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The role of child-directed speech in language acquisition: a case study

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Abstract

This study examines the nature of child-directed speech (CDS) from the perspective of functions [M.A.K. Halliday, Learning how to mean: Explorations in the development of language, Elsevier North-Holland, Inc., New York, 1977] and social interactionist theory. It is argued that previous explanations of CDS, often called motherese or caregiver speech, have either minimalized or neglected the functionalist–interactionist dimension of input in language acquisition. Far from being merely a novel way of describing the language caregivers use with infants, CDS is presented as a crucial catalyst in the complex process of L1 acquisition.

At the heart of CDS is negotiation between caregiver(s) and infant. The infant need not always respond with complete or near-complete linguistic units or constituents such as an adult might during a given negotiation, yet the context of the negotiation remains crucial to the infant. As physical maturation increases and the infant begins to produce more adult-like utterances, the negotiation between interlocutors becomes more balanced, syntactically and phonologically, but not necessarily semantically/functionally.

This paper presents the results of a case study which specifically examines the utterances or input which family members direct at a Japanese infant during the early part of his language development. The data generated by the subject and his parents provide an interesting glimpse into one of the ways in which infants absorb language. The results of the data analysis show that while the parents of the subject were seen to use roughly equal amounts of language with

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the child, the distribution of language functions used by the mother was importantly different from that used by the father; therefore, it is suggested that this difference in CDS aids the language development of the infant by providing more interactive negotiation, which is argued to be the crucial factor in language development.

Keywords: Child language acquisition; Child-directed speech; Language functions; Social interactionism

1. Introduction

On the face of it, the following short piece of actual dialogue would seem to contain an ordinary exchange between a mother (M) and father (F) and their young child (H). That it is in Japanese or that its contents relate to mundane events in the life of the child are not the especially noteworthy parts, except, perhaps, to suggest the universality of such parent–child exchanges. However, whether this language exchange contains components crucial to the child's language acquisition process is extremely important.

M: *hikaru chan*, *yatta to itte*, 'Hikaru, say, ''hooray!'''
F: *gokigen wa ii mitaidesu*. 'It appears that his mood is good.'
M: *yatta wa*, *iutte*, 'What about ''hooray?'' Say it.'
F: *yatta to itte*, 'Say, ''hooray.'''
H: [pepe, pepe,]
M: *pipi ne* '''Pipi'', isn't it?'
H: [pu:] [pu].
F: *koe dashite*, *yattatte*, 'Speak up. Say, ''hooray.'''
H: ((laughs.))
F: *yatta to itte*, 'Say, ''hooray.'''
((pause here; lots of background noise.))
H: ((laughs,)) [ba, ba,]
M: *doshitan? meme?* 'What's wrong? (Is it your) eye?'
H: [meme] ((squeals and makes 'brrr' noise with lips many times.))
F: *yatta*. 'Hooray!'
((M & F talking in the background for some time here.))
H: ((playing and shouting,)) [pipi pipi pi], [pipi pipi,]
M: ((to F)) *chotto*, *nitattekitara yowabi ni shitene*.
((to F)) 'Hey, when it starts boiling, lower the heat.'
((to H)) *tori no koto pipi ittendane. pippi pippi*,
((to H)) '(You say) pipi for bird, don't you? Pippi, pippi.'
M: ((goes outside and tells F she is going to the garden.))
F: *hikaru chan itchadameyo*. 'Hikaru, you can't go.'
H: ((starts to cry))
F: ((to H)) *iyo iyo ittekite*, *ittekite*, ((to H)) 'Ok, ok. Go, go.'
H: ((cries))

Superficially, this kind of language interaction, which is replicated daily by parents and their children around the world, seems unremarkable, even meaningless. However, it is anything but meaningless for it contains utterances which urge this child into action, question him, and confirm things for him, all of which are rather complex concepts. Parents use language to help reveal the world to their children. However, infants are not born with adult-like language competency with which they can comprehend the meaning of the language their parents direct at them. So, where, one may logically ask, do they get that ability? Though it is likely that children are born with some sort of innate capacity for language acquisition (the nature of which is only theorized at present) which might play some role in the language learning process, we know that normal infants successfully manage to acquire the language(s) of their environment. Exactly how infants become such skilled manipulators of a communication tool as complex and nuanced as language, and to do it within a relatively short time frame, still remains a fascinating riddle without a completely satisfying solution.

Chomsky (1988, p. 3), near the outset of his Managua Lectures, states that

> [a] person who speaks a language has developed a certain system of knowledge, represented somehow in the mind and, ultimately, in the brain in some physical configuration. In pursuing an inquiry into these topics, then, we face a series of questions, among them:
>
> 1. What is the system of knowledge? What is in the mind/brain of the speaker of English or Spanish or Japanese?
> 2. How does this system of knowledge arise in the mind/brain?
> 3. How is this knowledge put to use in speech (or secondary systems such as writing)?
> 4. What are the physical mechanisms that serve as the material basis for this system of knowledge and for the use of this knowledge?

Chomsky's second question, which deals with the thorny issue of acquisition, necessitates direct, empirical study of child or first language (L1) learning in order to help explain the 'system of knowledge' mentioned in his first question. Yet, to approach any sort of answer to the question of how language is acquired, an examination of how and for what purposes that language comes to be used by the infant (Chomsky's third question) should also be conducted.

To begin to answer this multi-faceted L1 acquisition question and how the acquisition relates to L1 usage, one must ask, 'Assuming that a language acquisition system of some sort exists within the mind of an infant and is operating normally, how does it work?' In the simplest of terms, the function of human language is to encode and decode signals that are sent between individuals. These signals can range from an infant's simple expression of pain or pleasure to a teacher's explanation of a sonnet. Typical production and comprehension of a language (the potentially infinite set of linguistic signals and functions of that language) assume an intelligence which creates, directs, and understands specific linguistic output, and which can accurately decipher and appropriately respond to linguistic input.

Chomsky's questions, especially the acquisition question, have long been considered either from a biological perspective or, once an infant is old enough to begin producing 'language' which somewhat resembles typical adult forms, from a developmental perspective, both of which are influenced by the environment. It is almost a truism that the theory of acquisition one adopts and the method of studying L1 acquisition one chooses determine to a great extent the types of questions one asks and the way one examines the data gathered from such questions, and so, theories of language acquisition abound. Piper (1998, pp. 141–164) provides a succinct overview of the principles, strengths, and shortcomings of behaviorist, nativist, cognitive, and social interactionist theories of language acquisition. Even though each of these general theories has strengths and weaknesses, the one that I believe provides the greatest insight into the process of language acquisition and, therefore, the one on which I base the present study, is social interaction theory.

More will be said about this theory later, but for now a short quote from Piper (1998, p. 161) sums up my motivation for choosing social interaction theory as a basis for examining L1 acquisition.

> The question that is of primary interest in language acquisition theory is how children acquire the ability to express their intentions or meanings in language. [Social] interactionists believe that they do so through *a process of negotiation with their mothers or principal caregivers* [emphasis added]. This negotiation occurs partly as a result of mothers treating children's speech, even if it is babbling, as *meaningful and intentional* [emphasis added].

Investigations of L1 acquisition which focus on biological aspects and which are unquestionably of great importance, neglect, or at least minimize, what I believe to be the crucial aspect of that acquisition: namely, the interaction (or in Piper's terms, the 'process of negotiation') of the child and mother (or primary caregiver), arguably the most important person in the infant's environment. It is this interaction, and its concomitant facilitation of the development of functional language use, which demands the closest scrutiny and, therefore, is the aspect of L1 acquisition on which I will focus.

1.1. Statement of the problem

The research on child language acquisition has examined from a variety of perspectives the language that infants *produce*. If, however, we assume that infants do not learn language in a vacuum, an examination of the infant's linguistic environment seems logical and appropriate. In a different but related area of study, second language acquisition (SLA) research, a great deal of work has focused on the *input* to which learners are exposed (see Gass, 1997; Gass and Selinker, 2001; for comprehensive and insightful discussions of issues regarding input). The implication of this vein of SLA research is that the input to which second language learners are exposed is a very important component in determining the output that they produce in the target language. That this should be even truer for first language acquisition is almost too

obvious to mention. Nevertheless, this specific area of L1 research, the linguistic input directed at infants by their parents, has not been examined from the perspective of what language functions it may contain and how those functions may affect L1 acquisition.

1.2. Research question

In this study I attempt to answer, at least in part, the question of 'how the system of knowledge arises in the mind/brain.' Specifically, I examine L1 acquisition through a study of the interaction between a young child and his family in order to discover how it might be that infants come to understand the relationship between the phonetic and semantic net which is thrown over them in the first few years of life and the world which that net represents. First, I will examine what research into L1 acquisition says about how language acquisition is believed to take place. Next, I will present what has been said about one of the most crucial factors in that acquisition: child-directed speech (CDS—variously referred to in the literature as 'infant-directed speech, parentese, caretaker speech, nursery talk, nursery language, and caregiver speech' (Cattell, 2000, p. 104)) and its contribution to the language learning process. Then, after having presented the research plan for this study, I give the results of this study with their analysis. Finally, I will explain why previous analyses of the L1 acquisition by infants are incomplete and will propose a more appropriate perspective from which to view the relationship of CDS and L1 development.

