NOTE

Perception of utterance relatedness during the first-word-period*

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ABSTRACT

Interactions between six toddlers (aged 1;0 to 1;6) and adults were examined to ascertain adult perceptions of toddler utterance relatedness and to determine temporal and interactional features that underlie those perceptions. Five raters made judgments regarding relatedness of the child utterances to the previous adult utterances; 251 utterances were examined. Utterances judged by adults as related occurred within 4·25 seconds of the preceding adult utterance nearly 90% of the time. This study also points to the need for using interactional categories that go beyond describing utterance relatedness, and introduces terms (i.e. co-participatory, initiation, narrowed focus) for doing so.

INTRODUCTION

Toddlers vocalize in ways that may or may not be meant for surrounding adult listeners. When their speech does not seem directed to adults or other interactional participants it has been termed private speech (Furrow, 1984) or practice speech (Dore, 1974, 1975). Child language researchers have generally referred to such utterances as noncontingent (beginning with Bloom, Rocissano & Hood, 1976) or unrelated, contrasting them with vocal behaviours which are considered related to adult contributions such as acknowledgements (Coggins & Carpenter, 1981; Coggins, 1987) or otherwise

socially relevant vocalizations (Kuczaj, 1985). A variety of claims concerning language development have been investigated which hinge upon the conceptualization and determination of relatedness. For example, Bloom *et al.* (1976) proposed that the degree of proximal and topical relatedness (expressed in terms of utterance adjacency and contingency) to adult utterances influenced the linguistic form of child utterances, with more grammatically elaborate speech emerging when child utterances were non-adjacent or noncontingent (unrelated) to an adult utterance. Children were thought to be free to use more complex language forms for nonadjacent and noncontingent utterances because they were less cognitively difficult, whereas contingent speech (i.e. utterances that maintained the topic or added new information related to the current topic) was theorized as the most difficult for children. Despite the importance of determining relatedness when examining infant/toddler interactions the task is difficult, partly because underlying judgments of relatedness is the issue of intentionality.

Although communicative intention coding systems have not explicitly addressed how children's utterances relate to previous adult utterances (Dore, 1974; Marcos, 1987; Oller & Eilers, 1989; Ninio, Snow, Pan & Rollins, 1994; Snow, Pan, Imbens-Bailey & Herman, 1996) many of these studies did implicate discourse descriptions within their systems. For example, Snow *et al.*'s (1996) interchange categories were primarily discourse oriented and Oller & Eilers (1989) distinguished expressive and communicative types of speech by whether an utterance was directed toward a listener or not. All of these studies relied on adult perceptions of the intentionality of toddler utterances. Most recently, however, intentionality in children's non-verbal behaviour has been grounded in analyses that rest firmly on the production and recognition of action in naturally occurring interactions (Jones, 2000; Jones & Zimmerman, 2002). Rather than imputing intentionality, detailed examination of selected episodes in which children aged 1;0 to 2;6 initiated pointing revealed how adults TREAT children's actions as intentional in social space, whatever the cognitive disposition of the child might have been.

Thus, in studying the linguistic characteristics of normally developing infants and toddlers as they become mature speakers, we walk a fine line between ascertaining features of socially relevant production while resisting the impulse to overly interpret intentionality. However, adults do make assumptions about toddlers' early linguistic meaning (Bates, Camaioni & Volterra, 1975; Papaeliou, Minadakis & Cavouras, 2002); therefore, adult judgments play an important role in language development and in co-creating the form–meaning links that are crucial in early linguistic development (Bacri, 1984; Flax, Lahey, Harris & Boothroyd, 1991; Warren & Yoder, 1998). Given the role of adult interpretations of early speech-like utterances as related to adult contributions, it is important to understand

both child productions and adult perceptions of these early vocalizations, as well as the integrated examination of their interaction in social space.

To better understand the differences between vocalizations directed to or not directed to communication partners, we need a tool that provides an initial foothold on the wide variety of potentially intentional infant vocalizations. The current study offers a two-fold methodology which relies on the convergence of adult perceptions of relatedness and then uses that convergence point to answer two key questions: (1) Does temporality (i.e. pause time) distinguish adult perceptions of the relatedness of toddler utterances produced during the first-word-period?; (2) If temporality does distinguish related and unrelated utterances, does it do so consistently for individuals and age groups? We further explore whether pause time is a valid indicator of relatedness by examining child vocalizations and utterances within their full interactional context. For this, we use a conversation analytic framework (Sacks, Schegloff & Jefferson, 1974) and related research concerning gaze and other non-vocal activity in establishing frameworks of engagement (Goffman, 1981; Goodwin & Goodwin, 1987; Kendon, 1990).

METHOD

Participants

Six toddlers and their mothers were selected from the participants in a larger study conducted at the Children's Prosody Lab associated with a large university. Subjects were recruited through local advertisement to parents receiving an infant/toddler newsletter, as well as the local paper. In this study, all children met the following criteria: (1) no concerns about physical, emotional or social development; (2) normal hearing (ascertained during a Visual Reinforcement Audiometry [VRA] procedure after play sessions), and (3) they were being raised in monolingual English (General American Dialect) environments (Snow, 2002). The six participants in the current study were chosen from the larger group based on these additional criteria: (1) the children were ages 1;0, 1;3, or 1;6 (an age range that corresponds roughly to the first-word-period; see Stoel-Gammon, 1989); and (2) the children used between 1 and 25 different words during a 30-minute play session (this measure is considered to be another indicator of the first-word developmental period; see Vihman, 1996). Table 1 shows each child's age, gender, total number of utterances during laboratory sessions, and lexicon size.

