.

Subcategories of Infant-Focus

Mothers of singletons had a significantly higher proportion of utterances ascribing Agency to the infant and also more Responsive utterances than mothers of twins, $U = 78.00$, $p = 0.01$ and $U = 91.50$, $p = 0.03$, respectively. The groups did not differ on Descriptions, Conversations, Simple Repetitions, or Semantic Repetitions.

Subcategories of Mother-Focus

No significant group differences for any of the subcategories of Mother-Focus utterances were found.
Mothers of singletons used significantly more Interrogative utterances than did mothers of twins, $U = 63.00, p = 0.00$, and mothers of twins used more Declarative utterances than mothers of singletons, $U = 96.50, p = 0.04$.

No significant difference was found between the groups on number of utterances that were negative towards or critical of the infant.

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### Table 1. Mean percentage data for mother’s speech across Focus categories with Mann–Whitney statistics for group comparisons and mean frequency data for Total Utterances with $t$ statistic for group comparison

<table>
<thead>
<tr>
<th>Utterance Category</th>
<th>Singleton M% (range)</th>
<th>Singleton S.D.%</th>
<th>Twin M% (range)</th>
<th>Twin S.D.%</th>
<th>$U$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Focus</td>
<td>38.6 (8.7–68.9)</td>
<td>16.7</td>
<td>26.8 (3.1–50.0)</td>
<td>15.8</td>
<td>96.50</td>
<td>0.04</td>
</tr>
<tr>
<td>Description</td>
<td>14.2 (2.3–34.4)</td>
<td>9.3</td>
<td>11.4 (0.0–31.6)</td>
<td>9.2</td>
<td>135.50</td>
<td>0.40</td>
</tr>
<tr>
<td>Responsive</td>
<td>22.9 (2.0–53.3)</td>
<td>13.4</td>
<td>13.3 (0.0–40.4)</td>
<td>11.3</td>
<td>91.50</td>
<td>0.03</td>
</tr>
<tr>
<td>Conversation</td>
<td>1.5 (0.0–16.4)</td>
<td>4.2</td>
<td>1.9 (0.0–15.6)</td>
<td>4.2</td>
<td>146.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Agency$^a$</td>
<td>6.4 (0.0–17.4)</td>
<td>4.7</td>
<td>2.2 (0.0–8.7)</td>
<td>2.5</td>
<td>78.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Simple Repetition$^a$</td>
<td>6.1 (0.0–22.2)</td>
<td>6.7</td>
<td>4.3 (0.0–15.8)</td>
<td>4.2</td>
<td>141.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Semantic Repetition$^a$</td>
<td>3.7 (0.0–33.9)</td>
<td>7.9</td>
<td>2.2 (0.0–7.9)</td>
<td>2.7</td>
<td>161.00</td>
<td>0.97</td>
</tr>
<tr>
<td>Mother Focus</td>
<td>59.5 (31.1–91.3)</td>
<td>17.3</td>
<td>68.7 (48.9–96.9)</td>
<td>15.5</td>
<td>112.00</td>
<td>0.11</td>
</tr>
<tr>
<td>Prompt</td>
<td>52.2 (31.1–80.4)</td>
<td>14.8</td>
<td>56.9 (18.2–96.9)</td>
<td>19.3</td>
<td>132.00</td>
<td>0.34</td>
</tr>
<tr>
<td>Game</td>
<td>3.8 (0.0–22.2)</td>
<td>6.8</td>
<td>2.9 (0.0–26.3)</td>
<td>6.8</td>
<td>157.50</td>
<td>0.86</td>
</tr>
<tr>
<td>Song</td>
<td>1.5 (0.0–9.8)</td>
<td>3.4</td>
<td>5.2 (0.0–28.1)</td>
<td>9.6</td>
<td>145.00</td>
<td>0.48</td>
</tr>
<tr>
<td>Description</td>
<td>1.4 (0.0–10.9)</td>
<td>2.8</td>
<td>2.9 (0.0–23.7)</td>
<td>6.4</td>
<td>161.00</td>
<td>0.97</td>
</tr>
<tr>
<td>Self-reference</td>
<td>0.5 (0.0–4.5)</td>
<td>1.3</td>
<td>0.5 (0.0–4.5)</td>
<td>1.2</td>
<td>161.50</td>
<td>0.98</td>
</tr>
<tr>
<td>Other Focus</td>
<td>1.9 (0.0–20.3)</td>
<td>4.8</td>
<td>4.4 (0.0–36.8)</td>
<td>11.7</td>
<td>145.50</td>
<td>0.47</td>
</tr>
<tr>
<td>Total Utterances</td>
<td>50.8 (34–74)</td>
<td>11.1</td>
<td>42.4 (20–63)</td>
<td>11.7</td>
<td>2.21</td>
<td>0.03</td>
</tr>
</tbody>
</table>

$^a$These three subcategories overlap with the Infant-Focus subcategories of Description, Response and Conversation.

### Syntax

Mothers of singletons used significantly more Interrogative utterances than did mothers of twins, $U = 63.00, p = 0.00$, and mothers of twins used more Declarative utterances than mothers of singletons, $U = 96.50, p = 0.04$.