For this study I examine the interaction between an infant and his environment in the context of social interactionist theory and using the taxonomy of language functions proposed and defined by Halliday (1977). Halliday's work posited that the language children use contains functions which show what children do with language. These functions, which Halliday believed to be present in the child's output system, do not, of course, appear fully formed and functioning at birth. The functions (and of course the language which is used to convey them) must have developmental roots within either the children themselves or the environment, or perhaps both. Although Halliday examined a child's linguistic *output* system, it is reasonable to ask what influence the environment, in other words, the *input*, has on the development of that output system. If the environment plays any role at all in the linguistic development of an infant, presumably the parents or primary caregivers are responsible for a substantial part of the input needed for the infant's linguistic development to commence and then flourish.

But, recalling Chomsky's question of how the system of knowledge arises in the mind/brain, we may ask 'What is the nature of the input, the "linguistic net," which is thrown over the infant? Does it contain some or all of the types of functions seen in the output that Halliday has proposed? If so, which functions appear and in what concentration? Can we discover any sort of relationship between the input and the output?' If this functional language 'net' does indeed exist, it should be detectable in the language spoken to infants by their family members or those with whom they have sustained contact. It is perhaps reasonable, then, to suppose that CDS may be more complex and play a more crucial role in acquisition than has been thought.

By examining the kind of language parents or caregivers use with infants according to the functions Halliday saw in the output of his subject, it may be possible to discover a better and more appropriately quantifiable way of describing CDS than has been available before. It is logical to believe that normal adult speakers have the ability to use their language for any and all functions that exist in a given language with other adults; however, one might assume that there is some observable and quantifiable variation among parents or caregivers in their use of functional language when they interact with their young children. But because there are no set rules about what sort of language people must use with their children, an empirical examination of just what they actually do is necessary. In an attempt to do this, I believed that recording the language and interactions in which an infant and his parents engaged would provide the raw data from which a clearer picture of CDS might emerge. Since much of the literature in the field of L1 acquisition examines the relationship between infant and mother, I hypothesized that it would be in that dyad where functional language use and L1 development would be most easily observable.

Since mother–child interactions would likely be the most profitable for investigation (Bloom, 1993; de Boysson-Bardies and Vihman, 1991; Snow, 1995), I also surmised that this relationship would produce results that were quantitatively very different from that of the other relationships the child would have with other family members. Based on my understanding of Hallidayan functions (which will be explained below), I presumed that the interactional function would be the most important and prominent and that the regulatory function would also be prominent in the mother–child interactions but to a lesser degree. Putting all of these beliefs, assumptions, and guesses together, I formulated and proceeded to test the following related hypotheses:

(a) The CDS used by the mother with her child in this study will be quantifiably different in content and quantity from the language that other family members use with the subject.
(b) Though all functions of language may be present in the linguistic input to which the child is exposed, a specific subset of those functions, the interactional and regulatory functions, will dominate the interactions between mother and child and will be less prominent in the language uttered by other family members.

2. A review of child-directed speech (CDS)

2.1. Introduction

In the following sections, I will present a discussion of language acquisition theory as it applies to the area of phonological acquisition. This is done to show the extent

to which one specific area of L1 acquisition research has gone to explain this process and to show that a crucial part of that process (the input) has been somewhat overlooked and should be re-examined. The suggestion here is that biological explanations for language development fail to provide a complete picture of how language acquisition happens, and that, consequently, there is a need for a greater consideration of environmental factors. Then I introduce and discuss social interactionism, the theory on which the present study hinges. Next, I present an overview of CDS (including a criticism), after which I will discuss various crucial aspects of CDS. Finally, I present Halliday's taxonomy of language functions and how they can relate to the L1 acquisition process.

2.1.1. Theories related to the acquisition of phonology

Although a complete understanding of how infants acquire language still eludes researchers, various theories of language development exist. Many of these theories are based on biology due to the assumption that the biological maturation process of an infant is concomitant with and largely responsible for the relatively rapid acquisition of language proficiency.

To take one example, a great deal of work has been done on the development of the speech capacity and phonological development in infants (Bloom, 1993; de Boysson-Bardies, 1999; Budwig, 1995; Harris, 1990; Ingram, 1989; Jusczyk, 1997; Locke, 1993; Oller, 2000). Even within this single component of L1 acquisition, there are various theoretical approaches. Ingram (1989, p. 96), for example, summarizes four main types of theories of infant speech production:

> *Universal theory*: the infant begins with the ability to articulate all human speech sounds, then loses those that do not occur in the linguistic environment.
> *Articulatory learning theory*: the infant is born with virtually no articulatory ability. Early speech sounds will consist of those heard in the environment.
> *Maturational theory*: the onset of human speech sounds will be gradual, that is, according to a biological predetermined program. Infants in all linguistic environments will show the appearance of specific sounds at the same approximate ages.
> *Refinement* (*vs. Attunement*) *theory*: the infant begins with a preliminary or basic set of speech sounds to build upon. He [sic] then acquires or adds other less basic sounds from the linguistic environment.

Ingram (1989, p. 97) adds a minor caution in his discussion of theories of infant speech production when he states that

> [these] theories can only begin to be appropriately examined with data from infants around 6–8 months of age. The reason for this is the tremendous physiological development that takes place in the infant's speech apparatus after birth, especially during the first year. These changes will continue in fact up to 14 years of age. It is at approximately 6 months, however, that the child's

Table 1
Infraphonological interpretation of infant vocalizations at four ages (Oller, 2000, p. 11)

Ages in months	Global protophone categories mastered	Principles of syllable well-formedness mastered
0–1	Quasivowels	Normal phonation
2–3	Gooing	Articulation
4–5	Marginal babbling, full vowels	Full resonance
6–7	Canonical babbling	Rapid formant transition

vocal tract begins to approximate to its adult shape, and that the vocal behavior generally referred to as 'babbling' begins.

This is not to suggest that during the first six to eight months of an infant's life nothing of phonological importance is generated. On the contrary, Oller (2000), who has created a taxonomy of what he calls protophones which can be used to analyze infant speech, indicates which categories of 'global protophones (the precursors of phones)' (11) have been mastered within even the first few months of life (see Table 1). This suggests that Oller views very young infants as already actively involved in the learning process. Nevertheless, Ingram's caution implies that the speculation regarding exactly what is happening to the very young infant in terms of perception and production of L1 requires more supporting data to be of maximum use.

An interesting point to keep in mind here is that the environmental input is quite prominent in three of the four theory types mentioned above. Even in the area of speech production, without input from the environment, the infant will apparently not successfully acquire the ability to produce the sounds of its language no matter how much physical maturation proceeds.

2.1.2. Influences of input on phonological development

Kent (1992, p. 83), in his discussion of the origins of perception and production, provides a simple diagram (Fig. 1) which shows how he views the interaction of genetic and environmental factors. This interaction is a very important aspect of social interactionist theory to be discussed later.

Although it may not appear so at first glance, the flowchart above contains both input and output stages with respect to an infant's phonological development: 'the input channel (principally audition, but this input may be integrated with vision) and the output channel (motor regulation of the speech apparatus)' (Kent, 1992, p. 82). As Kent (1992, pp. 82–83) goes on to describe this input-output relationship, he mentions that:

> [b]oth input and output channels have a genetically determined potential. With respect to audition [the input], the genetic potential is for an apparently universal, multicategoried analysis of acoustic stimuli... The genetic potential for output, *as mediated by environmental factors* [emphasis added], is expressed primarily in the form of predispositions to certain sound patterns... *Exposure to*

		Environmental influences • Ambient language		
Genetic Factors		=		
• Audition: Universal (innate) speech sounds Categories	→	Attentional Subsystem	→	Recognition code for speech sounds
		> =		
		Orienting Subsystem		
		=		
• Speech Motor Function: Developmental anatomy of speech apparatus; early movement synergies	→	Modification by perceptual experience; development of sensorimotor trajectories	→	Adjustment of motor patterns to phonetic properties of the ambient language

Fig. 1. A scheme of auditory-motor developments in early phonological acquisition. Genetic and experiential factors interact during development to produce the final observed behaviors (Kent, 1992, p. 83).

> *the ambient language* [emphasis added] selects some categories of auditory analysis for preservation, others for neglect. The mechanisms appear to involve both attentional and orienting processes.

For Kent, a very important aspect of language development seems to be how the genetically determined potential is maximized via the intricate processes of motor development. Yet, as the emphasized portions of the previous quote suggest, without the environmental influences (presumably, the language the infant is exposed to), there might be no motor adjustments, no sensorimotor trajectory changes, and no language development at all. Even the terms used in this model, 'attentional subsystem' and 'recognition code,' suggest that meaning is present in the language the infant is exposed to; otherwise, it would simply be noise. Therefore, the infant must somehow deal with this meaning; it must make sense of the language input it receives, not simply be exposed to it.