Materials

A variety of age appropriate toys and household objects were provided for the children to play with during their sessions. Each child had the opportunity to play with balls, blocks, and a bucket; kitty and duck hand puppets;

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TABLE I. *Description of participants*

Child	Gender	Age	[a]Number of utterances	[b]Lexicon size
AB	F	1;0	218	7
AX	M	1;0	161	8
AN	F	1;3	108	2
ZW	M	1;3	108	6
SG	F	1;6	155	23
DR	M	1;6	127	22

[a] The number of utterances produced during the lab session. [b] Lexicon size is the number of different words in a 30–35 minute session (Stoel-Gammon, 1989; Vihman, 1996; Snow, 2002).

a mobile with keys and Winnie the Pooh characters; a baby doll and items for dressing and feeding (e.g. socks, hat, apple, banana, cookie, bottle, cup, plate, spoon); bubbles; and a wind-up bunny in a clear plastic container. Additional toys were also available for the mother and baby to play with (e.g. airplane, book, lion, bear, baby bed, blankets, and a telephone). Toys were selected from this set based on the parent's report of words the child produced (MacArthur Communicative Developmental Inventory; Fenson, Dale, Reznick, Thal, Bates, Hartung, Pethick & Reilly, 1993).

Recording child–adult interaction

The infants/toddlers participated in 30- to 40-minute play sessions with their mothers and an experimenter in the Children's Prosody Lab. The play sessions were not unlike play interactions that adults and children might have at home; children were free to crawl or toddle in the space, choose toys, and so on. However, two configurations for the play were orchestrated. In context one, the child and his or her mother played together for approximately 10 minutes. In context two, an experimenter joined the mother and her child for the remainder of the session.

Each play session was audio- and video-recorded. The mothers and the toddlers each wore a TELEX FMR-70 wireless microphone. The transmitter for the child's channel was secured in the pocket of a vest that the child wore during the recording session. The microphone was clipped to the front of the vest. Audio recordings were made on a Marantz PMD43 stereo cassette recorder. Audio for the child was also linked to the video recording, which was done on a Sony Digital 8 DCR-TRV 103 digital handycam.

Delimiting utterance units

Adult speech was transcribed orthographically and toddler speech was phonetically transcribed. The children's speech-like utterances were defined

as vocalizations separated by a one-second silence (Branigan, 1979). For example, the vocalization /bɑ/ (1·2) /gɑ/ would be two distinct utterances, /bɑ/ and /gɑ/; whereas, the vocalization /bɑ/ (0·2) /gɑ/ would be one utterance, /bɑ gɑ/. Utterance boundaries were also marked by interjections of non-speech-like vocalizations (e.g. laughing, coughing) or utterances made by another person (Stoel-Gammon, 1987, 1989). All speech-like utterances were considered, including those presumed to have meaning and those characterized by babbling.

Holistic rating task

Five adults, including the first author and four graduate students studying speech-language pathology participated as raters for this task. These students were chosen because they had general speech and language training but minimal knowledge regarding communication in infants and toddlers. Raters were given verbal instructions on how to use the playback equipment and how to record information, but were not otherwise trained in what to look for; they were simply told to make their best holistic judgment as to whether the child utterance marked in the transcript was RELATED or UNRELATED to the previous adult utterance. (Pause times were not available in the transcripts.) Although this instruction (relatedness to immediately prior turn at talk) significantly narrowed the scope to immediately adjacent activity, it was decided that this would be the best way to examine the traditional criterion of pause time, and it also suited the level of interaction at which young children typically communicate (i.e. babies tend to be responsive to the immediately preceding utterances and activities, and less likely to retrieve earlier topics). The raters were not limited in the amount of time spent on the task.

Selection of usable utterances

In order to maximize the number of opportunities for agreement, all infant utterances were analysed (total 878; range 108–218 utterances per child). Those utterances with 80% or greater rater agreement were considered to be the BEST EXAMPLES of relatedness (335 utterances). From the best examples, 251 utterances were chosen for the final analysis based on the following criteria: they did not overlap with the previous adult utterance and they followed an adult utterance. Eliminating overlapping utterances was to allow for closest possible acoustic examination of child utterances. (Table 2 presents the number of best examples for each child individually and by age groups.)

