

# THE POETICS OF BABYTALK

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Caretaker-infant attachment is a complex but well-recognized adaptation in humans. An early instance of (or precursor to) attachment behavior is the dyadic interaction between adults and infants of 6 to 24 weeks, commonly called "babytalk." Detailed analysis of 1 minute of spontaneous babytalk with an 8-week infant shows that the poetic texture of the mother's speech—specifically its use of metrics, phonetics, and foregrounding—helps to shape and direct the baby's attention, as it also coordinates the partners' emotional communication. We hypothesize that the ability to respond to poetic features of language is present as early as the first few weeks of life and that this ability attunes cognitive and affective capacities in ways that provide a foundation for the skills at work in later aesthetic production and response. By linking developmental social processes with formal cognitive aspects of art, we challenge predominant views in evolutionary psychology that literary art is a superfluous by-product of adaptive evolutionary mechanisms or primarily an ornament created by sexual selection.

KEY WORDS: **Aesthetic response; Attachment behavior; Babytalk; Dialogue; Diction; Foregrounding; Infant abilities; Literary analysis; Literary theory; Meter; Mother-infant communication; Mutuality; Phonetics; Poetics; Sexual Selection**

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The quality of the interaction between an infant and its primary caregiver—usually its mother—has significant implications for the infant's later life as a child and adult. For both evolutionary biologists and psychotherapists perhaps the most important contributions to an understanding of this relationship have been based on attachment theory, stemming from the work of John Bowlby. A child psychiatrist with an interest in ethology, Bowlby postulated that infants have a positive need to form what he called "attachment" with caretakers. In this paper we focus on an early component of attachment behavior not described by Bowlby, the "babytalk" of mother and infant.<sup>1</sup> Through detailed analysis of a transcript of a mother's dialogue with an 8-week-old baby we show that babytalk displays remarkable and systematic features that serve to create and maintain interpersonal coordination (called here "mutuality"), which precedes and provides a scaffolding for subsequent attachment. In addition, we argue that the "poetic" nature of such features deserves consideration as a foundational (or "proto-aesthetic") phase of temporal arts, such as literary language and music, that we create and experience as adults.

In the first volume of his pioneering three-volume treatise, Bowlby (1969) described attachment as a complex of behaviors that serve to maintain an infant's proximity to a specific caretaker. He further hypothesized that the evolutionary value of proximity-seeking to the helpless hunter-gatherer baby was that it would not wander far away, and when frightened or alone, it would cry, reach out, move toward, or otherwise try to resume contact with a specific protective figure, rather than remain vulnerable to predators or accidents. Comparable behaviors have been observed in the dependent young of many bird and mammal species.

Classical attachment as described by Bowlby and his followers is not expressed until around 8 months, when most babies are first mobile.<sup>2</sup> Before that, they are usually carried and thus already physically "attached." However, in the years since Bowlby's formulation, research with much younger infants has shown the significance of innate predispositions for interaction and intimacy (Beebe et al. 1979; Brazelton et al. 1974; Jaffe et al. 2001; Stern 1971, 1985; Stern et al. 1985; Trevarthen 1977, 1979a, 1979b, 1980; Tronick et al. 1979). These studies, and many others, have indicated remarkable propensities for *social interaction* in neonates and very young infants. Although the studies have been conceived within other theoretical perspectives—e.g., psychotherapy, psycholinguistics, or general developmental psychology—their implications are pertinent to theoretical concerns and interpretations within evolutionary psychology.

From the early weeks of their first year, infants demonstrate a complex set of presymbolic representational capacities (Beebe et al. 1997) that predispose them to interaction with others. A few minutes after birth, for example, a neonate shows a preference for its mother's voice, which it has

heard from within the womb (DeCasper and Fifer 1980); even before birth, it can identify the mother's voice (Spence and DeCasper 1982). It can imitate facial expressions such as sticking out the tongue or opening the mouth, or opening and closing a hand (Kugiumutzakis 1993; Meltzoff and Moore 1977). Neonates discriminate among adults' facial expressions of sadness, fear, and surprise with corresponding expressions of their own (Field et al. 1982) and can estimate or anticipate intervals or sequences of time (DeCasper and Carstens 1980).

At 6 weeks, infants are sensitive to the time pattern of a social exchange, extracting temporal information displayed via one modality (adult vocalization) and expressing this information by means of a different modality (infant gaze) (Jaffe et al. 2001). Infants develop expectancies of these patterns, remember them, and categorize them. The expectations are organized through time, space, affect, and arousal (Beebe et al. 1997). Infants' temporal sensitivity permits them at 6–8 weeks to engage with adults in multimodal (vocal, visual, kinesic) dyadic interactions based on the infant's expectation of *social contingency*, defined as interpersonal sequential dependency, in which the behavior and affect of both partners are coordinated or "attuned" (see Jaffe et al. 2001:13–16; Stern et al. 1985). When normal ongoing positive interaction via dual video is experimentally desynchronized (i.e., the baby is presented with a slightly delayed replay of a recorded sequence of just-experienced positive interaction with the mother), 6- to 12-week infants show signs of psychological distress such as averted gaze, closed mouth, frown, grimace, fingering of clothing, and the displacement activity of yawning (Murray and Trevarthen 1985; Nadel et al. 1999).

Such studies of infant social abilities make clear that babies come into the world ready to engage interactively with the people around them, and that their responses in turn influence how others behave towards them. However, we find that even the most careful and informed studies of human parent-infant behavior by evolutionary psychologists (e.g., Daly and Wilson 1995; Fernald 1992; Hrdy 1999) seem to place insufficient emphasis on the exquisite and subtle interactive coordinations of emotion and behavior between very young infants and adults. We consider that the usual interpretations of caretaker-infant communication in such studies—manipulation and deceit—do not go far enough, and indeed mask the singularity and importance of the exchange of "honest" emotional signals between a pair with joint and relational as well as individual interests and the consequent behavioral and emotional coordination and attunement that takes place.