### Negativity

No significant difference was found between the groups on number of utterances that were negative towards or critical of the infant.
Gender differences
Mann-Whitney U tests were conducted to compare mothers of male and female infants on all language variables. There was a trend for mothers of female infants to use a higher mean percentage of Mother-Focus utterances than mothers of male infants (females: $M = 68.8$, S.D. = 11.8; males: $M = 60.4$, S.D. = 19.4; $U = 106.00$, $p = 0.09$). No significant gender differences were found on any other language measure.

DISCUSSION
The current study found that maternal speech style in dyadic interaction with prelinguistic twin infants differed qualitatively from the type of speech used with singletons along several dimensions that correspond to the differences that have been shown to occur at a later language learning age (Tomasello et al., 1986). The speech of mothers of twins was less infant-focused, less responsive to infant nonvocal cues, and ascribed less agency to the infant than the speech of mothers of singleton infants. Mothers of twins also differed in using less interrogative speech (fewer questions/requests) and more declarative speech (more statements/Assertions). All of the differences between mothers of twins and singletons found in this study were consistent with less use of ‘motherese’ speech by mothers of twins and, therefore, a language learning environment for twin infants which differs from that experienced by singletons in dyadic contexts.

Focus of Maternal Speech
Our prediction that mothers of twins would be less able than mothers of singletons to sustain speech focused on their infants was confirmed; however, not all categories of Infant-Focus speech were equally depressed. Differences were greatest for the categories of utterances that require the mother to interpret the infant’s internal states (e.g. Responsive, Agency), while categories in which the
mother’s speech is responsive to more easily observable cues (e.g. Description, Conversation) occurred with similar frequency across the twin and singleton groups. This finding could be interpreted as indicating a general lack of sensitivity and responsiveness on the part of mothers of twins, although this is not likely given that the twin and singleton groups were matched on mother–infant attachment status. In addition, the groups did not differ in the frequency of Negative utterances critical of the infant or in Mother-Focus speech, which might be expected if twin mother-child relationships were less optimal (Murray and Trevarthen, 1986; Murray et al., 1993).

An alternative and, from our perspective, more likely interpretation is that the speech differences arise because mothers of twins have less opportunity to learn the meanings of their young infant’s more subtle behavioural cues, as they have less time to spend individually with their infants in focused dyadic interactions. Consistent with this interpretation is the lack of group differences in speech when mothers were responding to easily observable physical characteristics of their infants or when they were responding to infant vocal cues.

**Syntactic Differences: Imperatives, Declaratives, and Interrogatives**

One of the most characteristic features of the ‘motherese’ register is a high frequency of Interrogatives (questions and requests) that can function to engage or sustain infant attention and to impose a conversational pattern on the infant’s non-verbal interactive behaviour (Snow, 1977). Interrogatives were used proportionately less among mothers of twins in the current study. This finding may be linked to the lower frequency of agency attributed to their infants by mothers of twins. When mothers ask questions of their infants, they are treating their infant as an active conversational partner even when the actual level of their infant’s responding is minimal. This form of interaction is likely to be nurtured in dyadic interactions where mothers are focused on interpreting their infants more subtle behavioural cues. The caretaking demands of twins may reduce the opportunity for this type of mother–infant exchange and lead to a reduction in this conversational speech pattern.

Contrary to expectation, mothers of twins in our sample did not use more imperative speech (commands and directives) than mothers of singletons as Tomasello et al. found in their study of mothers of toddlers. Nevertheless, mothers of twins in our sample were found to use more declarative forms of speech (assertions, statements) than mothers of singletons. It is possible that because 4-month-old infants exhibit less autonomous behaviour than toddlers, the imperative form of language is much less likely to be called into use to try to control or direct the course of the interaction, and imperatives were, in fact, the least frequently occurring of the syntactic categories in both twin and singleton groups. Declarative statements have been defined by linguists as a form of imperative in that they implicitly command attention (Bates et al., 1975, cited in Murray and Trevarthen, 1986). Thus, the tendency for mothers of twins to use a more declarative style with 4-month-old infants than mothers of singletons may be a precursor to later higher use of imperative forms of expression with twin toddlers.

The overall pattern of syntactic differences lends some support to the prediction that, in comparison to mothers of singletons, mothers of twins use a speech style with their infants that more closely resembles typical adult-to-adult conversational speech. This more adult-focused speech style may be less
facilitative of language development for the infant, because it contains fewer communicative routines that are aimed at teaching the infant about conversational turn taking and the roles of ‘speaker’ and ‘listener’ and which are more focused on talking to the infant rather than speaking for the infant (Snow, 1977).

**Complexity of Maternal Speech**

Although most of our results are consistent with the conclusion that mothers of twins have less opportunity to engage in ‘motherese,’ our results did not indicate that the speech of mothers of singletons was more repetitive (a marker of less complex speech and a prominent feature of ‘motherese’) than that of mothers of twins as we predicted. One explanation for the equivalent performance of the mothers of twins and singletons in this area is that repetitiveness may be one of the easiest aspects of ‘motherese’ to engage in because it does not require familiarity with an established set of play routines or the ability to follow the infant’s attentional focus. This result may also be an artifact of the experimental situation where mothers were required to talk to their infants for a set time period, and all mothers may have used repetitive speech as a fall-back strategy to fill in time.