Measurement of pause time

Following data collection and judgments, acoustic analysis of utterances was completed. Those utterances considered best examples of related or

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TABLE 2. *Number of utterances rated as best examples of Related (R) or Unrelated (U)*

Child (Age)	R	U	Total	R/Total	U/Total
AB (1;0)	33	1	34	0·97	0·03
AA (1;0)	33	8	41	0·80	0·20
Total (1;0)	66	9	75	0·88	0·12
AN (1;3)	33	4	37	0·89	0·11
ZW (1;3)	31	8	39	0·79	0·21
Total (1;3)	64	12	76	0·84	0·16
SG (1;6)	40	19	59	0·68	0·32
DR (1;6)	32	9	41	0·78	0·22
Total (1;6)	72	28	100	0·72	0·28
Total	202	49	251	0·80	0·20

unrelated utterances were digitized and acoustically analysed using CSpeech (Milenkovic & Read, 1992). Using the sound waveform, the precise end of the previous adult utterance and the precise beginning of the child's utterance was determined. This yielded an accurate temporal measurement of the pause time between the adult and child utterances. Hand measurements were recorded for pauses that were greater than 10 seconds. In these cases, a stopwatch was used to make 3 time measurements that were averaged for the final data report. Inter-rater reliability was completed on 22% of the sample, representing a cross-section of utterances types and contexts. A total of 54 utterances were analysed for temporal reliability. Time measurements were considered to be reliable if they were within 100 msec of each other (1/10 of a second). Inter-rater reliability was 81%.

The temporal cut-off was originally determined by visual assessment of the data distribution of all the temporal measures across evenly divided temporal segments. For instance, the number of utterances in each relational category was calculated for 250 millisecond (msec) temporal categories (i.e. 0–250 msec; 251–500 msec, and so on). The first noticeable gap in the data occurred between 4000 msec (4 seconds) and 4251 msec (4·251 seconds). In other words, there was a visible interval in the distribution of utterances across time. At this split, nearly 90% of the data in the shortest temporal categories were related utterances and nearly 90% of the data in the longest temporal categories were unrelated. Refer to the results section and Figure 1 for further clarification.

Validating relatedness and pause time
Despite the robustness of results supporting a distinct temporal threshold for adult perception of toddlers' utterance relatedness, we were concerned that these judgments be substantiated in a more detailed analysis of the actual

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adult–child interaction. Clearly, judging the relatedness of an early child utterance is likely based on additional factors that may or may not be obvious to our conscious awareness. The holistic rater judgments led to a temporal criterion for sorting data and provided the foundation for a closer look at contexts in which the utterances were embedded. This afforded the opportunity to establish the validity of the temporal cut-off as a possible indicator of relatedness.

From the best example utterances ($n=251$), 60 related utterances (10 from each child) and all unrelated utterances ($n=47$) were further analysed for behavioural characteristics (of both the child and the adult) that might have contributed to the sense of relatedness (or unrelatedness) perceived by our adult judges. One of the first aspects inspected was JOINT ATTENTION. Joint attention has been defined loosely as a sharing of space and experience (Baldwin, 1995), and children are thought to begin to engage in jointly attended activities between 0;9 and 1;0 (Kasari, Sigman, Mundy & Yirmiya, 1990; Mundy & Willoughby, 1998). Blinded to the relatedness judgments, the first author returned to the videotaped interactions and categorized each utterance as having joint attention or having no joint attention. Utterances with joint attention were distinguished by behaviours such as shared eye gaze, gestures, and body postures indicative of shared attention (Kasari *et al.*, 1990; Butterworth, 1991; Corkum & Moore, 1998). The ability to follow another's eye gaze is the most indicative signal for joint attention and is established in the infant/toddler system by 0;10 (Corkum & Moore, 1998).

While joint attention characteristics are important and seem to be strong indicators for adults regarding the relatedness of the child utterances, utterances judged to be unrelated had no discernible pattern of attention. Using the concept of engagement frameworks (*cf.* Goffman, 1981; Kendon, 1990) we were able to narrow the types of joint attention so that we could determine what it was about the activities that led to judgments of unrelatedness of each child's utterance. We discerned 3 types of child engagement with the ongoing activity: CO-PARTICIPATORY, in which child and adult were fully engaged with each other in an activity (e.g. a particular play scenario shared with the adult), NARROWED FOCUS, in which the child engaged in their own activity; and INITIATIONS by the child of a new topic or focus of interaction (as evidenced through lexical production, eye gaze, pointing, or other bodily behaviour).

Below are exemplars for all of the interactional categories (i.e. co-participatory, initiation, and narrowed focus). A brief presentation of one outlier utterance is also provided (see Excerpt 2 below). This utterance was one in which the raters' judgments fell outside the typical temporal boundary for related and unrelated utterances. We utilized IPA transcriptions for the children's utterances and selected transcription notations from

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TABLE 3. *Descriptions of symbols for conversational transcriptions*
(Ochs, Schegloff & Thompson, 1996)

Symbol	Description
°	Talk is softer/quieter than surrounding speech
(0·5)	Pause time (in seconds and tenths of seconds)
<u>cat</u>	Perceived stress or emphasis on underlined portion
(( ))	Contextual description by the transcriber
.?:	Punctuation symbols indicate perceptual impressions of intonation (i.e. falling, rising and sound stretch, respectively)

Ochs, Schegloff & Thompson (1996) for the adult utterances (see Table 3 for the conventions used). Behavioural descriptions and pause times are in parentheses and have been added to the following transcripts for presentation purposes only. They were not included in the transcripts used by the raters.