In this paper we analyze a sequence of babytalk, deploying methods derived from the study of literary texts, that is, studies focused on stylistic features, particularly sounds and rhythms (e.g., Leech 1969; Miall 2001;

Van Peer 1986). Such analysis supports findings by developmental psychologists that through babytalk mothers seek to create or maintain temporal coordination and emotional communion with their babies. For their part, the precocious ability of infants to elicit and respond to contingently interactive visual, vocal, and kinesic signals of caretakers suggests an evolved and primary human capacity and need for mutuality, expressed in a temporally coordinated social-emotional relationship preceding and going beyond the needs for protection, reassurance, or care implied by classical attachment (Bowlby 1969), parental investment (Trivers 1972, 1974), or parental solicitude theory (Daly and Wilson 1995) [see "Babytalk as Adaptive" below]. We further claim that our stylistic analysis of babytalk for its metrical and phonetic features reveals an elementary poetics that, in turn, contributes to understanding the deep-rootedness, if not the origin, of human aesthetic and emotive responses to the temporal arts.<sup>3</sup>

## BABYTALK

In all cultures, people's behavior with infants is different from their behavior with adults, or even with older children (Fernald 1984; Stern 1977; Trevarthen 1979a, 1979b). The facial expressions, head and body movements, and vocalizations used with infants are significantly altered from those used in other social interactions. They are simplified, rhythmically repeated, exaggerated, and elaborated in a way that invites dyadic interaction, the patterns of which recall ritualized behaviors in other animals. This common everyday interaction, often dismissively called "babytalk," is far from idle or trivial. Its complex structure, universal features, and demonstrable benefits suggest that it is highly adaptive (see below and Dissanayake 2000a, 2000b).

Our analyses are based on the initial 64 seconds of a five-minute stream of babytalk (Table 1) that occurred between a Scottish mother and her 8-week male infant, Liam. It was recorded at the laboratory of Professor Colwyn Trevarthen at the University of Edinburgh.<sup>4</sup> Although our paper analyses only the vocal utterances of the mother, it should be remembered that these (and her accompanying facial expressions and gestures) are inseparable from Liam's facial expressions, vocalizations, and the movements of head, body, and limbs with which he solicits, participates in, and influences her behavior and sounds.

Many studies have described the universal features of motherese or infant-directed speech (IDS) (e.g., Fernald 1992; Trevarthen 1993). From birth to between 3 and 4 months, maternal utterances universally tend to be spoken in a high, soft, breathy voice. They are short and repetitive, with clear, interspersed pauses. Pitch contours are distinct and well-controlled;

Table 1. Transcript of Babytalk: Sequence of 64 Seconds with Mother and Liam (aged 8 weeks)

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Oh, what you say? You going to tell me a story?  
 Tell me a story, then. Tell me a story.  
 Really! Ah, that's a good story!  
 That's a good story, tell me more.  
 Tell me more. Tell me more, yes?  
 [Ah!] Come on then.  
 You're struggling, trying to get out of the chair.  
 You're trying to get out of there, yeah?  
 You want your own chair, don't you.  
 You want your own chair.  
 Do you want your own chair?  
 Do you? Liam?  
 Do you want your own chair?  
 Is it better? Is it better?  
 Is it better than that one?  
 Better than that one?  
 Is it better than that one?  
 Yes. Yes.

Ohhh  
 Big yawns! Big yawns!  
 Oh your ear's all squashed.  
 Your ear's squashed.  
 Have you got a squashed ear, yeah.

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Sequence recorded in the laboratory of Professor Colwyn Trevarthen, University of Edinburgh, U.K., and used here with permission.

regular stresses set up a steady rhythm that is soothing and reassuring. The subject matter comes from moment-to-moment occurrences—comments on the baby's looks, actions, on events in the vicinity, and so forth. (In the segment analyzed here, the mother mentions Liam's sounds, movements, yawns, and his "squashed" ear: see Table 1.)

Even though length of phrases, syllables, and syllable groups resemble those of adult conversation (Lynch et al. 1995), mothers systematically modulate—increase or decrease—the overall tempo in order to influence the infant's level of arousal and receptivity. The pair interact to a measurable pulse (regular timing intervals that serve to coordinate their joint vocalizations; Malloch 1999–2000), mutually set up and supported by the mother's movements and vocalizations. The precise timing and turntaking of their interaction and the infant's affective responses encourage the mother to act as if she imagines they are conversing ("That's a good story. Tell me more." [Trevarthen 1993]).

Over time, mothers subtly adjust their sounds and movements to what the baby seems to want (or not want), and to its changing needs and abilities. They gradually move from the gentle, cooing reassurance of the first weeks to trying to engage the baby in increasingly animated mutual play. At 8 weeks utterances and facial expressions have become more exaggerated, both in time and space (e.g., the mock seriousness of Liam's mother's voice as she says "Big yawns!" and "Your ear's squashed"). Facial expressions that accompany vocalizations are often formed more slowly, held longer, and punctuated with behavioral rests or silences in between (e.g., "Do you want your own chair? [Pause] Do you? [Long pause] Liam?").

As babies grow older, babytalk continues to change. By 5 months, babies respond vigorously to teasing and structured routines where there is a buildup to a climax. Hence most mothers enthusiastically provide dramatic and exciting games and songs for both to enjoy. Vocal pitch frequency is usually still raised, but utterances become longer with longer pauses between them. There is a greater range of pitch contours and dynamic contrasts, as well as more variable rhythms. In the second half of the first year, babytalk wanes, as the baby finds stimulation in exploring and learning about a larger world. Mother-child interaction begins to contain more referential (lexical) content and to sound more like adult conversation. By 2.5 years, children are capable of generating spontaneous utterances in solitary verbal play that, as Weir (1962) showed, themselves contain a range of complex poetic features at the phonetic, rhythmic, and semantic levels.

Although babytalk routines vary culturally (see discussion in Dis-sanayake 2000a, 2000b), most mothers find them natural: they do not deliberately set out to act in an exotic way or to "teach" their babies. As far as the pair is concerned, they are simply enjoying each other's company.

## MACRO-POETIC ELEMENTS IN BABYTALK

A number of structural and other features of the transcribed babytalk segment substantiate our claim that, despite the inevitable simplification of semantic content and little formal syntactic elaboration, one can identify a poetics of babytalk. On what might be termed a "macro-" level, in other words, with regard to features evident to the ear and eye in actual heard and written language, we note the following features (which the micro-poetic analyses further support):

Liam's mother's utterances have a describable **temporal structure**. They are, first of all, organized into individual **framed episodes**, with a clear *beginning* or introduction ("Oh, what you say?") and final felt *closure*, sometimes with a refrain or coda: "Is it better than that one? [Pause] (softer,

words drawn out) Yes. Yes." Although a sequence of episodes may display a varying range of tempos, and although within an episode a mother varies emphasis, vigor, and amplitude, each episode while it proceeds tends to sustain its own tempo.