Kent bases the innateness of speech sound categories on Jusczyk (1992) who has concluded that infant speech sounds are universal and very similar across languages. This system of environmental influences and genetic factors requires the attentional and orienting subsystems to be both stable and plastic at the same time; stable 'in the presence of irrelevant or frequently repeated events' and plastic 'to deal with new or novel events, or changing circumstances' (Kent, 1992). Although Kent (1992, p. 83) states that the attentional and orienting subsystems interact 'to produce a recognition that is stable for important events but also adaptive as environmental or behavioral demands change,' he does not specify how this occurs but simply that it does. Unfortunately, this is descriptive not explanatory. Presumably, and this certainly seems uncontroversial, the 'environmental or behavioral demands' to which Kent refers, would be conveyed to the infant, no matter what its age, through linguistic

input from the caregivers in the environment. This may be the first inkling of how language input influences the genetic or biological factors related to language acquisition. Nevertheless, however the genetic and environmental factors may interact for audition, motor control proceeds differently. Kent (1992, p. 84) states that

> [q]uite early in life, as the infant gains motor regulation of the vocal tract and is exposed to the ambient language, articulatory adjustments will reflect the learning of a motor envelope. This envelope is to some degree language sensitive, and this sensitivity is revealed in cross-language studies of infant babble, which indicate that babbling becomes adjusted to the parent language in terms of features such as syllable structure and vowel articulation... Adjustments in the motor envelope presumably are precursors to phonetic mastery but they are not in themselves necessarily segmental in nature.

This statement suggests that as an infant begins babbling, the sounds coming from it undergo a sort of internal analysis in which they are compared with the ambient language (typically the speech of parents) and are progressively adjusted during the 'motor envelope' to match that ambient language. A Japanese infant, for example, would, according to this view, eventually develop the typical vowel system ([a], [i], [u], [e], [o]) (Shibatani, 1990, p. 159) and syllable system (essentially CV(C)) of Japanese as its articulatory mechanism and control over those systems develop.

2.1.3. The place and limitations of biology in the L1 acquisition process

The references to the biological processes of development which affect an infant acquiring language are clear and important: anatomical changes, motor development, sensory input, and 'vocal motor schemes.' To summarize, it can be claimed that physiological development is the biological driving force behind the acquisition of the units of sound which combine to make phones and syllables which ultimately become words, phrases, and sentences.

Although such a theory assumes that biology ('nature') is the driving force behind language and its development/acquisition, it is important to note that during virtually the entire physiological maturation process, a normal infant will continue to receive input ('nurture') in all forms of CDS, which in turn also affects the sounds the infant produces during the complex process of language acquisition, ultimately transforming those sounds into meaning. For theorists to attribute the infinite capacity of language entirely to the workings of an enormously complex yet ultimately finite system such as biology, or more specifically, genetics, may be too simplistic an answer. Certainly the physical maturation of infants into normally functioning adults is an observable fact of biology. We note the physical changes which help explain why the infant becomes physiologically articulate (the changes in the vocal tract during the first few months of life, for example.) Other processes, such as increasing manual dexterity due to ever-increasing gross and fine motor control, are observable and play an important role in the overall development of the infant and how it interacts with its environment. But to attribute language development mainly to biological changes, no matter how complex they may be at, say, even

the cellular level (see Behe, 1996), does not explain why a child comes to differentiate accurately the pronunciation of the words for, say, 'dog' and 'cat' in his/her language. Observable maturational processes which take place in infants are, therefore, not necessarily sufficient to account completely for language acquisition.

Biological explanations only partially answer the question of how L1 acquisition is achieved. They provide explanations of how the physical apparatus necessary for L1 acquisition develops, but they cannot go further. An apt analogy to how these biological explanations relate to L1 acquisition might be that of a computer complete with all peripherals (monitor, keyboard, hard drive, etc.) but with no programs loaded into it. Until the programs are loaded and set into operation by the programmer with the appropriate 'input' commands, the computer will remain a simple collection of parts without purpose.

2.1.4. The contribution of Oller's theory to understanding the L1 acquisition process

As researchers have attempted to understand how language is acquired, many have looked specifically at one component of language development, as has already been noted. In his highly informative book on the emergence of the speech capacity, Oller (2000, p. 7) has suggested that previous approaches to the explanation and even transcription of infant 'speech' have been inaccurate and inadequate because they have attempted to 'shoe-horn' the infant's output into normal adult forms. To avoid this, he proposes what he calls an infrastructural model to account for early language development.

To illustrate how an infrastructural system functions at the conceptual level, Oller gives an example from the field of chemistry. In such an infrastructural system, three interrelated levels are posited: the operational categories, the infrastructural model, and the prime parameters. The *operational categories* of this chemistry example would be the 'lowest-order functional units: air, water, stone, etc.' The *infrastructural model* would contain the various theories of chemistry: 'atomic theory, thermodynamics, etc.' This level would 'specif[y] first-order units [elementary particles], and properties of function and interaction for both first-order and lower-order units.' The final and conceptually most basic level, the *prime parameters*, would 'include dimensions of description for units: mass, form, charge, viscosity, elasticity, color, number, etc.' (Oller, 2000, p. 7).

This system of interrelated levels is part of the backbone of scientific inquiry. Applying this theoretical framework to the study of language, specifically the area of phonological development, Oller (2000, p. 12) gives the following general infraphonological model:

> *Operational categories*—examples of functional units: particular phonological features, segments, syllables, phonological phrases, etc.
> *Infraphonology*—specifies principles generating the entire class of potential well-formed operational units and specifies properties of utilization and function of such units.
> *Prime parameters*—dimensions of description for units: amplitude, duration, frequency, resonance, etc.

He further explains why this type of approach is important

> The principles themselves in an infraphonological approach are primary points of reference in interpretation. In this newly designed search for understanding of the development of the speech capacity, operational-level questions, such as whether or not a newborn infant did or did not produce a [b], are avoided. Instead, at each point in time, the question is more fundamental. We seek to determine the extent to which infant sounds reveal command of the principles of well-formed speech sound construction. Further, we encourage description of the operational categories of infant sounds on their own terms with no shoe-horning. Infant sounds are called protophones in general and are given individual infant-appropriate operational-level titles, but they are not forced into frames of mature alphabetical categories where they do not fit (13).

Not only can this building block approach apply to theories of phonological development, it certainly seems logical to apply it to the account of the acquisition of meaning in infants as we will note in Oller's discussion of 'Semanticity' (see Section 2.3.3). The present study attempts to show that Oller's theoretical approach, which he uses to establish the tenets of infraphonology, is applicable to and can aid in the analysis of the meaning in early language since biological models account for developmental issues related to articulation but not directly to intentional meaning (Locke, 1995; Kent and Miolo, 1995).

2.2. Social interactionist theory

The theoretical foundation of the present study is that of social interactionism. This theory of L1 acquisition differs from others in important ways that will be examined here. Like behaviorists, social interactionists see the environment as central to language growth (Piper, 1998, p. 159). Piper also notes that 'both [theories] see parents as crucial to the process, but there is a major difference. Behaviorists tend to view children as passive vessels into which language is poured while social interactionists believe that children are active participants [in the L1 acquisition process] through their interaction with their parents.' She also mentions that though concerned with syntactic universals (like nativists), social interactionists '...are interested in how structure helps the child to function socially with language and thus learn more of it.' Also like nativists, social interactionists believe that children have some sort of innate predisposition to language acquisition but that that predisposition is less important to acquisition than is the social environment (1998, pp. 159–160).

Within the broad area that social interactionist theory subsumes can be found recent studies of baby-talk and motherese. These studies show that far from being linguistically impoverished (see Section 2.3.5 for comments on this issue by de Villiers and de Villiers), these forms of CDS actually aid language acquisition (Field et al., 1982; Gallaway and Richards, 1994; Stern et al., 1977). Social interactionists would argue that the mother's (or caregiver's) role is of prime importance within the envi-

ronment of the child. Piper (1998, p. 168) says that 'parents play an important role in matching the language *input* to the appropriate level of cognitive and language development of their children.' We will note later in the discussion of motherese some of the alterations parents make in the language they use with their children, such as shorter sentences and less structural variety. However, as Piper (1998, pp. 168–169) continues, 'it is probably not the case that adults consciously make such adjustments to their speech; what is more likely is that in their attempts to communicate with children, they unconsciously match their language to the appropriate cognitive and linguistic level for the child.' Parents also aid in language acquisition by focusing the child's attention on the immediate environment, the here-and-now. Whatever the child tends to be focusing on at a given moment is what generally becomes the topic of the language the parents use. These claims will be considered in the analysis of the data in this study.

According to Snow (1995, p. 180), the alterations parents make in the speech they use with their children (i.e., CDS),

> ...whether by adults or older siblings, differs from speech among peers on a variety of dimensions. It is syntactically simpler, more limited in vocabulary and in prepositional complexity, more correct, and more fluent... In other ways, though, CDS is still quite complex; it displays full range of conventional indirectness, for example, without the simplification of form-function one might expect (Shatz, 1978). While in general CDS is constrained to the here-and-now and related to the child's focus of attention or ongoing activity, a high proportion of at least some mothers' CDS redirects children's attention and activity, introduces non-present referents, and in other ways seems to complicate the task of learning language.