Co-participation

In Excerpt 1, both of the child's utterances (arrowed below) were judged by the 5 raters to be related to the mother's contributions; both occurred within the 4·25 second threshold. The co-participatory framework or main line of action in this excerpt is BRUSHING HAIR. The child (1;0) is sitting with her body almost perpendicular to the mother's (who is also sitting, cross-legged, on the floor). The child has a toy hairbrush in her hand and is holding it up to her mouth as she gazes toward a shelf with stuffed animals on it. The mother shifts the child's body slightly and as the brush comes away from the child's mouth the mother moves to verbally initiate the brushing hair activity with the phrase 'Can I see you brush your hair?' (line 1). From that point, their vocalizations and the child's nonverbal activity are centered on the hair brushing activity, albeit with varying understanding of whose hair is to be brushed – the child's own hair or the hair of the doll the child is holding.

(1) Brushing Hair (AB-014 and AB-016)
   1 Mom: Can I see you brush your hair?
   2   (1·2) ((AB tapping doll's head with brush))
   3→AB-014: /wʌʒæ/((AB continues tapping))
   4 Mom: Oh: brush the <u>ba</u>by's hair. °Yeah.°
   5 AB-015: /ʒɛ/
   6   ((AB points to doll's head at onset of
   7   utterance in line 5))
   8 Mom: Right.
   9   ((AB draws doll toward her, clutching it with
  10   free hand))
  11 Mom: There. There's her hair.

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12                (0·2) ((AB looking at brush in her hand))
13→AB-016:   /ʒʌ/
14   Mom:     Can you brush it?
15                ((AB moves brush over her own head and then over
16                the doll's))
17   Mom:     Oh: brushing AB's hair.
18                (0·5)
19   Mom:     And the baby's.
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The mother treats the child's vocalization at line 3 as a related utterance and responds by commenting on the ongoing action of the baby (i.e. parallel talk). At line 12, the child stares at the brush and then vocalizes (line 13), prompting the mother to ask 'Can you brush it?' at which point the child draws the brush across her own hair once and then through the doll's a few times. Again, the mother displays a new understanding this time, inferring that the child's intended activity was to brush both her own hair and the doll's hair (lines 17–19). In summary, analysis of the full sequence shows that AB-014 and AB-016 were behaviourally linked to and moved forward the joint activity; they were responded to as relevant contributions by the adult in the interaction and holistically judged to be related by the 5 raters.

It is important to note that not all utterances judged to be related fell within the 4·25 second threshold. In Excerpt 2, the child's (1;3) request for additional winding of a toy comes 9 seconds after the experimenter's observation that the bunny has stopped. Despite the long silence, the child's request for further winding is still the topic of joint attention within the interaction, and in fact is judged to be related by the 5 raters.

(2) Wind-up Bunny (ZW-103)
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    1   Mom:     Can you clap for bunny?
    2                ((child reaches for toy))
    3   Exp:     He stopped.
    4                (9·0) ((child grasps toy and hands it to the
    5                experimenter, it bobbles once in her hand and
    6                stops again))
    7→ZW-103:   /m̩/
    8                ((child points at toy in experimenter's hand,
    9                then to his own palm in a manner which parent
    10               had reported indicates 'more'))
    11  Exp:     More?
    12  Mom:     ((laugh))
    13  Exp:     More?
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In this instance, the nonverbal reaching and pointing behaviour of the child clearly demonstrate the child's interest in the wind-up toy; this behaviour is

the activity filling the 9-second silence. His utterance and coordinated point (lines 7–10) are not so much related to the experimenter's prior utterance as they are relevant to the ongoing activity of playing with the wind-up toy. In this case, the judges likely deemed the utterance related in that it was still in the domain of the co-participatory action – continuing the wind-up toy game – not necessarily that it was responsive to the adult's 'He stopped.' utterance of line 3. In other words, relatedness must be broadly construed to encompass activity relatedness, not just topic relatedness or responsiveness to speech acts, and the temporal threshold may miss some of these sorts of utterances.

Initiation

In Excerpt 3, the child (1;6) and the adults are picking up their toys in an effort to leave the room. The child's use of a meaningful word and searching eye gaze indicate the topic of initiation.

(3)   Cookie to Ball (SG-153)
　　1　Mom:　　Just a little snack before you go: huh.
　　2　　　　　　((Mom refers to a toy cookie that the child is
　　3　　　　　　holding))
　　4　　　　　　(3·4 sec)
　　5　　　　　　((Mom is packing up the toys and SG initiates
　　6　　　　　　looking for a ball.))
　　7 → SG-153:　/bɑ/
　　8　Mom:　　Yep. ((Mom points to the balls.)) Can you go put
　　9　　　　　　those in the bag? Go put those in the bag.

At line 1, the mother refers to a toy cookie in the child's hand, but the child does not respond, instead she is looking for something (eventually revealed as the balls she had played with previously). At line 7, SG vocalizes as she initiates a search for the balls. The mother acknowledges the child's initiation of the new topic, points to the location of the balls, and requests that the child put them in the bag.

Raters judged SG-153 to be unrelated to the prior adult utterance, and indeed it is not responsive to the mother's comment concerning the toy cookie. On the contrary, the child initiates a new topic/activity, vocalizing when she begins looking for the balls. The mother treats that vocalization (/bA/) as a relevant contribution and the initiation of a new line of action (getting balls into the bag).