Much use is made of **dynamic poetic features** such as *pauses* and *rests*, and *changes* and *exaggerations of amplitude*: loud and soft, fast and slow. There are heavy *stresses* or *accents* ("better than that one"), providing a rhythm that might be unnatural in everyday discourse ("squashed ear, yeah"). The use of short, simple (one- or two-syllable) words or phrases that are frequently repeated encourages a **repetitive regulating meter** around which elaborate melodic, dynamic, and rhythmic variations are interwoven.

The utterances also appear to be organized primarily around what we have transcribed as **lines**, judged either by number of words or by timed length. In this respect our representation accords with the length of 3 to 4 seconds that Turner (1985) and Hogan (1997) showed to be a universal characteristic of lines of verse and that Lynch et al. (1995) found to be typical in the phrasings of prelinguistic infant vocalizations, adult speech, oral poetry, and music.

Many episodes are **variations** of sounds and movements on a "**theme**" established at the outset (e.g., Tell me a story. The chair. Is it better? The squashed ear). Several other **poetic devices** also occur: *parallelism* ("big yawns, squashed ear"); *hyperbole* of facial expression and mock seriousness of voice ("Big yawns"; "Your ear's all squashed") and in vocal contours which are exaggeratedly undulant, with distinct, well-controlled pitch steps or glides of regular (i.e., predictable) size and duration; the *alliteration* and *assonance* that is inevitable with repeated words and phrases, but that also occurs beyond this; and *rhyme* or *vowel matching*, often coincident with resolution or "thesis."

The mother's **pace and voice echo the subject matter**: in the passage as a whole there is an **overall thematic and formal construction**. The adagio introduction (A), which forms the section we analyze in detail below, is followed by an accelerated disquisition on tickly feet (B), then a digression into blowing bubbles (C), followed by a reprise of (B) and closure: "With your tickly feet, oh your tickly feet."<sup>5</sup>

Interestingly, at a formal level the macro-poetic features of babytalk are achieved by operations that typically characterize "ritualized" behaviors in other animals, described by ethologists (e.g., Eibl-Eibesfeldt 1989:439–440; Smith 1977). Liam's mother's utterances are simplified (formalized, regularized, stereotyped), repeated, exaggerated, and elaborated (varied). Such operations serve as a kind of "foregrounding" (see "Metrical Structure" and "Phonetic Foregrounding")—that is, they attract and sustain attention, in both humans and other animals. Their employment in culturally

created human ritual ceremonies has been noted by Eibl-Eibesfeldt (1989) and Watanabe and Smuts (1999), among others (see "The Relevance of Babytalk").

## MICRO-POETIC ELEMENTS IN BABYTALK

With regard to "micro-" poetics (i.e., features not immediately evident to conscious perception), the first author analyzed the utterances for their intrinsic structures, and to see how closely they relate to the moment-by-moment attitude of mother and baby.

### Verse Pattern

The transcript was articulated into 23 lines, guided by repeated listening to the tape recording (see the left side of Table 2). On the assumption that a rhythmic shape corresponding to the elementary principles of English verse structure could be identified (Hogan 1997; Turner 1985), lines were determined by an attempt to locate "natural" boundaries. Consideration was given to the pace of delivery, to stress patterns, to the perceptual units and caesuras analysed by Tsur (1992a:132–139), and to the focus of the topics developed by the mother. The result is an elementary poetic structure with four verses. Overall, the verses exhibit an alternating pattern that we will term *intimacy* and *observation*; however, alternative pairs of terms might equally well be *empathy* and *commentary*, or *proximal* and *distal*. The verse pattern is clearly driven primarily by the mother's response to the baby's behavior. It is clear from the aural recording that the baby's responsiveness to the mother varies: verse 2 reflects the baby's restlessness in his chair; verse 4 is initiated by the baby's yawns, probably accompanied by a shift of the head that results in the "squashed ear." The sequence as a whole lasts 1 min 4 secs; the four verses occupy 25, 15, 12, and 12 secs, respectively.

From the baby's perspective, of course, the lexical content of the topics is incomprehensible. The verse patterning by topic must be seen as a device adopted by the mother to hold the baby's attention, to vary the nature of the interaction, or as a response to the baby's behavior: each topic, in other words, is primarily a resource for effects at the level of sound—i.e., the intonation, rhythm, and phonetic color afforded by the words and phrases of a given topic. We assume it is through these features that the baby's attention is captured or reengaged; thus the following analysis focuses principally on phenomena at this level.

### Metrical Structure

The metrical analysis shown in the left side of Table 2 follows the system suggested for English verse by Roberts (1986). In contrast to the more

Table 2. Metrical and Phonetic Analysis of Babytalk Transcript

	Phonetic Analysis			
	seg	vow	cons	pres
Oh,	1	3	-27	-24
Tell me a	2	54	28	82
Really!	3	18	-5	13
That's a	4	22	8	30
Tell me	5	38	33	71
Come on	6	3	-3	6
[Ah:]				
You're	7	12	-51	-39
You're	8	13	-38	-25
You	9	-26	-35	-61
You	10	-12	-21	-33
	11	-20	-23	-43
	12	-4	3	-1
	13	-20	-23	-43
	14	34	10	44
	15	23	18	41
	16	7	21	28
	17	23	18	41
	18	12	-22	-10
	19	-3	0	-3
	20	18	-18	0
	21	2	-14	-12
	22	1	-19	-12
	23	-2	-46	-48

Key to Phonetic Variables: seg, line number; vow, weighting from front (high number) to back (minus number); cons, weighting of consonants from front (high) to back (minus); pres, 'presence'; combines vow and cons, overall front-back measure

usual display by feet (iambic, trochaic, etc.), this method aligns stresses vertically to give a visual representation of the metrical pattern. It is designed to capture more effectively the temporal sequence of events and to foreground similarities and differences across verse lines. It can be compared with the written representation of musical rhythms in measures or bar lines. A minor disadvantage is that, unlike musical notation, it may give a misleading impression of the length of the intervals between stresses (there is, for example, no audible gap in lines 11 and 13, as the table appears to show).