Snow explains that finetuning (the language adjustments caregivers make to their language when addressing infants and very young children) which begins in infancy is noted for its 'high pitch and exaggerated intonation pattern' (1995, p. 182). Research has confirmed that these characteristics are found in languages as varied as 'Chinese (Greiser and Kuhl, 1988), Japanese (Masataka, 1992), and various European languages (Fernald et al., 1989)' (Snow, 1995, p. 182). Though finetuning may deal with phonetic alterations of language directed at children, it is within the area of syntax where discussions of finetuning most often take place. Sokolov (1993) found that when children were more likely to delete items such as modals, nouns, or pronouns, parents were more likely to supply these missing items. However, as Snow (1995, p. 183) points out, there may be some developmental advantages in a relative absence of finetuning. She says:

> [c]onsiderable work (see Mannle and Tomasello, 1987; Barton and Tomasello, 1994, for extensive reviews) suggests that fathers (or secondary caregivers) and older siblings produce CDS that is less finely tuned to the child's developmental level than do mothers; these less familiar interlocutors are in general less responsive to immature child utterance and less likely to continue child topics... Fathers are also more likely to use unusual vocabulary items than are

> mothers. While the immediate effect of this poorly tuned speech may be conversational disruption, it is possible that fathers and other less familiar interlocutors provide children with important opportunities to learn skills needed for communication to more distant or unknown audiences, without the contextual and conversational support very young children enjoy in interaction with mothers.

Although it is clear that some input is needed for language learning, the question, as Snow (1995, p. 187) puts it, is whether or not this crucial language input should be viewed 'as a trigger (Lightfoot, 1989) or a catapult (Randall, 1990) launching the child into the language system with a single nudge, or as a source of opportunities for incremental learning.' There is likely some lower limit on the degree to which input can act as a trigger since we know that children in impoverished linguistic environments show language delays (Culp et al., 1991). But Snow also adds that 'most children clearly receive more input than is strictly necessary to support normal language acquisition, as shown by the fact that input can be distributed over two or three languages with the result that the child is a fully bilingual or trilingual speaker' (1995, p. 187).

Snow (1995, p. 189), discussing communicative intent, states the following:

> As children acquire new words during the one word stage, they typically also acquire expanded capacities to express themselves. There is considerable controversy over the degree to which children's early meanings and the means for expressing them derive directly from input. For example, Ninio (1992) demonstrates that over 90 percent of 18-month-old's single word utterances are used to express the same communicative intents as the single word utterances of the mothers addressing them, and furthermore that the children typically selected the most frequent form used by the mothers to express any particular speech act. She argues that this is possible because the children have an adult-like system for analyzing communicative intent, but rely on predictable form-function mappings in the input when seeking ways of expressing those intents. Barrett et al. (1991) agree that initial word uses are closely tied to maternal use, but argue that subsequent uses by the child are less predictable from high frequency maternal use.

But there are some potential inconsistencies herein. If the child uses an adult-like system for analyzing intent, then the child must already have at its disposal, possibly through prior acquisition or an innate endowment, some type of system for the comprehension and interpretation of intent. Although these researchers have observed what children do, they do not explain how the input causes the children to acquire this apparent ability to understand intent and produce utterances which adults believe contain that intent.

Certainly simple utterances usually associated with the expression of pain or pleasure noted in infants are typically construed by caregivers as carrying an appropriate (expected) intent/function of seeking assistance of some sort or giving confirmation of contentment. But when more complex requests or ideas are to be conveyed to

these caregivers, there must be something in the input which has caused the child to know which sounds to utter to achieve his/her goals.

2.2.1. Issues regarding noun and verb learning

Examining specific aspects of L1 acquisition, Snow (1995, p. 188) cites research (Huttenlocher et al., 1991) which indicates there are two primary factors that are extremely important for vocabulary acquisition. They are (1) density of maternal speech and (2) situation of exposure to the novel word. She cites research which points to the not unexpected fact that the first words children learn are those they are most frequently exposed to (Hart, 1991; Harris et al., 1988). She also points out that 'children whose mothers talk more per unit time show more rapid growth of vocabulary (Huttenlocher et al., 1991)' (Snow, 1995, p. 188).

Within the area of vocabulary learning, noun learning research (Tomasello and Todd, 1983) points to the most likely learned nouns as being those which are used during 'joint attentional focus between adult and child in naturally occurring interactions' (Snow, 1995, p. 188) Also, not surprisingly, 'highly nominative children are those whose mothers respond to social initiatives by naming objects the child is attending to (Goldfield, 1990)' (Snow, 1995, p. 188). Finally, 'Huttenlocher et al.'s findings (1991)... [show] that children who hear more maternal speech, other things being equal, learn vocabulary faster' (Snow, 1995, p. 188). Such findings certainly suggest the importance of the interaction between mother and child for noun learning.

A word of caution is in order here. Since the research just mentioned was done in an English-speaking environment, the question arises about how differences in basic syntactic structure may affect such outcomes as those given. Japanese is SOV in nature while English is SVO, and this difference may have some undetermined effect on just how language develops in children who are exposed to syntactically different input. (See the next section on 'verb learning').

Snow (1995, p. 188) indicates there are, however, differences between the learning of nouns and verbs. While nouns may be effectively learned by the child through 'joint attentional focus', verbs do not seem to be learned this way. In fact, 'Tomasello and Kruger (1992) report that verbs used to name impending actions are better learned than those used to name ongoing action.' This, Snow points out, may seem to contradict the findings that 'highly directive mothers have children who learn language more slowly (Della Corte et al., 1983; Tomasello and Todd, 1983), since directives typically include impending action verbs.' However, Snow (1995, p. 188) mentions a fascinating finding in which a 'careful analysis of directive mothers' talk suggests that ''responsively directive'' mothers, those who issue directives that do not shift the child's attentional focus but follow on from the current activity, actually facilitate vocabulary acquisition ($r = 0.78$ in a study by Akhtar et al., 1991).'

It seems, then, that there is still an important 'focus of attention' which mothers must make sure their children maintain if vocabulary learning of nouns or verbs is to be facilitated. Naturally, not all verbs can be learned in this way. Mental state verbs (think, feel, etc.) or abstract nouns (love, fear, joy, etc) do not lend themselves to these contexts for acquisition (Snow, 1995, p. 188).

An interesting point emerges when the data for this study are examined. Nouns are predominantly, though not exclusively, the focus of the parents' attention in getting H to speak during the recording sessions. However, Snow (1995, p. 193) points out that Clancy's (1985) study showed that 'children in Japan do not start out learning nouns, sharing with English-speaking children the unquestioned conviction that nouns are cognitively more accessible, easier to map onto referents, and simpler in form; they prefer to learn verbs, just as their language prefers to retain verbs and delete nouns in conversational ellipsis.' Snow concludes this discussion of the work which is beginning to be done with children on the effects of input on the language system itself with this statement: 'these effects of language structure on children's language systems suggest an enormous susceptibility on the part of language learners to the effects of input, only a tiny portion of which have we yet documented. (1995, p. 193)'

Input, then, would appear to be of much greater importance than anyone has yet believed. It is responsible for language acquisition with CDS clearly being the leading component of the input which, depending on one's point of view, either gradually leads the infant closer and closer to adult proficiency or catapults the infant into the world of meaningful communication. What appears most clearly in all the preceding discussion is that social interaction between the child and its caregivers is of crucial importance if a child is to foster normal L1 language development.

2.2.2. Where social interactionism and biology meet

To conclude this discussion of social interactionist theory of language acquisition, several crucial points that Dickinson and McCabe (1991) make will prove helpful both to understanding the theory and to seeing how the current study employs this theory. In their description of social interactionism, they state (1991, pp. 10–11) '[w]hereas behavioral and linguistic approaches to language acquisition are on opposite extremes of the empiricism–nativism pole, *social interactionism* is an approach that acknowledges biological contributions to the language acquisition process but emphasizes also the way that language is acquired socially.' They cite research by White (1978) which indicates a positive relationship between the amount of time parents talk to their children and the IQ of those children between birth and three years. In addition, research by Wells (1981) relates the same factor (amount of parent talk) to academic achievement between ages three and five. The obvious implication here is that the interaction parents and infants engage in reaps long-term benefits academically as well as socially.

Dickinson and McCabe (11) provide the following reasons (from Snow et al., 1984) why such 'global measures of language are predictive of intellectual accomplishment.'

1. To begin with, such language is *semantically contingent* (i.e., what the parent says meaningfully relates to what the child says). For example, if a child says, "truck," an adult might respond, "A big, big, yellow truck, isn't it?" In such exchanges children hear language related to their own but providing a little more informa-

tion on a topic of interest to them. Repeatedly, investigators find that semantically contingent speech facilitates children's language acquisition (Clark-Stewart, 1973; Cross, 1976; Snow, 1984; Wells, 1980).