Narrowed focus

In Excerpt 4, the child (1;0) has been playing with the adults with some blocks and a bucket.

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(4) Block & Bucket (AX-079)
    1 Exp: Here AX put it in the bucket.
    2   (8·5)
    3   ((child's gaze and hands are in the bucket;
    4   child takes out a block and plays with it in his
    5   lap))
    6 → AX-079:   /ʒʊ ʒɛ ʒɪ/
    7   ((no adult response immediately follows child's
    8   utterance))
    9   (5·4)
    10 AX: ((child makes non-speechlike noise))
    11   (.9)
    12 Mom: ((laughs))
    13 Exp: You like those blocks. Don't you.

During the 8·5 second silence (line 2), the child drops his first block in the bucket, gazes at it and rotates the bucket around. At this point, the experimenter extends a hand with another block, but in one continuous move withdraws the hand again and just watches the child play until the silence is broken by the child's vocalization (line 6) as he continues to gaze at the block and bucket already in his possession. Thus, the child is visibly operating in his own personal space (i.e. narrowed focus) within the larger co-participatory activity of blocks and bucket; he does not attend to the experimenter's offer and keeps his gaze steadily on the block in the bucket and his hands active with the bucket. When the child vocalizes after this long pause, there is no involvement from the adults. The utterance was treated by the adult participants as not socially directed, and the raters judged the utterance that way as well.

RESULTS

In terms of raters' judgments of relatedness, from our best examples that met additional criteria (i.e. the utterance followed a previous adult utterance and did not overlap with adult speech), 80% were judged to be RELATED and 20% UNRELATED. This supports previous findings from Bloom *et al.* (1976) who reported that the number of adjacent utterances (referred to as related in this study) exceeded the number of nonadjacent utterances (referred to as unrelated in this study). For each child and each age group the number of related utterances substantially outnumbered unrelated utterances. In Bloom *et al.* (1976) approximately 60% of the utterances were adjacent and 40% were nonadjacent across all language stages. While our results differ quantitatively from theirs, they followed a similar trend.
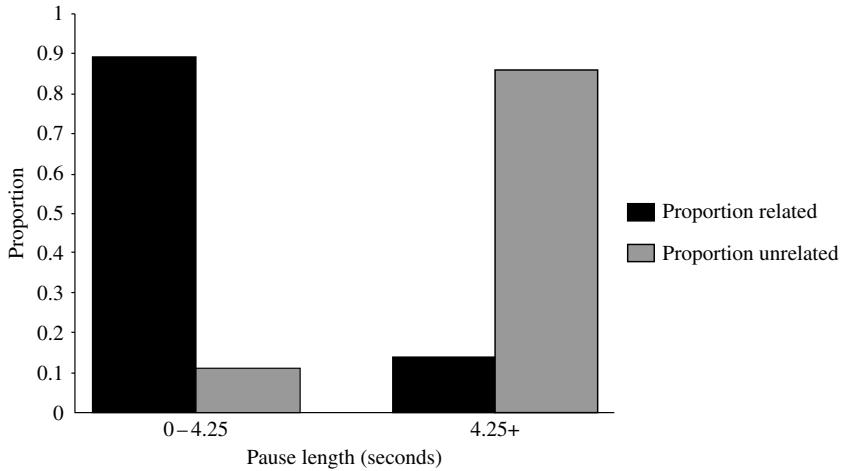
Fig. 1. Proportion of related and unrelated utterances using 4·25 second temporal criterion.

Temporal findings

The time measurements for silences between adult and child utterances ranged from 0·004 to 33·71 seconds. Two distinct temporal categories emerged: less than 4·25 seconds and greater than 4·251 seconds. The proportion of related and unrelated utterances in each of these larger temporal categories was calculated to determine whether each time period could accurately categorize 90% of the data as either related or unrelated. Figure 1 shows that 89% of the related utterances which occurred between 0 and 4·25 seconds of the previous adult utterances were related. Utterances that occurred after 4·25 seconds following the adult utterance were generally (86%) rated as unrelated.

The data analysis was also conducted on individual children and on age groups. While there were not enough data for each child to see trends for individuals, temporal trends were observed for age groups. Children aged 1;0 and 1;3 demonstrated temporal trends that coincided with the group data. That is, related and unrelated utterances were easily distinguished using a temporal criterion of approximately 4 seconds. However, by the time the children were 1;6, adult perceptions indicated a different trend. For the older children, the temporal division between related and unrelated utterances occurred just above 3 seconds (again, this temporal division was ascertained from visual inspection of a graphical representation of the data). These findings were closer to the 3-second temporal criterion used by Coggins (1987). In that study, children aged 0;9 to 2;0 were observed; our

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results indicate that Coggins' criterion may have been biased toward the older ages in that study.

The change in the temporal results across the three age groups suggests a developmental trend in the expectations of adult observers. Our findings suggest that adult judges were more forgiving of longer silences between adult and child speech for the younger age groups (ages 1;0 and 1;3). Although these findings are preliminary, it may be that even the increase in number of words in the productive lexicon is enough to tilt the expectations of listeners toward a more adult model of interaction (i.e. an approximately 1-second silence in adult speech, as proposed by Jefferson, 1989).