In verse 1, after the first four words, the pace of delivery is relatively slow, with the mother leaving short silences between each phrase. It seems probable that mother and baby are engaged in mutual gaze, with the slow pace and repeated strong stresses serving to hold the baby's attention. The mother construes some behavior of Liam prior to line 3 as a response, since she says "Really! Ah, that's a good story!" The following lines show that the mother continues to elicit a similar response, but the final line suggests that the baby's attention is becoming withdrawn at this moment (also shown by the baby's audible "Ah!"). The opening "Ohhh," which glides into "what you say?", might be seen as an upbeat to the ensuing line; we have shown it stressed, however, since it appears to be a signal to engage the baby's attention. In other respects, each of the first five lines contains a relatively well-spaced set of four stresses with a midline caesura (shifted to the left, to mark the baby's interaction, in line 3). We have shown an extra stress on the first "story" in line 4, although this is lighter than the stresses heard elsewhere on this word, and the pace ensures that it fits temporally within the underlying rhythm of this group of lines, since the caesura at the comma is almost elided.

Verse 2 begins with a faster pace but progressively slows, reaching its slowest pace at line 12, where the mother appears to be attempting to re-engage the baby's attention by using a long midline pause and the baby's name. The corresponding reduction from four stresses per line to two also seems to signal the mother's response to her baby's withdrawal of attention: in contrast to the fluent delivery of verse 1, pacing here is deliberate and becomes emphatic. If the mother-baby relation is proximal in verse 1, here it is distal.

Verse 3 follows verse 2 with almost no audible break. It also reverses verse 2 by demonstrating an accelerating tempo. At the same time a progressive drop in volume occurs; by lines 16–18 the mother's voice is reduced to a whisper. While it is not clear what change in the baby's behavior elicits this response, intimacy appears to be reestablished during the course of the verse, an achievement signalled by the affirming "Yes. Yes" at line 18; the second word emerges marginally from a whisper, being voiced with a warm tone. The pattern of two stresses per line appears to

be justified syntactically, with the basic kernel “Is it better?” of line 14 being expanded by the stressed deictic term (“that”) added in lines 15–17. This seems to suggest a narrowed focus, its repetitions with their minor rhythmic variations achieving, then affirming the reengagement of the baby’s attention.

Finally, verse 4 shifts once again, following the yawns emitted by the baby; he appears to move at this point, resulting in the “squashed ear.” Line 20 is spoken with a low pitch and a long pause at midline. The tempo then quickens in the last three lines; however, line 23 gives the impression of a missed stress, for which the rapid delivery of four unstressed syllables is a substitute, although the first word “Have” is spoken almost subvocally and is somewhat conjectural in this transcript. The tone during these last three lines progressively warms, the voice once again approaching a whisper, but the pitch shows a shift of emphasis away from “squashed” in line 21 (where it is pitched high relative to “ear”) to “ear” in line 23, which now shows the higher pitch.

Overall, it is the resources provided by meter—from 4 or 5 stresses per line down to 2 or 1, together with the variations provided by tempo and pitch, that offer the basic aural instruments for the mother to either sustain, respond to, or reengage the baby’s attention. Each of these instruments serves to direct attention, although each does so in different ways. Using the term of Mukarovský’s (1964) translator, we can speak of such attention-signaling devices as an elementary form of *foregrounding*. A foregrounded device draws attention to itself either by deviating from an expected event or by presenting an unusual degree of parallelism in events. In this respect, meter itself is a form of parallelism; once established, however, it can also show deviation by such means as variation in the placement of stresses or by acceleration or deceleration of tempo. Thus our analysis has shown the establishment of patterns in each verse against which variations become perceptible. These occur, for example, in the resolution of verse 2 onto two stresses per line, which in turn become progressively slower, or in the reduction of volume across verse 3 from voiced to whispered speech. Other foregrounded devices are also present, however, at the phonetic level, and these we describe next.

### Phonetic Analysis

*Phonetic contrasts.* Phonetic patterning across the whole sequence is created by systematic variation in the placement of phonemes in the oral tract. The following analysis, shown in detail in the right side of Table 2, is based on a system for weighting vowels and consonants according to several criteria (described more fully in Miall 2001). For the present analysis, two key weightings will be described. First (*vow* in Table 2), based on the

standard vowel-space diagram (supplemented by the frequency level of the second formant), vowels are ordered according to the position of pronunciation, ranging from the front of the mouth (such as /i/ in *bid* or /a/ in *day*) to the back of the mouth (such as the /u/ in *food*, or /oy/ in *boy*). The 20 vowels that commonly occur in standard English are then assigned weights from 9 to -10. Similarly, the 24 consonants (*cons* in Table 2) are ordered from those pronounced frontally (such as /b/ and /m/) to those pronounced at the back of the mouth (such as /g/ and /k/), using the numbers 11 to -12. In this way, a cumulative weighting can be computed for a given line of text.

A combined vowel and consonant measure (based on adding *vow* and *cons*) has also been used here, which we have termed *presence*. This enables overall tendencies in vowel and consonant position to be detected, based on the premise that high, front phonemes connote intimacy or presence, in contrast to back phonemes which, being pronounced in the rear oral cavity or the throat, connote distance. This contrast may often be violated in adult literary productions (Miall and Kuiken 2002), but it appears to have developmental significance. According to Tsur (1992b; cf. Jakobson 1968), front phonemes appear first during the child's speech acquisition. In an interesting development of this insight, Tsur has shown (1992b:59-61) in analysis of a speech from *Hamlet*, that regression to earlier syncretic modes of thought typical of earlier childhood is marked by increased occurrence of frontal phonemes, especially /m/.