2. Children acquire *communicatively useful language* from all that they are exposed to; that is, children learn the words that apply to objects and experiences that interest them, ignoring words for objects and experiences that are not salient to them. For example, although young children undoubtedly hear the articles *a*, *and*, and *the* quite frequently—these are the most frequent words used in English—they never include these among their early vocabulary; the words refer to nothing of interest to them.
3. Children *imitate selectively* as a technique to keep conversation going, to practice unfamiliar forms of language, and to learn new forms; they do not mechanically imitate upon request. Despite learning theory accounts that foreground child imitation is a key mechanism of the language acquisition process, adult imitation of children may be more important than child imitation of adults in the language acquisition process. Only when children find imitation communicatively useful will they engage in it.
4. Children *negotiate meaning* with their parents, with parents requesting clarification from them and vice versa. Communication allows for second, third, and fourth chances for success in optimal parent–child encounters.

These concepts, tenets if you will, are important not simply because they encapsulate the elements of social interactionism but also because they raise questions about the validity of both behavioristic and nativist theories of L1 acquisition. Social interactionism cites the interactive nature of parent-infant language as the reason why language acquisition happens. L1 acquisition is not viewed as simply stimulus-response conditioning no matter how complex one might envision the stimulus-response chains which behaviorist theory posits as responsible for learning. The communicative and creative nature of language, especially the language of children, cannot be accounted for by behaviorism, nor can the selective imitation of words children engage in. Such 'selective imitation' implies a decision on the infant's part as to what chunks of the language he/she is interested in and is willing to explore further. Similarly, the question arises of how the 'here-and-now' nature of infant speech relates to nativism with its heavy reliance on innate capacities of language. Social interactionism sees parents and children negotiating meaning of the 'here-and-now'—children selectively imitating portions of L1 input they deem interesting and parents expanding on that output to provide the child with additional and more finely tuned input.

CDS, I believe, facilitates the infant's exploration and development of L1 in more varied ways than may be first apparent. Within the negotiation that takes place in CDS, the mother's CDS (at least in this study) contains a unique combination of language functions which is importantly different from that directed at the infant by other family members. Far more than being just a part of the overall process of L1 learning an infant goes through, CDS/motherese may be seen as a possible catalyst for L1 acquisition.

Before going on to a discussion of CDS, one last point needs to be made. There are some who feel that social interactionist theory and CDS have some serious flaws. These criticisms will be discussed in Section 2.3.1.

2.3. CDS: an overview

The miracle that is language acquisition can be examined from a wide variety of perspectives through the lenses of various theories, some of which have been mentioned. Ultimately, however, a fully adequate theory of first language acquisition must account for the influence of both genetic and environmental factors on that process. Recall the discussion of Kent's views on how genetic and environmental factors interact in the development of the child's phonological system. Those environmental factors require further examination and explanation. To explain at least part of this enigmatic process, CDS, surely one of the most crucial parts of the environmental influence on language development, must be examined closely. Many researchers have weighed in regarding the nature of the linguistic input directed at children from parents. What follows touches on specific important aspects of CDS. The next sections will present information that will explain various aspects of CDS and provide support for the social interactionist theory of language acquisition.

2.3.1. First, a criticism of social interactionist theory and CDS

Some objections to social interactionist theory of language acquisition have been voiced, however, and should be considered. One criticism of this theory, as Piper (1998, p. 163) puts it, concerns universality: 'As Susanna Pflaum has pointed out, if the dialogue between parent and child is the critical mechanism for language learning, then such dialogues would be found in the language learning of all children everywhere.' This claim (or unsupported hypothesis) may be too broad to be viewed as a serious criticism; however, some researchers (Heath, 1983, 1986, Schieffelin and Ochs, 1983) have cited cultures where this (the 'dialogue' between parent and child) apparently does not take place. 'In one community studied by Heath, it appears that baby talk does not exist; and if children wish to participate in the talk of the group, they have to interrupt to do so' (Piper, 1998, p. 163). This particular issue will be discussed further a little later in a related context.

This criticism certainly must be considered if social interactionist theory is to try to account for any L1 acquisition. Although social interactionist theory does hinge on the interaction between infant and caregiver (though perhaps not just on parent–child dialogues), perhaps for the exceptions cited in the above examples, the definition of caregiver simply needs to be broadened. Parents, especially the mother, are typically the primary caregivers and language providers for an infant; however, the theory does not necessarily exclude other people from being sources of language input for the infant. In fact, if parents (or just mothers) are not going to be the primary caregivers and/or source of linguistic input for infants, given that even the children cited in Piper's statement above do learn their first language, it is clear that enough input from an appropriate source (others in the community, surely) has been available to achieve the goal of L1 acquisition.

A slightly different but related issue will now be discussed. Though many researchers have written about CDS and have taken it as an important factor in child-language research, at least one linguist, Lightfoot (1991), presents an opposing view. Reacting to the theory of motherese put forth by Snow (1977a,b), which claims '... that the crucial input for language growth is very small, and that it consists of a specially structured form of speech transmitted through mothers and caretakers,' Lightfoot states that though '... "motherese" is supposed to provide a set of patterns which are generalized by children on an inductive basis[,] ... there are at least four reasons why this kind of pattern generalization is not the means by which children acquire speech' (1991, pp. 18). These reasons (Lightfoot, 1991, pp. 18–19) are summarized here:

(1) no factual basis exists for the claim that children 'register only what is filtered for them through their parents' deliberately simplified speech,'
(2) if motherese does help the child register well-formed utterances, it still does not overcome the other problem of 'deficient' input; it deals only with the 'degeneracy' problem,
(3) if motherese allows the child to register only simplified and well-formed sentences of motherese, then the task of learning the complete language is made more difficult since it does not provide the child with all the other sorts of language that must be encountered to ensure mature language development,
(4) motherese exposes the child only to a limited set of sentence types (questions and imperatives) and does not represent the typical language the child will meet in the real world.

Additionally, Lightfoot comments that there is no clear definition of what motherese consists of and that, in fact, it may not be universal. Therefore, 'even where motherese is not practiced, children nonetheless attain a normal linguistic capacity' (1991, p. 19).

These criticisms of motherese/CDS are perhaps valid if one considers motherese as the 'cause,' or perhaps 'trigger,' of an infant's development of syntactic competency. However, it may be, in fact, that the main purpose of motherese/CDS is not necessarily to supply all the language that will trigger the specific parameters of universal grammar (UG) for the infant's L1. It may have a very different role. However, Lightfoot is quite right to ask for a better definition of motherese/CDS, one that will specify its bounds and highlight its strengths. This is part of what this study attempts to do.

I will attempt to counter or at least diminish the preceding criticisms Lightfoot has leveled at motherese/CDS. First, perhaps it is not necessarily syntax that is filtered through motherese as much as it is affect. If anything stands out from Harris's descriptions of motherese below (see Section 2.3.7), it is the way in which those who use motherese with a child try to make their language fit the child's emotional state. Syntactic concerns are not the primary focus of descriptions of the qualities of motherese. Therefore, to criticize motherese for not being structurally adequate to account for all language development seems to me to be unfair. Lightfoot says at the outset that we cannot know exactly what it is that any child registers out of the total input.

If that is the case (and I do not admit that contention is absolutely valid), this does not necessarily mean that motherese does not provide the child with substantial and important input.

Lightfoot's second criticism of motherese deals with the problem of 'deficient' input. Again, if motherese is not viewed primarily as a conveyor of L1 syntax, then this criticism is not valid.

His third criticism, that a limited set of well-formed motherese utterances would hamper rather than facilitate language learning, is problematic. Whether motherese consists of nothing but well-formed utterances is debatable. The data of this study certainly do not support such a claim, so his assumption may be flawed.

A study by Kuntay and Slobin (1996) of the language a Turkish mother uses with her child dealt with what they referred to as 'the ''puzzles'' presented to a child by a language with flexible word order, complex nominal and verbal morphology, and a high rate of nominal ellipsis' (265). The purpose of this study was to determine whether, in a language other than English, CDS does in fact exhibit simplified structures to aid the child in learning the language, in this case Turkish, a very complex one. If, as Lightfoot suggests, CDS contains only a limited set of well-formed utterances, the child could not succeed in learning the complex language without, perhaps, substantial simplification in the mother's CDS. The Kuntay and Slobin study, however, found that, 'at all identifiable points of morphological complexity, we [saw] no evidence of simplification or avoidance of complex forms in child-directed speech' (1996, p. 284). They go on to say that

> [i]n Turkish the child must learn to track lexical items across varying utterance positions, with different associated collections of agglutinated morphemes, moving in and out of patterns of ellipsis. The mother did not seem at pains to simplify these tasks for the child. If anything, we would propose that the entire set of cues is necessary for the child to be able to solve the problem. That is, without being exposed to this range of variety, it would probably take much longer to identify the relevant dimensions of lexical, morphological, and syntactic variation in the language (1996, p. 284).