Behavioural analysis

As mentioned in the methods section, joint attention to topic or activity was the primary indicator for co-participation. Related utterances were coded as having joint attention (and were, therefore, co-participatory) 98% of the time. Unrelated utterances were not so clearly demarcated: 40% were coded as having joint attention and 60% as having no joint attention.

A total of 47 unrelated utterances were evaluated for contextual participation in terms of the three behavioural categories (i.e. co-participatory, initiation, and narrowed focus). Two unrelated utterances were excluded from this analysis because the child was not visible on the videotape. Of the remaining utterances, 23 (49%) showed evidence of initiation. Initiations were characterized by interactions when the child changed the topic or the preceding adult utterance was directed toward an interaction outside the child's scope (i.e. the adult was not talking to the child), making the child's utterance likely to appear unrelated to the adult's. Utterances in which an adult shifted the frame of reference from child to adult participants occurred in 7 of the unrelated utterances and were evident through a change in vocal register (i.e. from child-directed speech to adult-directed speech).[1]

The child was judged to be participating in narrowly focused interactions in 21 (45%) utterances. Narrowed-focus utterances were those in which the child vocalized but seemed to have no discernable social intention, as evidenced through adult participants' treatment of the utterance. Often the child could be described as interacting within his or her own personal space.

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[1] Child-directed speech (also termed infant directed speech) is characterized by higher and wider pitch, slower rate, and longer duration of speech sounds than that which is typical of adult directed speech (Stern, Spieker & MacKain, 1982; Fernald & Simon, 1984; Grieser & Kuhl, 1988; Fernald, Taeschner, Dunn, Papousek, de Boysson-Bardies & Fukui, 1989).

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The three remaining utterances were judged to have full joint attention (2 utterances) with the adult or no joint attention (1 utterance) and were not analysable according to the criteria for initiations and narrowly-focused utterances. Thus, most of the unrelated utterances were classified as either initiations or as having narrow focus.

DISCUSSION

Our results point to a reassuring relationship between a well-founded temporal criterion (based on multiple raters' judgments) regarding utterance relatedness and the actual interaction. As such, the temporal criterion was supported when conversations were examined in their full sequential context and in terms of the child's level of participation. In most cases, relatedness judgments coincided with the interaction between the child and the adult conversational partner (either the mother or the experimenter). Related utterances were characterized by conversational co-participation and unrelated utterances were characterized by an initiation or a narrowing of focus on the child's part. Verbalizations and behaviours from the adults (i.e. the way they treated the child utterance) also played an important role in categorizing the children's utterances conversationally.

In a sampling of 60 utterances judged to be related (10 from each child), the adult utterances both prior to and after the child's utterance indicated joint attention and topic maintenance in 59 of 60 utterances (see Excerpt 1 in the methods section). Additionally, in related utterances, the adults spoke directly to the child as evidenced by their chosen words, eye gaze, body orientation, and gestures. Many unrelated utterances were easily observed as initiations on the child's part. In most instances, it was clear (either by word choice or bodily cues) that the child's utterance was making a departure from the interaction set up by the adults and the adults were, in fact, treating and accepting the child's contribution as an initiation of new activity (see Excerpt 3 in the methods section).

Other unrelated utterances were of the type described as narrowed focus above. Here, regardless of the surrounding adult interactions (although, for the most part the adults were attempting a joint activity with the child), the child's speech did not appear socially motivated. Lack of social motivation during an utterance was characterized by both child and adult behaviours (see Excerpt 4 in the methods section). On the part of the child, checking behaviour (described as when an infant vocalizes and/or gestures then turns to see that his or her communicative partner is paying attention; Baldwin, 1995) was absent. Adults very often indicated their understanding that the child's production was narrowly focused by no longer responding verbally to the child, although their visual attention may have stayed avidly focused on whatever the child was doing.

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CONCLUSION

Our results indicate that silence length does distinguish related and unrelated utterances in very young children nearly 90% of the time. However, we caution against unreflective use of this temporal measure. Several related utterances occurred beyond the temporal boundary of 4·25 seconds and several unrelated utterances occurred within that boundary. Thus pause time does not provide an infallible tool for determining relatedness; however, it does provide a convenient and largely reliable point of entry for engaging questions of relatedness in adult–toddler discourse. While our findings provide a more complete definition of pause time in relationship to child utterances (similar to adjacent/non-adjacent utterances; see Bloom *et al.*, 1976), we do not see those temporal features as sufficient for determining relatedness. Furthermore, 3 seconds as used by Coggins (1987) as a temporal criterion for relatedness in infant speech for children aged 0;9 to 2;0 may be appropriate for older children, but too short for all children in the first-word developmental period.