In the present example, the difference in intimacy between the verses that we have already described is most clearly reflected in the *presence* measure. As shown by the last column in Table 3, the lines of verse 1 are characterized by predominantly positive weightings, underscoring the mutual attentiveness that we identified between mother and child. In verse 2 the weightings are predominantly negative, signaling the shift to objectivization of both the baby (here repeatedly addressed as "you") and the chair. Verse 3 returns to the intimate or proximate mode, while verse 4 is once again more distal or objective (in its discourse on the baby's ear). The mean presence weightings for each verse are 29.7, -35.0, 28.8, and -15.0, respectively. Within this overall pattern, it is also worth noting that a difference in tonality between the two distal verses is given by variance in the source of the negative weightings: in verse 2 it is due to the predominant negativity of both vowels and consonants (e.g., /u/ in "Do you" and the /o/ in "want"; the /d/, /t/, and /ch/ sounds in "Do," "try," and "chair," respectively); whereas in verse 4 negative weighting is largely confined to consonants (the /s/, /k/, and /sh/ of "squashed"; the /g/ and /t/ of "got").

While these data for phoneme weightings complement the earlier analysis of the verses for proximal and distal qualities, it is less clear what the

origin of such phenomena may be, especially as it might be thought that speakers have little control over the phonetic qualities of the words selected at a given moment. It may seem implausible that the mother in this example chooses words with the appropriate tone qualities to represent the transitory shapes of her relationship with the baby. Consideration of the examples discussed will show a naturally occurring iconicity in certain contrasting words, such as the high value on *presence* for “me” in contrast to the lower value for “you.” It may seem fortuitous that other words, such as “better” and “squashed,” show a similar contrast; however, speakers generally have some choice of both topic and word, and they may be attracted to the phonetic form of a specific utterance for its match to a prevailing situation or feeling. The present finding, which is supported by a number of analyses we have carried out with literary texts and their readers, points to a significant role for what we will term *phonetic iconicity*. This does not rest on the supposition that the phonetic qualities of words have a fixed affective or semantic meaning, a problem inherent in some earlier stylistic literary analysis, as critics such as Fish (1980) and Smith (1988) pointed out. Phonetic contrasts appear to have the function, rather, of setting up systematic differences in tonality that underline particular semantic contrasts, according to the local context.

*Phonetic foregrounding.* Superimposed on the broad shifts in tonality between verses analyzed in the last section, a number of specific phonetic effects serve to foreground certain words. In poetry this effect, as Coleridge put it, evokes “a more than usual state of emotion, with more than usual order” (Coleridge 1983 [II]:17). Here its function seems to be a related one, preliminary to its more developed form in poetry: it serves to create an order that the baby can perceive to be structured and systematic, and which has the property of attracting and stabilizing the baby’s attention, an attention that might otherwise be more labile and distractable. The mother’s speech is clearly much more systematic and repetitive than ordinary speech between adults or between adults and older children; at the same time, the foregrounded phonetic features occur more frequently and repetitively than would be the case in most poetry (although it seems closer in this respect to the use of foregrounding in oral poetry: cf. Finnegan 1996).<sup>6</sup>

As the analysis shown in the right-hand column of Table 3 reveals, foregrounded effects tend to confirm and amplify the underlying metrical patterns: foregrounded phonemes occur more frequently within stressed than unstressed words. The central features identified also tend to result from simple repetitions of phrases, such as “tell me a story.” However, sound patterns thus set up are at times echoed in other words, such as the /e/ sound echoed at “yes” in line 5, and at “then” in line 6; similarly, the /o/

Table 3. Foregrounding Analysis of Babytalk Transcript

Oh,	what you	say?	You going to <b>tell</b> me a <b>story</b> ?	1	ɛ / ɔ [6 / 1]; t × 4
Tell me a	<b>story</b> then.	Tell me a	<b>story</b> .	2	ɛ / ɔ + ɛ; ɛ / ɔ; t × 4
Really!	Ah, that's a	good	<b>story</b> !	3	
That's a	good <b>story</b> ,	tell me	<b>more</b> .	4	ɛ / ɔ; m × 2
Tell me	<b>more</b> .	Tell me	<b>more</b> ,	5	ɛ / ɔ; ɛ / ɔ + ɛ; m × 4
Come on	then.		<b>yes</b> ?	6	ɔ; m
[Ahi]					
You're	struggling,	trying to get	<b>out</b> of the	7	ʌ / ay [2 / -2]; ɛɛ; tr × 2
You're	trying to get	<b>out</b> of there,	<b>yeah</b> ?	8	ʌ / ay; ɛɔ × 2
You	want your	<b>own chair</b> ,	<b>don't you</b> .	9	oo / ɛɔ [-7 / 4] + oo; u × 2
You	want your	<b>own chair</b> .		10	oo / ɛɛ; u
Do you	want your	<b>own chair</b> ?		11	oo / ɛɛ; u × 2
Do you?	Liam?			12	u × 2
Do you	want your	<b>own chair</b> ?		13	oo / ɛɛ; u × 2
Is it	<b>better</b> ?			14	l × 4; ɛ × 2; t × 4
Is it	<b>better than</b>	<b>that one</b> ?		15	ɛ / æ [6 / 3]; δ × 2; æ × 2
Is it	<b>better than</b>	<b>that one</b> ?		16	ɛ / æ; δ × 2; æ × 2
Is it	<b>better than</b>	<b>that one</b> ?		17	ɛ / æ; δ × 2; æ × 2
Yes.	Yes.			18	ɛ × 2
Ohhh				19	
Big	<b>yawns!</b>	Big	<b>yawns!</b>	20	l / ɔ [8 / 1]
Oh your ear's all	<b>squashed</b> .			21	i / a [9 / -3]
Your ear's	<b>squashed</b> .			22	i / a
Have you got a	<b>squashed</b>	ear,	<b>yeah</b> .	23	i / a

Note: Words that are metrically stressed are shown in bold. Repeated consonants (alliteration) are shown in italics; repeated vowels (assonance) are underlined. These patterns are identified on the right using the standard symbols of the IPA (International Phonetic Association). The numbers in brackets indicate the numeric codings assigned to phoneme pairs that exhibit the high/low pattern ("linguistic freezes").

component of “*story*” is subsequently repeated three times in “*more,*” and the /m/ sound recurs with “*Come*” in line 6. The /or/ vowel thus creates an internal rhyme in verse 1 that attracts attention though its use of similarity in difference, as well as helping to unify the tonality of the verse overall. A comparable effect is apparent in verse 2 in its deployment of “*chair,*” “*there,*” and “*yeah.*” Additional evidence for the supposition that word choice is driven by tonality is the occurrence of two forms of the word “*yes*”: in verses 1 and 3, “*yes*” follows the use of /e/ in “*tell*” and “*then*”; in verses 2 “*yeah*” follows the words “*chair*” and “*there,*” and in verse 4 it follows “*ear.*”