It appears then that, although the Kuntay and Slobin study was based on only one informant and extrapolating their results to other languages is dangerous, it is quite possible that mothers or caregivers do not simplify or limit their speech as Lightfoot states. Their study concludes by reminding readers that the communicative context of all language is crucial:

> It would be strange, indeed, to equip the child with subtle means for detecting lexical, morphological, and syntactic structures, while leaving her with only the most primitive equipment for learning to become an interactive member of human society. Every linguistic structure that we have explored in CDS takes its meaning in definable communicative contexts (1996, p. 284).

Another study by Crago et al. (1998) on the differences between English-speaking children and Inuktitut-speaking children with respect to their acquisition of affixes

provides another plank, though perhaps smaller than the previous one, in the argument against Lightfoot's claims. The researchers found that the CDS of Inuktitut mothers and caregivers was not simple; rather, it was quite complex. Since Inuktitut is 'a null subject polysynthetic language with numerous verbal, nominal, and possessive inflections as well as numerous affixes that function as verbalizers, nominalizers, valency changers, and modifiers' (Crago et al., 1998, p. 37), it is not perhaps very surprising that infants exposed to this language acquire a much higher level of affixation accuracy than do English-speaking infants, who are exposed to relatively much less affixation. Still, the point here is that the non-English CDS was, in fact, not simple, but rather complex and therefore speaks against Lightfoot's claim that CDS is limited in complexity.

Lightfoot's fourth criticism of motherese, that the relatively more frequent instances of questions and imperatives than of declarative sentences is unnatural, again misses the point that motherese/CDS is primarily a 'language' of interaction. Therefore, questions and imperatives would seem to be much more logical candidates for fostering interaction than simple declaratives.

Finally, his comment that this 'phenomenon' of motherese is not uniform and does not occur in all households or cultures may be too broad to be useful. It may simply be that 'motherese' can be present in atypical ways. If parents in some cultures do not interact linguistically with their children in the same way Western parents typically do, it may be that other individuals in the linguistic community provide similar, or at least, adequate motherese-like language which the child requires for that interactional base. Additionally, we must be aware that what individuals say they do in a given context may not be what they actually do. To illustrate this, the following study by Haggan (2002) will be examined.

Haggan (2002), in her study of Kuwaiti adults, indirectly supplies a very compelling piece of evidence that may help counter Lightfoot's last criticism of motherese/CDS. Of the adults in her study who believed they did not use motherese with children, all were found to exhibit characteristics consistent with (Kuwaiti) Arabic motherese. Haggan's fascinating study points out that self-reported perception of what informants do in a given linguistic context may be very different from what they actually do. A very important part of Haggan's study highlighted the fact that Heath's (1983) study has been used by other highly reputable linguists to support claims that motherese is not universal. Haggan believes, however, that using Heath's study was inadvisable since even Heath herself warned against making too much of the claims of an important informant in the very small Trackton community, Annie Mae, who suggested the following as the way her grandchild, Teegie, would learn language: '... He just gotta be keen, keep his eyes open, don't he be sorry. Gotta watch himself by watchin' other folks ...' (Heath, 1983, p. 84). Haggan suggests that a closer examination of the Heath study would have shown researchers who wish to support 'the nativist poverty of data argument in language development' (2002, p. 26) that some statements, which appeared to support the idea of a lack of motherese in that community, actually 'would seem to provide quite a wide range of linguistic opportunities for the child to be exposed to speech from adults' (2002, p. 27). As

Haggan rightly states at the end of her study, '[t]he case for the innateness of language and the poverty of data theory may or may not be sound, but the Heath study should not have been presented as "evidence"' (2002, p. 27).

I believe the point of Haggan's comments is to caution us against accepting what informants 'tell' us they do since, as her own study showed, this is not always true. This caution can be applied to Heath's study. Although there are definite differences between the ways parents/caregivers interact with infants in the Roadville and Trackton communities of her study, the fact is that the children in both communities ultimately learn to communicate in the same way the adults in their respective communities do. It is not possible to say that there was no interaction between infants and adults in either community because there was in fact a great deal of communication going on around infants all the time in both the Trackton community (Heath, 1983, p. 74) and the Roadville community (116–117). Because of this almost constant contact with adults, it appears, as Haggan suggests, that linguistic input was readily available to the children in both communities albeit in very different forms. Heath's study appears to me not to show that one community exhibits and one does not exhibit the CDS or input necessary for children to acquire language. Rather, it suggests that different types of input and ways of presenting it to the infants can have the same result: successful L1 acquisition.

To sum up, the preceding criticisms which have been leveled at social interactionist theory and CDS have little merit when (a) previous data used to support such claims are re-examined more carefully, and (b) faced with additional cross-linguistic data that appear to support the claim that CDS is not the simplified version of adult language it is thought to be, but a rather complex form of language which seems to be specifically designed to facilitate learning among the infants who are exposed to it.

2.3.2. The purpose of CDS

Moskowitz (1978) presented what may now be viewed as the traditional view of CDS (though she used the term 'caretaker speech'). She stated that '... the language environments children inhabit are restructured, usually unintentionally, by the adults who take care of them' (1978, p. 5). Though she was referring primarily to syntactic issues, she did mention that caretaker speech was 'a distinct speech register that differs from others in its simplified vocabulary,' that it contained 'syntactic simplification,' and that 'the functions of the various language modifications in caretaker speech are not [as] equally apparent [as syntactic ones]' (1978, p. 5).

In a more recent examination of the language that caregivers use with infants, de Boysson-Bardies (1999, p. 83) explains what she views as the purpose of CDS, or what she terms motherese.

> What is the point of motherese? These first vocal messages—which are intended, on the one hand, to capture the child's attention, and on the other, to encourage exchanges—convey affective values through melodic contours. The voice, more than any other stimulus, provokes smiles in infants, attracts their gaze, allows face-to-face exchanges of verbal communication. These early

> vocal exchanges with the mother orient the baby toward a mode of oral communication. Thus, the behavior of turn-taking emerges toward the end of the second month, when infants react to the vocal promptings of the mother by cooing when she stops talking.
>
> Parents' use of higher pitch of voice, nearer that of children, lets their child know that they are talking to her.

Shifting to an explanation of baby talk, de Boysson-Bardies (1999, pp. 84–85) states that

> when their babies reach seven or eight months, parents realize that they are beginning to recognize words and then to understand them: the remarks that are directed to them must therefore prepare them for this. These remarks become clearer and better articulated, utterances shorter and spoken more slowly, with longer pauses in between. Adults seek to make themselves understood. Prosodic characteristics remain important. The voice continues to be higher, and intonation, like the emphasis placed on ends of sentences, is quite pronounced... Sentences are simple, short, and repeated. The frequency of words containing reduplicated syllables is important.
>
> Present-day research finds labials and syllables not involving too many movements of the upper articulators appear with the greatest frequency in the first production of babies and in the vocabulary of mothers, who spontaneously employ more words beginning with labials ([m], [b], [f], [v]) when they speak to children.
>
> The child's repertoire reflects that of the language spoken in the family circle more than any particular aspect of the mother's phonetic repertoire.

From the preceding sections relating to the nature of CDS, it is a simple matter to conclude that CDS is a crucial factor in the language development of children and that those unfortunate infants who received little or no normal linguistic nurturing face a harsh life, the (in)famous case of Genie (Curtiss, 1977) being a prime example. What will be shown later in this study is that CDS has an even greater influence than may already be appreciated but in ways not previously examined.

2.3.3. Interpreting intent

As soon as infants have begun to utter sounds that resemble the phones and then the words of their parents' language, the problem of meaning arises. Interpretation of those sounds and/or words by caregivers becomes a crucial factor in the infant's language development, but such interpretation, even by highly trained observers, is not without its pitfalls. Karmiloff-Smith (1979, pp. 228–230) gives an example from an early book of Piaget in which he cites the example of a young child, J., who is asked to determine, upon seeing some slugs on the ground, whether or not a second slug is 'another' slug or 'the same' slug. The conclusion Piaget came to was that the question had no meaning for the child. Throughout the discussion of this example, many assumptions are made about the intent of the child's utterances. The implication is, of course, that the researcher knew this intent at least well enough to assume

he was correct. But how can we be sure of the veracity of such assumptions? The researcher was making interpretations of the child's utterances. These interpretations, according to Karmiloff-Smith, can be viewed differently if the observer's assumptions change. This is certainly true for all scientific inquiry and should be applied to the acquisition of meaning by very young children. By the time children have begun uttering adult-like phones, it is necessary that the innate seeds of meaning for the child have already begun to germinate.

As in the Piaget example just mentioned, language researchers, as observers, apply interpretations to the utterances and behaviors of infants in order to explain what the infants 'mean.' Though the very act of interpretation is subjective, it is an unavoidable problem when dealing with infants who are still unable to communicate meaning or intent via normal adult language. The present case study is also faced with this unavoidable problem, as are all the other references used herein, which rely to a greater or lesser extent on interpretation.