Indeed, our results concerning age-grading point toward a shift in adult expectations regarding conversational response time in children who are still in the early stages of their language development. The change in pause time associated with rater judgments suggests that even within the first-word-period enough development occurs to encourage adult perceptions to shift toward the adult norm. This is an intriguing finding that merits further study. If, as Jefferson (1989) suggests there is a standard maximum silence that adult speakers of English orient toward, then this initial evidence of a trend in adult expectations provides a snapshot of how and when those tolerances for silence may emerge. This could be an important area for further research, both in normally developing children and in those who are showing signs of language delay. Further study of pause time is warranted to determine at what age/developmental level children and their adult caregivers orient to the proposed adult interactional norm of the 1 second silence.

These data may also have clinical implications for disordered populations whose language development is characterized by poor pragmatic (i.e. interaction) skills. Future research may focus on the analysis of the interactional environment when pause time is judged to be too long or too short in populations such as those with challenges on the pervasive developmental disorders (PDD) spectrum (Fine, Bartolucci, Ginsberg & Szatmari, 1991; Kjelgaard & Tager-Flusberg, 2001; Shriberg, Paul, McSweeny, Klin, Cohen & Volkmar, 2001).

Overall, the findings of this study support the use of a temporal criterion as a valid entry point for determining the relatedness of a child's utterance to surrounding talk. Our findings suggest that the categorization of utterance-relatedness based on the use of relatively quick temporal measurements

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can create a smaller collection of best examples from larger, less manageable data sets. Researchers can then work within and between the smaller collections to develop more detailed understanding of adult–toddler interaction. Secondly, our results point to the importance of using multiple methods when making judgments about infant/toddler discourse with and among adults. Participants' instinctive orientation to children's behaviour and discourse is crucial for obtaining valid results. Additionally, since outside observers are often an integral part of language assessment activities, using outsider judgment of conversational interaction is also valid for gaining a foothold in the language production routines of children and their caregivers.

In this study, the more detailed examination of related and unrelated utterances revealed three broad categories of interaction among the children: CO-PARTICIPATORY, NARROWLY FOCUSED, and INITIATION. Finer grained analyses of these holistic judgments demonstrated that parental set-up or response matched outside rater judgments sufficiently enough to merit confidence in the use of raters to sift through large collections for later examination of linguistic correlates of utterance relatedness. This methodology is particularly useful when analysing data sets which lack conventional verbal content (such as recording of very young children) or very large collections of data.

In a narrow sense, this study begins the work of determining how adult–child joint attention and other observable features of interaction build the sense of either socially directed or privately directed child utterances. In a larger sense, it opens the door to more detailed examination of the intersection of the linguistic and social components of child language development. Ultimately, researchers can begin to piece together the local, fundamentally socially situated nature of relatedness with features of linguistic development, allowing for better understanding of the emergence of language as coordinated social and developmental activity.

REFERENCES

Bacri, N. (1984). Pitch and timing cues in speech intelligibility: the case of child language. In M. P. R. van den Broeke & A. Cohen (eds), *Proceedings of the tenth international congress of phonetic sciences*. Dordrecht (Holland): Foris Publications.

Baldwin, D. A. (1995). Understanding the link between joint attention and language. In C. Moore & P. J. Dunham (eds), *Joint attention: its origins and role in development*. Hillsdale, NJ: Erlbaum.

Bates, E., Camaioni, L. & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill-Palmer Quarterly* **21**, 205–26.

Bloom, L., Rocissano, L. & Hood, L. (1976). Adult–child discourse: developmental interaction between information processing and linguistic knowledge. *Cognitive Psychology* **8**, 521–52.

Branigan, G. (1979). Some reasons why successive single word utterances are not. *Journal of Child Language* **6**, 411–21.

Butterworth, G. (1991). The ontogeny and phylogeny of joint visual attention. In A. Whiten (ed.), *Natural theories of mind: evolution, development, and simulation of everyday mind reading*. Oxford, England: Blackwell.

Coggins, T. E. (1987). Communicative intention scale. In L. B. Olswang, C. Stoel-Gammon, T. E. Coggins & R. L. Carpenter (eds), *Assessing prelinguistic and early linguistic behaviours in developmentally young children*. Seattle, WA: University of Washington Press.

Coggins, T. E. & Carpenter, R. L. (1981). The communicative intention inventory: a system for observing and coding children's early intentional communication. *Applied Psycholinguistics* **2**, 235–51.

Corkum, V. & Moore, C. (1998). The origins of joint visual attention in infants. *Developmental Psychology* **34**, 28–38.

Dore, J. (1974). A pragmatic description of early language development. *Journal of Psycholinguistic Research* **3**, 343–50.

Dore, J. (1975). Holophrases, speech acts and language universals. *Journal of Child Language* **2**, 21–40.

Fenson, L., Dale, P. S., Reznick, J. S., Thal, D., Bates, E., Hartung, J. P. & Reilly, J. S. (1993). *Technical manual for the MacArthur communicative development inventories*. San Diego: San Diego State University.

Fernald, A. & Simon, T. (1984). Expanded intonation contours in mothers' speech to newborns. *Developmental Psychology* **20**, 104–13.

Fernald, A., Taeschner, T., Dunn, J., Papousek, M., de Boysson-Bardies, B. & Fukui, I. (1989). A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. *Journal of Child Language* **16**, 477–501.