Another systematic feature of vowel ordering across most of the transcript is the placement of high vowels before low in several key phrases. In terms of the weights assigned to each vowel, this occurs in several repeated collocations: at line 1 with “*tell . . . story*” (weights: 6 / 1); at line 7 with “*try . . . out*” (2 / -2); at line 15 with “*better than*” (6 / 3); at line 20 with “*big yawns*” (8 / 1); and at line 21 with “*ear . . . squash*” (9 / -3). The principal exception to the pattern appears in line 9, “*own chair*” (-7 / 4). This common ordering of words by high/low vowel sounds is one of the constituents that make up what has been termed linguistic freezes (Landsberg 1995; other constituents include liquids and nasals before fricatives or plosives, and words with fewer syllables before words with more; cf. Pinker and Birdsong 1979). The ordering is thought to draw on the “*me first*” principle, or to be due to the lower demand it places on cognitive and somatic resources for pronunciation while resources are also required to formulate the remainder of the phrase. The high frequency with which key phrases conform to this rule in the transcript might be considered a foregrounded feature: it may have the effect in particular of creating a shared perspective for mother and baby, in which the first term with its higher vowel sound helps to create and perpetuate the intimacy of shared verbal space. It is tempting to note that the main exception to the rule, “*own chair,*” occurs during the one sequence where the mother fails to keep the attention of the baby.

## **BABYTALK AS ADAPTIVE**

The fundamental features of the babytalk interchange are observable cross-culturally (Dissanayake 2000a, 2000b) and investigators have described its functional benefits to infants, whether of the interaction itself or of one of its features. Within an adaptationist perspective, Fernald (1992) considers maternal vocalizations as biologically relevant signals, shaped by natural selection, that influence infant attention, arousal, emotion, and

eventual language comprehension, and Monnot (1999) has demonstrated a significant positive correlation between infant growth and the mother's use of infant-directed speech.

Outside a directly evolutionist framework, other investigators have noted that participation in early interactions aids an infant's homeostatic equilibrium (Hofer 1987), biobehavioral self-regulation (Beebe and Lachmann 1994; Spangler et al. 1994), and self-organization (Tronick 1998). Such participation also develops an infant's cognitive "narrative" abilities for recognizing agency, object, goal, and instrumentality (Stern 1985); predisposes the infant generally to intellectual and social competence, including recognizing intentionality, engaging in reciprocity, and developing expansion (recall and prediction) beyond the present situation (Hundeide 1991); and reinforces neural structures predisposed for socioemotional functioning (Jaffe et al. 2001; Schore 1994; Trevarthen and Aitken 1995). Psycholinguists point to the contribution of babytalk to eventual language learning—that is, the baby is preadapted for eventual speech and the reinforcements of babytalk move the infant along that path (e.g., Kuhl 1993; Locke 1993; Snow 1977).

These functional claims demonstrate that motherese and mother-infant interaction in general contribute in a number of ways to an infant's positive socioemotional and physical development and hence to its mother's reproductive success. This should not be surprising to evolutionary psychologists. What we feel is not well enough recognized, however, are the implications of the exquisite sensitivity of infants as young as 6–8 weeks to indications (in vocal, visual, and kinesic modalities) of social contingency in their partners. To us, this is "evidence of design" (Tooby and Cosmides 1992) in neural organization,<sup>7</sup> and it supports our view that a capacity for mutuality or intersubjectivity—the coordinating of behavioral-emotional states with another's in temporally organized sequences—is a primary human psychobiological endowment that has not been sufficiently incorporated into adaptationist thinking.

Although mutuality is clearly a precursor to attachment, we think that its early appearance and its dependence on a fundamental dyadic timing matrix warrant special evolutionary consideration. Disorders of emotion, communication, and learning in early childhood are traceable to faults in early brain growth of neural systems underlying this capacity (Trevarthen and Aitken 1994), and failures of mutuality make later attachment difficult if not impossible. The importance of mutuality at the very beginning of life also suggests the importance of behavioral and emotional interactivity and coordination as a human endowment. With reference to the present paper, we emphasize that it is by means of intrinsic poetic ("foregrounded" or "aesthetic") features that the coordinations of mutuality are supported and reinforced.

## THEORETICAL CONSIDERATIONS

Although studies in evolutionary psychology and literary theory customarily appear in different journals, we would argue that our findings are relevant to current considerations in both, and justify combining the two. That an infant as young as 8 weeks responds spontaneously and selectively to poetic features of maternal speech supports and refines the Russian Formalist position in twentieth-century literary theory on the importance of nonverbal and emotional aspects of poetic utterance—aspects that are generally ignored by other schools of literary theory as well as by evolutionary and cognitive studies of human language. In addition, the infant's precocious and unlearned response to poetic features refutes the common assumption within other, more recent literary theory that all aspects of language are culturally constructed (see also Dissanayake 2001). It suggests instead that the ability to respond to poetic features of language is present as early as the first few weeks of life and that this ability attunes cognitive and affective capacities in ways that provide a foundation for the skills at work in later aesthetic production and response. As Hogan (1997) has recently argued, the formal features we have noted here, such as assonance and alliteration, appear to be a universal feature of literary technique in every culture. This contention has relevance to evolutionary studies of spoken language and of the arts, particularly literary art.

Moreover, since this infant response is part of a spontaneous but temporally, behaviorally, and emotionally coordinated dyadic interchange in which poetic elements of maternal speech have a demonstrable adaptive function, our analysis has relevance to influential hypotheses in evolutionary psychology regarding the nature of aesthetic behavior and the selective forces driving its development—namely, the claim for “art as superfluous by-product” (e.g., Pinker 1997:528, 534–543), and the claim that aesthetic behavior is primarily an ornament created by sexual selection (e.g., Miller 2000, 2001).

### **The Relevance of Babytalk to Literary Art, Literary Theory, and the Nature and Function of Spoken Language**

Although babytalk is produced as a form of verbal discourse, with words that for the most part refer to the real world, it is not received as conventional symbols or signifiers by the infant hearer. One can say, however, that the baby, who responds to its paralinguistic features, is intensely receptive to the communication. Like the temporal arts of song, dance, or literary speech, particularly as they appear in nonliterate societies, babytalk has a performative, multimedia (visual, vocal, and kinesic), emotionally expressive, mutually participative nature. This resemblance, we

suggest, justifies our considering it as a foundation of the production of and response to adult literary art, which has its roots in oral performance.