Bloom (1993, pp. 4–5) discusses intent and emotion, two important components in language learning. With regard to intent, for example, she believes that,

> the 1-year-old child's intentionality drives the acquisition of language. Our intentional states—the beliefs, desires, and feelings that we have—are themselves unobservable, but they determine how we relate to one another in daily events. Children learn language for acts of expression in the effort to make known to others what their own thoughts and feelings are about, and for acts of interpretation in the effort to share the thoughts and feeling of other persons. Intentional states underlying acts of expression and interpretation provide the *mental meanings* for which knowledge of language—its vocabulary, semantics, syntax, and discourse procedures—is acquired.
>
> Mental meanings are constructed, as we talk and listen, from data perceived in the here and now and data recalled from the knowledge we have in memory... Because such mental phenomena are hidden, language is required to make them manifest when what one individual has in mind differs from what another has in mind and needs to be shared.
>
> A basic assumption being made here is that infants at the end of the first year of life have intentionality. All this means is that they are capable of having thoughts and feelings and that the thoughts and feeling they have in mind are *about something*, because they are directed at objects (including persons and events) in the world... Attributing intentionality to infants should not be controversial: after all, we routinely attribute intentionality to a pet cat or dog.

From this we can surmise, based on the assumption of intentionality, that meaning is something that is given to the utterances an infant may make. This intentionality, in turn, is interpreted by the listener, in the case of speech, based on that *listener's interpretation* of the sounds and/or any actions accompanying the speech. If this seems somewhat circular reasoning, it may be unavoidable. Attributing a specific meaning to an infant's utterance may in fact be straightforward. If, for example,

a parent holds out a tempting piece of an infant's favorite food and the child upon seeing it lunges for it while uttering something like [a] with a sharply rising intonation, one could assume or interpret that utterance to mean approximately, 'Yes! I want that! Give it to me!' However, surely interpretations of similar examples of 'infant language' would likely *not* be something like, 'Why Father, Mother! I am shocked by the fact that you recalled my favorite food and were good enough to offer me some.' Beyond examples of nascent language that appear to have a stimulus-response component, it is very difficult to be certain that the meaning ascribed to an infant's utterance is absolutely accurate.

The debate as to relative influence on the development of language has frequently referred to the concepts of input and output. Input refers to the language (or signals or communication) which arrives at the sensory receptors of an infant and which may or may not be directed meaningfully at the infant. Output, of course, is what the infant produces communicatively. Certainly, input which is directed at the infant for some clear purpose is what we hope has the greatest influence on L1 development. This assumption may or may not be correct since without direct feedback from the infant (as is implied above), determination of the degree of influence any given input exerts on L1 remains elusive.

One last example here will, I believe, highlight the problem of ascribing intent to the language of an infant (from simple grunts to phones to words) no matter what its age. Oller (2000, pp. 277–278) discusses how animal and human communication differ with respect to alarm calls which he believes can all be subsumed under the term 'reference,' which is clearly associated closely with intent. He states, however, that '... humans can be seen to command reference in a more powerful way, and that the advantage can be seen by the second year of life in the human infant.' To clarify this difference in usage that exists between animals and humans, he cites the property of Semanticity (a component of his overall infrastructural theory of language acquisition) which he explains thus:

> [w]hen I say a child commands the property of Semanticity (or referentiality in the common usage of the field of child language), I normally intend to indicate that the child is capable of referring to a class of entities analytically, to designate that class specifically in a way that is free of contextual and illocutionary limitations. A variety of illocutionary forces are possible once Semanticity is in place (2000, p. 277).

Although Oller suggests that other 'illocutionary forces are possible' once the infant has developed 'Semanticity,' he does not actually explain how the infant manages to acquire this. Presumably, the environment is responsible for allowing the infant to get 'Semanticity.' Next, Oller shows how he believes an infant uses this ability through an example in which an infant utters [ba] in a variety of contexts:

> Suppose a child says [ba] while playing a game involving a ball. If this is the only circumstance under which the child uses [ba], we cannot be sure the child is intentionally referring to the class of objects, balls, or whether the utterance

> [ba] is merely produced in the context of a particular game. Therefore we do not know whether the term [ba] analytically designates the class for the child or merely has the effect on mature listeners of invoking their awareness of a class of objects that the mature language designates by the term *ball*.
>
> One kind of evidence that the child does control semanticity and its implied analytical referentiality to classes of entities can be seen when the usage of the term [ba] is extended to new illocutionary conditions. Suppose the child not only says [ba] while rolling a ball, but also points to the ball, looking up at a parent, then back at the ball while saying [ba], suggesting an illocutionary force we might call labeling. The game is not being played on this occasion, nothing is requested in such circumstances, and no obvious emotion (only interest) is expressed. Suppose further that when the parent holds the ball, the same child reaches for it, saying [ba] with a tone *suggesting* [emphasis added] an illocutionary force of solicitation, and then after having been given the ball, the child *seems appeased* [emphasis added]. Finally, suppose the same child points to the ball and says [ba] with rising intonation, waiting for the adult to confirm that indeed the object is called *ball*. The child's illocutionary force in this last case is that of a question. Such variability of usage within the same child at a single age, pairing a single meaning and sound with multiple forces, provides evidence that the child understands the term [ba] to refer analytically to the class of objects, balls. The word [ba] can be said to have achieved semantic status. When the child uses the term, *he or she intends for the listener to understand* [emphasis added] that in the act of communication, the class of objects is being invoked (2000, pp. 277–278).

The scenario cited in this example, most would agree, is certainly typical of infants when they are beginning to explore their world linguistically. The problem, as I see it, and as has been emphasized by italics in the above citation, is that in so assigning illocutionary force, or intent if you will, to even obviously unambiguous utterances such as those given, the assigner is simply confirming what *he/she believes* those utterances mean. Even granting the fact that the child commands the property of Semanticity does not mean that we know what the child actually means. The only way that we can discuss the meaning of a given utterance is if there is already some innate ability related to the giving and receiving of meaning which is awakened in the infant by situations such as those above and by the adults involved who ascribe meaning to the child's utterances and actions. In other words, it is not just the child who begins to understand the meaning but also the adults around the child who, through their actions, confirm what meaning they believe is present in the child's utterance.

Therefore, while Oller's system of infraphonological properties (of which semanticity is but one) may have applicability to the development of phonology in infants, I do not see that using his theory (at least the component of semanticity) to discuss the meaning which is swirling around and through the utterances parents use with their children provides much explanatorily regarding the acquisition of that meaning.

2.3.4. Response of mothers to emotional signals from infants

On the other hand, Bloom does, a little later in her discussion of emotion and intent in language acquisition (1993, pp. 5–6), describe how important social context is to infants.

> Sharing the contents of mind is not something that 1-year-old infants purposefully do as they set out on their language-learning careers. Instead, the motivation for sharing is in the need they have to sustain intersubjectivity with other persons and thereby locate themselves in a social world.
>
> If intentionality drives the acquisition of language, then intersubjectivity drives the development of intentionality. Intersubjectivity comes from the appreciation infants have for 'being together' with another person and depends on each attributing to the other a sense of being in touch with what they are feeling and thinking about. These mutual attributions certainly happen without the infant's and probably even the adult's having a sense of where the thoughts and feelings in these situations come from. One-year old infants do not yet have a theory of mind, but they do have a good start on acquiring a commonsense theory about the world. And a large part of their nascent theorizing has to do with the other persons in their lives who care for and about them.

Here Bloom stresses the close social contact, i.e. the interaction, which is necessary for the development of intentionality. She continues (1993, p. 64) in this vein by suggesting the emotional value of infant vocalization and the adult language which surrounds the infant.

> ...We needn't be surprised, then, that studies that set out to catalog the features of vocal affect associated with the different emotions in infant's expressions have met with little success. Instead, infant vocal behaviors have been more successfully discriminated on the basis of their positive and negative hedonic tone. Part of the reason may be that young infants perceive the vocal and facial features of other persons' emotional expression holistically, rather than componentially.
>
> As long ago as 1936, M. M. Lewis underscored the importance of affective tone in the speech infants hear: ''From the outset, heard adult speech comes to the child steeped in affective quality. In the first month it soothes him; a month later it makes him smile.'' One highly salient feature of adult's speech to babies is its melody, or intonational quality, and infants respond to speech based on intonation long before they respond to the words. An infant will actually respond in the same way to messages that have different words and meaning if the intonation contour is the same. ''Conversations'' with babies sound like conversation because infants are particularly sensitive to patterns of pitch contour (intonation) from an early age. Ann Fernald pointed out that the message in the melody of adult speech to infants is a pragmatic one—prohibitions, affection, impatience, and the like—rather than informational. Moreover, the different melody contours for these pragmatic messages are essentially the same

> in talk babies hear from speakers of such widely different language as Japanese, German, Italian, and English, and infants heading them respond similarly, even though much else about the sound patterns in these languages is very different.

This is the sort of discussion which gets at the heart of the acquisition model, I think, since it focuses on that interaction that is constantly going on between child and caregivers.

Bloom (1993, pp. 184–186) discusses how caregivers (in her study, mothers) responded to emotional signals from infants at 9, 13, 17, and 21 months.