Fine, J., Bartolucci, G., Ginsberg, G. & Szatmari, P. (1991). The use of intonation to communicate in pervasive developmental disorders. *Journal of Child Psychology & Psychiatry & Allied Disciplines* **32**, 771–82.

Flax, J., Lahey, M., Harris, K. & Boothroyd, A. (1991). Relations between prosodic variables and communicative functions. *Journal of Child Language* **18**, 3–19.

Furrow, D. (1984). Young children's use of prosody. *Journal of Child Language* **11**, 203–13.

Goffman, E. (1981). *Forms of talk*. Philadelphia: Pennsylvania University Press.

Goodwin, C. & Goodwin, M. H. (1987). Concurrent operations on talk. Notes on the interactive organization of assessments. *IPRA Papers in Pragmatics* **1**, 1–54.

Grieser, D. L. & Kuhl, P. K. (1988). Maternal speech to infants in a tonal language: support for universal prosodic features in motherese. *Developmental Psychology* **24**, 14–20.

Jefferson, G. (1989). Preliminary notes on a possible metric which provides for a ''standard maximum'' silence of approximately one second in conversation. In D. Roger & P. Ball (eds), *Conversation: an interdisciplinary perspective*. Philadelphia, PA: Multilingual Matters Ltd.

Jones, S. E. (2000). Pointing as a recognizable communicative action in toddler–caregiver interaction. Unpublished master's thesis, University of California, Santa Barbara.

Jones, S. E. & Zimmerman, D. H. (2002). The achievement of intentionality in interactions between young children and their caregivers. Paper presented at the National Communication Association, New Orleans, LA.

Kasari, C., Sigman, M., Mundy, P. & Yirmiya, N. (1990). Affective sharing in the context of joint attention interactions of normal, autistic, and mentally retarded children. *Journal of Autism and Developmental Disorders* **20**, 87–100.

Kendon, A. (1990). *Conducting interaction: patterns of behaviour in focused encounters*. Cambridge, MA: Cambridge University Press.

Kjelgaard, M. M. & Tager-Flusberg, H. (2001). An investigation of language impairment in autism: implications for genetic subgroups. *Language and Cognitive Processes* **16**, 287–308.

Kuczaj, S. A. (1985). Language play. *Early Child Development and Care* **19**, 53–67.

Marcos, H. (1987). Communicative functions of pitch range and pitch direction in infants. *Journal of Child Language* **14**, 255–68.

Milenkovic, P. H. & Read, C. (1992). *Cspeech version 4*. Department of Electrical Engineering, University of Wisconsin, Madison.

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Mundy, P. & Willoughby, J. (1998). Nonverbal communication, affect, and social-emotional development. In A. M. Wetherby, S. F. Warren & J. Reichle (eds), *Transitions in prelinguistic communication*. Baltimore: Paul H. Brookes Publishing.

Ninio, A., Snow, C., Pan, B. & Rollins, P. R. (1994). Classifying communicative acts in children's interactions. *Journal of Communication Disorders* **27**, 157–87.

Ochs, E., Schegloff, E. A. & Thompson, S. A. (1996). *Interaction and grammar*. Cambridge, UK: CUP.

Oller, D. K. & Eilers, R. E. (1989). A natural logic of speech and speech-like acts with developmental implications. *First Language* **9**, 225–44.

Papaeliou, C., Minadakis, G. & Cavouras, D. (2002). Acoustic patterns of infant vocalizations expressing emotions and communicative functions. *Journal of Speech, Language, and Hearing Research* **45**, 311–17.

Sacks, H., Schegloff, E. A. & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking in conversation. *Language* **50**, 696–735.

Shriberg, L. D., Paul, R., McSweeny, J. L., Klin, A., Cohen, D. J. & Volkmar, F. R. (2001). Speech and prosody characteristics of adolescents and adults with high-functioning autism and Asperger syndrome. *Journal of Speech, Language, and Hearing Research* **44**, 1097–1115.

Snow, C., Pan, B. A., Imbens-Bailey, A. & Herman, J. (1996). Learning how to say what one means: a longitudinal study of children's speech act use. *Social Development* **5**, 56–84.

Snow, D. (2002). Intonation in the monosyllabic utterances of 1-year-olds. *Infant Behaviour and Development* **24**, 393–407.

Stern, D. N., Spieker, S. & MacKain, K. (1982). Intonation contours as signals in maternal speech to prelinguistic infants. *Developmental Psychology* **18**, 727–35.

Stoel-Gammon, C. (1987). Language production scale. In L. B. Olswang, C. Stoel-Gammon, T. E. Coggins & R. L. Carpenter (eds), *Assessing linguistic behaviours: assessing prelinguistic and early linguistic behaviours in developmentally young children*. Seattle, WA: University of Washington Press.

Stoel-Gammon, C. (1989). Prespeech and early speech development of two late talkers. *First Language* **9**, 207–24.

Vihman, M. M. (1996). *Phonological development: the origin of language in the child*. Cambridge, MA: Blackwell Publishers.

Warren, S. F. & Yoder, P. J. (1998). Facilitating the transition from preintentional to intentional communication. In A. M. Wetherby, S. F. Warren & J. Reichle (eds), *Transitions in prelinguistic communication*. Baltimore: Paul H. Brookes.