A few twentieth century literary theorists have drawn attention to pre-verbal or nonverbal and emotional aspects of poetic language (e.g., Tsur 1992b). Our analysis of the poetics of babytalk gives empirical support to these conceptions, while refining or modifying some of the assumptions about emotion and language apparent in their writing.

The Russian Formalists, notably, considered patterns of sound in poetry to be of equal or more importance than its semantic components (cf. Erlich 1981:212–229; Steiner 1984:149–154). In their early work, Jakobson, Brik, Jakubinsky, and Shklovsky analyzed sound structure in poetry, claiming that its very strikingness and unfamiliarity revitalized and “de-automatized” the sound of language in comparison with its routine and economical use in everyday discourse (e.g., Shklovsky 1965). Although babytalk, like poetry, “defamiliarizes” verbal language, at least from an adult’s perspective, to the baby it is presumably familiar and natural. To a baby, it is the “poetry,” not the everyday language of the utterance, that is the norm (and babies much prefer recorded babytalk to recorded ordinary adult speech [Fernald and Kuhl 1987]). We suggest that our identification of affective aesthetic (or protoaesthetic) elements in babytalk provides a biological or naturalistic basis for Formalist claims about the importance of sound structure in poetry.<sup>8</sup>

The Formalists also stressed the close link between sound and emotion (e.g., Shklovsky 1965:9), although Roman Jakobson (1971:84) warned that there is a difference between emotive language (cries for help, expressions of outrage) and poetic language. Babytalk is not emotive language in Jakobson’s sense, since it occurs outside the mother’s “practical language” that might accompany her caregiving responses to the infant’s cries for attention. It is, rather, a kind of poetry that is at the same time an *emotional* (though not *emotive*) language or narrative. As Miall and Kuiken (1994) showed empirically, foregrounded passages in a literary text attract attention, typically arousing a heightened affective response on the part of readers. Thus babytalk can be characterized theoretically by pointing to the prominence in it of the “poetic” function which, in Jakobson’s term (1972), denotes the priority given to the qualities of the language itself (although not to the exclusion of its communicative aspects).

In their essays, Jakubinsky and Bakhtin emphasized the importance of *dialogue*, and thus provided a theoretical direction that has been relevant to modern reader response theory (Matejka 1971). Babytalk provides a biological foundation for Jakubinsky’s claim (cited by Matejka 1971:291) that dialogue is “natural” as much as “cultural,” but rather than emphasizing a *text* that is written *for* and interpreted *by* a reader within cultural constraints, it suggests that there is an inherent biological (i.e., natural psycho-

logical) foundation for back-and-forth responding to emotion expressed dialogically in a temporal structure that is, at the outset of each human life, *unverbal* (Locke 1993). Thus the assumption by poststructuralist and other schools of contemporary literary theory that all aspects of language are necessarily culturally constructed is false (cf. Hogan 1997).

We suggest that the nonverbal, presymbolic, interactive, and emotional aspects revealed in our analyses of babytalk are also relevant to efforts to understand the nature and function of human language. The early interaction studies by Trevarthen (e.g., 1993) demonstrate that an infant comes into the world possessing motives<sup>9</sup> and propensities that are specifically adapted to perceive, respond to, and influence how other persons feel and what they perceive and do—a “with-the-other-awareness” that informs all its relations with other people, not only in early interchanges of the babytalk variety but in eventual verbal communication. Our findings support Trevarthen’s claim that babytalk not only contributes to the learning of lexical and syntactic aspects of language, but undergirds its persisting dialogic and emotional aspects. Our findings further suggest that language is important not only for naming objects or requesting things in the world, or externalizing thoughts, as some evolutionary psychologists and cognitive scientists propose, or for fitting in with socio-historical-political constructs, as some poststructural cultural theorists have claimed. One must not overlook the importance of human language in negotiating shared meanings with other persons, maintaining social relationships, and demonstrating emotional reciprocity (see also Locke 1993).

### **The Relevance of Babytalk to Understanding the Nature and Function of the Arts**

One can propose that because of human infant immaturity (altriciality), the primate propensity for relationship—not only or simply “sociability”—became so crucial that special affinitive mechanisms to enhance (reinforce) mother-infant interaction evolved to ensure it. Our analyses of the poetics of babytalk support the findings of developmental psychologists that in the interactions of mothers with their preverbal infants there is an innate predisposition for communicating and responding to emotional narrative dynamics with another person at the very beginning of human life.

What no other investigators of this interactive behavior have mentioned is that the preverbal competencies and sensitivities utilized in babytalk are in themselves the rudimentary affective and aesthetic elements that human individuals and societies ultimately build upon in an ordered and sophisticated manner when they engage in the arts. The appealing and compelling mechanisms of mutuality at both the macro- and micro-poetic levels—the simplifications, repetitions, exaggerations, and elaborations in

visual, kinesic, and vocal modalities; their organization into theme and variations; the use of structural features such as framing, phrasing, pacing, and closure; the development of pretense; the manipulation of anticipation and expectation; the use of phonetic tones and clusters; variations in rhythm—these are the same features and operations that artists use for the similar purpose of attracting attention and provoking and shaping emotional response. The existence of sensitivities to such features in the first weeks of life suggests that humans are born with natural (innate, universal) predispositions for aesthetic engagement, from which, we suggest, cultures and individuals have gone on to create their myriad elaborated forms of artistic expression.

Tracing the origin of the arts to mechanisms of mutuality suggests an alternative to the currently popular view (e.g., Miller 2000, 2001) that the arts evolved as advertisements of fitness—signals of desirability as a mate. Although it is widely observable that human males, like males of other species, display their artistic competencies to win mates, we suggest that the mechanisms of mutuality in ancestral humans provided other, specifically human, adaptive avenues for artmaking and response. The most conspicuous locus for the arts in preliterate societies that we know of today is in ceremonial rituals, in which visual, vocal, and kinesic elements occur together in communally participative performances.<sup>10</sup> Although individuals in such ceremonies have opportunities to display their prowess, one finds other adaptive functions of ceremonial aesthetic display: to pass on group knowledge, reinforce group loyalty, and reduce debilitating effects of anxiety by instilling in individuals the belief that they are not helpless or alone. Ceremonies everywhere deal with biologically important matters: their very aesthetic extravagance and excess also testify to (are correlative to and an honest signal of) the urgency and cultural truth of the messages they are used to convey.