**Gender Effects on Maternal Speech**

The fact that we found no significant infant gender effect on maternal speech style is consistent with a review of the literature suggesting that gender effects on parents’ verbal interactions with children are less likely to be observed in laboratory versus naturalistic settings (Leaper et al., 1998). It is possible that gender differences may have been more apparent if mother–infant interactions had been observed in the home.

**Overlap with Other Studies of Maternal Speech Style**

There are both similarities and differences between the profiles of speech for mothers of twins in our study and profiles observed in mothers who are under stress or depressed. With respect to our finding that mothers of twins used less infant focused speech, it may be worth considering that in addition to the stresses of caring for two infants, participation in the experimental procedure itself may have been more stressful for mothers of twins. Their focus on the interaction with one twin may have been influenced to a degree by concerns about the wellbeing of the other twin. Murray and Trevarthen (1986) experimentally induced mild disruptions to the interactions of mothers with their 2-month-old infants and found that, as a result, these mothers exhibited a less infant-focused speech style. They also exhibited increases in expression of negative emotion and more imperative and declarative forms of expression.

Less infant-focused speech and more negative utterances were also reported in a study of postnatally depressed mothers (Murray et al., 1993). It should be noted that mothers of twins in our sample did not express greater levels of negative speech than mothers of singletons and, although they did use more declaratives, they did not use more imperatives. Thus the negative aspects of speech most likely to be indicative of problematic relationships were not found in our twin sample.

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While the results of our analysis suggest that mothers of prelinguistic twin infants share a number of speech characteristics with stressed and depressed mothers, their speech style cannot be explained by stress or depression symptoms alone. Rather, we argue that it is likely to stem from a lack of time to practise and become fluent in ‘motherese’, and to become familiar with their infant’s interactive behaviour in a dyadic context, possibly as a result of the mothers’ attention being constantly divided between two infants. This suggests a context in which 4-month-old twin infants would have fewer opportunities than singletons for engaging in joint dyadic interaction with their mothers, who may be either less skilled or less focused on initiating and maintaining such interaction. These features may contribute to the differences in language development observed between twin and singleton children in the early years.

A methodological strength of this study is that mothers of twins and singletons were matched on potentially confounding variables such as socioeconomic status, maternal age, mother–infant attachment status, infant birth order and gender. In addition, the mothers in both groups were well-resourced, that is, they were older and the majority had high education levels, both of which are strong markers for optimal mother–infant interaction styles. These factors allow us to argue strongly that our finding of differences in maternal speech style in dyadic interaction among mothers of twin infants is likely to be robust, and attributable to the complex demands of caring for twin infants rather than other factors known to stress mother–infant relationships. Indeed, it is possible that even stronger differences would be observed in naturalistic rather than laboratory settings. Under naturalistic conditions in the home, for example, it is quite conceivable that the demands of caring for and interacting with two infants may have had more impact on the interaction style for mothers of twins than was the case in a laboratory where their attention was focused on only one infant at a time and for a relatively brief period of 2 min. It would be interesting for a future study to attempt to replicate our results both with a range of socioeconomic groups and under naturalistic observation conditions over a longer time period and also to include some measures of concurrent triadic interactions. Future research could also incorporate an analysis of the prosodic and intonational features of maternal utterances as well as the mother’s use of facial gestures, all of which have been shown to enrich maternal communication with infants (Fernald and Simon, 1984; Papousek and Papousek, 1991; Papousek and Juergens, 1992; Mumme and Fernald, 1996). Another area that was not considered in this current study but would be worth investigating in future research would be the effect of infant temperament on maternal communication, as research has clearly shown that infants’ responses can strongly influence the quality of maternal speech (Fernald and Simon, 1984; Murray and Trevarthen, 1986). It is possible that twin infants themselves elicit less attention from their mothers than do singleton infants, affecting both the quality and quantity of maternal speech. Finally, while in our study there were not many premature infants, future studies of twin language development may need to explore the relative influence of chronological age compared with developmental age of the infant on the interaction style of the mothers.

In summary, this study has identified significant differences between mothers of prelinguistic twins and mothers of singletons in the style of their dyadic communicative interactions with their infants. It is not clear what impact these early maternal speech differences may have on the long-term development of twin infants. Recent studies indicate that the inter-relationships among maternal interactional style, joint attention and infant language development are complex,
and that factors that have a strong influence at one developmental stage may not be as relevant at another (Saxon, 1997; Laakso et al., 1999). Twin children appear to catch up to singletons as early as pre-school age, in terms of their linguistic competence. It is also important to consider that twins may develop different language competencies specific to triadic interaction such as turn taking, role switching and attention sharing to a third person (e.g. Trembley-Leveau et al., 1999). Perhaps after the first 2 years of infancy, as the stress and fatigue of caring for two infants diminishes and twins themselves become more verbally interactive, any negative influence of early maternal speech differences may be counteracted.

REFERENCES