The existence of robust aesthetic propensities in individuals and the widespread existence of arts in societies far and wide, past and present, calls into question the claim that art is a superfluous by-product of another adaptation—an artificial stimulant that people use to push their own pleasure buttons (Pinker 1997). Unlike the consumption of cheesecake, pornography, or recreational drugs for self-interested pleasure, participation in the arts additionally promotes emotional communion with other humans. The paleolithic cave painters, and the persons who crawled through cold, wet, dark tunnels to view the images and engage in communal activities before them—or distraught Americans responding spontaneously to their confusion and suffering after the September 2001 attacks in New York City by writing poems, displaying flags and flowers, and joining to sing or listen to poetically expressed language together—seem unlikely to have been simply “pushing pleasure buttons.”

Had our ancestors wished to devise a way to promote group cohesion and a sense of common purpose, and to relieve individual anxiety, they could hardly have done better than to co-opt the mechanisms for mutuality that were in place between mothers and 6- to 8-week infants in order to reliably and compellingly shape attention, coordinate emotional state, enculturate, and bond.

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## NOTES

1. It is necessary to explain our choice of the word "babytalk" and distinguish it from other uses of this term, as well as from terms that may seem similar, such as "infant directed speech," "motherese," or "parentese." These latter three terms refer to *vocalizations*, as do the definitions of "baby talk" (two words) in Webster's Third International Dictionary: (a) "the syntactically imperfect speech or phonetically modified forms used by small children learning to talk" and (b) "the consciously imperfect or mutilated speech or prattle often used by adults in speaking to small children." In contrast, we use the term "babytalk" (one word, which does not appear in Webster's) to refer to dyadic, jointly constructed engagements between a mother (or adult, or parent) and an infant (under the age of 5 or 6 months) in which vocal, visual, and kinesic behaviors (or signals) are exchanged. A one-word label for this behavioral phenomenon seems justified.

2. Attachment theory has been considerably amended and developed over the past thirty years. Refinements to the theory or controversies among its adherents do not affect the plausibility of the ideas described in the present paper, in which Bowlby's theory is mentioned primarily to provide historical perspective.

3. The standard linguistic term for the nonverbal expressive features of language—*how* something is said—is "prosody." We choose the term "poetics" to refer to these prosodic features as they foster interpersonal coordination and attunement, and in contrast to the literary term, "prose," which suggests the exposition of verbalized thoughts and descriptions—i.e., *what* is said.

4. We are aware that our conclusions here rest on a 1-minute utterance by one English-speaking mother. Recordings by Trevarthen of Greek, Swedish, Italian, and Yoruba mother-infant pairs await transcription, translation, and poetic analysis. There is strong support for the theory that motherese is universal among modern humans (see reviews that show "impressive consistency in the use of exaggerated intonation in speech to infants" [Fernald 1992; see also Monnot 1999]). Microanalyses of caretaker-infant interactions and perturbations of social contingency experiments for 8-week-old infants exist only for North American and Western European pairs. However, studies of infancy in contemporary hunter-gatherer societies such as the !Kung (Konner 1977), Arnhemland Aborigines (Hamilton 1981), Efe pygmies (Tronick et al. 1987), and Aka pygmies (Hewlett 1991) unani-

mously report that caretaker-infant association is vocally, visually, and physically stimulating, giving plausibility to an assumption that the predisposition for interactions such as we describe may be ancestral.

5. For additional analysis of the transcript see Dissanayake 2001.

6. Researchers (e.g., Papousek and Papousek 1997; Snow and Ferguson 1977) have noted the importance to a child's eventual language learning of adults' use of stress, prolongation, isolation, repetition, and other operations on speech that we here call "foregrounding." Here we point out its equally important contribution to the coordination of emotional communication.

7. For example, Trevarthen and Aitken (1994), in a review of the relationship between brain development and emotional regulation of the infant's emerging personality, identify an "intrinsic motive formation" (IMF), i.e., a neural system that guides infant brain growth after birth, predisposing infants "to share emotions with caregivers for regulation of the child's cortical development, on which cultural cognition and learning depend."

8. Interestingly, Jakubinsky was also one of several authors to suggest that verse emerged from the babble of the infant (Steiner 1984:151). In her notion of *chora*, the contemporary psychoanalyst and literary theorist Julia Kristeva posits a prelinguistic "semiotic" that precedes, underlies, and is eventually overpowered by the "symbolic" process of signification in language (Kristeva 1984). Initially this formulation seems to be relevant for a poetics of babytalk: Kristeva emphasizes the emotional importance of the mother to the preverbal infant, stresses the psychosomatic modality of *chora*, suggests that it is subject to vocal and gestural organization, and posits an underlying semiotic rhythm within verbal language. Yet her theoretical position seems to rest ultimately on a pervasive dualism of body/mind, animal/human, self/Other, nature/culture, female/male, and nonverbal/verbal that babytalk as we have heard it challenges and subverts.

9. Trevarthen (1993:123–124) uses the term *motive* to "designate a mental function that is a cause and director of movement and, at the same time, a seeker of information to direct and confirm movement—to make it work for a purpose . . . The motive regulates what will be chosen for uptake in perception and for retention in memory. Motives originate in largely inaccessible cerebral activity, but because they generate a wealth of movements for aiming and focussing perception as well as for acting on the world, they are as real and readily observable as any regulatory principle in behavior, provided the observer is [concerned] to detect their invariant indices. The central energy and self-regulating quality of motives are expressed in emotions."

10. William H. McNeill (1995) proposed that coordinated rhythmic kinesic and vocal movement ("muscular bonding," as in military drill) might well have evolved in humans to reinforce feelings of group solidarity. McNeill's study did not include findings about young infants' capacities for engaging in dyadic, temporally organized interactions, which we offer here as a plausible evolutionary origin for the rhythmic coordinated activities of adults that he identifies and discusses.

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