> They [the mothers] either expressed emotionally toned affect themselves, or they did or said something that was directed at the causes, consequences, or circumstances of the child's emotional experience and expression. However, the frequency with which mothers responded to emotional expression was not the primary way in which they influenced a child's emotion profile.
>
> The mothers contributed to their children's understanding of emotional experience and expression in other ways. An emotional expression is a public display to which we can attribute a private representation, which is its meaning or what it is about. And indeed, in responding to a child's emotional expressions, the mothers were attributing mental meanings to them. At a minimum, they acknowledged the child's expression by saying things like "What?" or "Okay" to indicate that they appreciated the child's effort at expression even if they might not have understood the child's intent. And in responding the mothers conveyed meaningful messages to their children. A caregiver's own affect, action, or speech is an expression and, in the context of a child's emotional display, communicates a message to the child about the feelings and expression of those feelings in the display. Regularities over time in the meanings a child attributes to a mother's behaviors when she responds to emotional expressions contribute to understanding and learning about the experience and expression of emotion.
>
> The mothers provided their children with a rich array of such meaningful behaviors. In addition to expressing affect themselves and talking about emotion or its expression, mothers responded with actions and action-directed speech. Either they acted themselves or encouraged their children to act in ways to achieve their goals, of they talked about those goals and/or the situations for them.
>
> In responding to positive emotions, the mothers most often expressed positive affect themselves. They were also very likely to do or say something directed at maintaining a child's goal and to talk about the situational context. In response to negative expressions, mothers were least likely to express affect themselves in response. Instead, they were most likely to act in a way or say something directed at helping the child achieve a goal or change the goal, either by abandoning it or substituting a new goal. They also attended to their children's physical needs in response to negative emotions.

> In sum, in their own actions and talk mothers provided information about the causes or circumstances of an emotion or provided information about how actions contribute to coping for the regulation of feelings. Mothers' actions and talk about actions were their dominant form of responding to a child's emotional expression, and the rate of action-related behaviors by the mothers remained a constant in their interactions, showing no change from 9 to 21 months.
>
> However, as the children acquired language, their mothers were increasingly likely to talk to them about the emotional experience and correspondingly less likely to express emotionally toned affect themselves. But they rarely labeled the child's emotion or talked about a child's feelings directly... Instead, these mothers talked about a child's goal or the situation or how to achieve their goals in one or another situation—the cause and occasions for their feelings and what to do about them—rather than about the feelings themselves.

From this rather long, detailed explanation, it is reasonable to hypothesize that a mother's interaction with her child is responsible for *associating affect* to both language and behavior and, in turn, *associating meaning* with both language and behavior. In other words, we can conclude that without mother's interaction, her CDS if you will, meaning cannot be achieved easily or completely.

2.3.5. Rich interaction between parents and child

de Villiers and de Villiers (1979, pp. 97–98) attribute normal language acquisition to the quality of interaction between and the child and parents.

> Language acquisition normally takes place in the context of a rich interaction between the child and his parents. Several facets of that interaction seem to be important facilitators of language acquisition, and some of them may even be necessary for the acquisition of normal speech.

They go on to say that

> [s]ince most of the early conversations between parent and child take place in familiar contexts and concern objects that are present in the situation, the child already has a good idea of what the parents' sentences are about (1979, p. 98).

One may wonder how the child has already developed 'a good idea of what the parents' sentences are about.' de Villiers and de Villiers suggest that familiarity of context is the reason for this which is certainly reasonable. What also has likely occurred is that the child has, even at this early stage of language development, acquired a means of 'figuring out' what the parents are talking about, quite possibly because of the functional language the parents have already directed at the child.

de Villiers and de Villiers continue their description of the language children receive from their parents and note the importance of various qualities of that language. They explain (1979, p. 101) that

> [t]he quality of the language that children hear from their parents and the way in which it relates to their own comprehension and production of speech may also be important factors in language learning.
>
> Mothers (and fathers too, although they have not been studied as much) tailor the length and complexity of their utterances to the linguistic ability of their children. Mother's speech to one- and two-year olds consists of simple, grammatically correct, short sentences that refer to concrete objects and events. There are few references to the past and almost none to the future. Sentence intonation and stress are greatly exaggerated, and clear pauses appear between sentences. Furthermore, as many as 30 percent of the utterances are repetitions, partial or complete, of one of the earlier sentences of the mother to the child.
>
> ... Other features of speech to children, such as the use of a higher-pitched voice and special baby-talk words containing simplified speech sounds, reflect the adult's conception of the way children talk. The adult assumes that the young child finds certain sounds and words easier to pronounce than others.
>
> Finally, some properties of speech to children of different ages seem to depend on what the parent is trying to do with the language. With a child of one or two years the mother is often trying to manage and direct the child's behavior, as well as provide him with the names of objects.
>
> How might the speech modifications made by adults assist the child in language learning? The restriction of early conversations to familiar settings and to objects and events that are present in those situations greatly simplifies the child's problem of learning the words for things. It limits the range of possible referents for any new word and provides the child with clues from the situation that might indicate what is being referred to, clues such as the speaker's direction of gaze of the presence of a new object among familiar ones. Adults also use recurrent sentence frames in talking to children: "Look at the __," "That's a __," or "Where's the __?" The word that enters into the frame is usually heavily stressed, so the child's attention is drawn to it.
>
> Other features of mother-to-child speech may help the child to divide speech up into words, phrases, and sentences. Single-word utterances are quite frequent, and even multiword sentences are slowly enunciated and have distinct pauses between them. Mothers also tend to repeat isolated phrases and words following the complete utterance.

The preceding clearly stresses the importance of this 'rich' interaction between parents and child and, at least in part, suggests that the nativist argument of 'impoverished input,' which says that the language input an infant receives during L1 acquisition is often ungrammatical and is insufficient to account for the infant's rather dramatic language learning ability, may not be absolutely valid.

2.3.6. Modification of adult speech to children

de Boysson-Bardies (1999, p. 81) explains the 'natural' concern that adults have for infants by stating that

> . . .[a]lmost all adults, no matter their sex or age, modify their way of speaking when talking to infants and very young children. Adults show a concern and a willingness to adapt to the capacities of the child by adjusting the register of their voices, adopting an affectionate tone, and articulating words clearly and more slowly.

Affect seems to lie at the heart of adult-to-infant interaction. Later she states that 'motherese'

> . . .refer[s] to the modulations of the prosody and voice of mothers (or other adults) speaking to babies, whereas *baby talk* indicates the simplification of vocabulary, syntax, and the forms of the words of the language addressed to a slightly older child, without, however, neglecting the modes of intonation that are associated with it. Whether peering into the infant's cradle or taking care of the baby, adults, when they speak, first attempt to establish affective contact and to elicit vocalizations (1999, p. 82).

She goes on to describe 'petel' (from the Italian word for 'breast'), coined by the poet Zanzotto (1986), as

> the cuddling language mothers use to address very small children, which tries to mimic the language these children use to express themselves. One notes, in particular, modifications of voice and prosody—a higher vocal register than usual; and a restricted range of intonation contours (but with very exaggerated modulations and variations of pitch), and long, soft melodic forms with sudden glissandi and large F0 [also, F_0, frequency of phonation, measured in hertz (Hz)] excursions. . . to focus the baby's attention, heightening interest and helping establish a preference for this type of communication (1999, p. 82).

Finally, she mentions that interestingly, though not surprisingly, 'this preference [for the voice of their mothers] is found until children reach preschool age' (1999, p. 83).

2.3.7. Possible results of a lack of CDS

If examined from the perspective of potential language impairment, the lack of CDS may cause serious problems for a child. According to Harris (1990, pp. 93–94) the vital role of CDS

> . . .has fuelled speculation that some forms of language impairment may arise from the child having insufficient exposure to adult language or, alternatively, being among adults who adopt inappropriate styles of talking to young children. . . These problems may then lead on to additional difficulties at school, especially if the teaching staff mistake linguistic delay as indicative of limited intelligence, or interpret differences in a child's inability to use language as a sign of impaired ability to learn language.

Harris (1990, pp. 200–201) later gives 6 characteristics of adult language directed to young language-learning children. Adult-to-child language:

1. Is slightly more complex than the language the child uses. This structural complexity may vary according to such factors as:
   (a) Mean Length of Utterance
   (b) Mean length of speaking turn
   (c) Grammatical complexity—embedded sentences and passives
   (d) Type-token ratio—the frequency of different words expressed as a proportion of all the words used.
2. Deals with the child's interests: actions, objects, people and events that are present in the 'here and now.'
3. Is semantically related to the child's language so that the child will recognise the connection between her own communicative intentions and the language structures presented by the adult. This can be done by
   (a) repetition of the child's utterance in a conventional or 'idealised form:' the child says 'buh' but the adult responds with 'butter.'
   (b) expansion of the child's utterance as when the child says 'play bath,' the adult responds with 'You want to play with your toys in the bath.'
   (c) recasting the child's utterance to illustrate an alternative grammatical structure. For example, to illustrate questions, after the child utters 'You can't get in', the adult might respond: 'No I can't get in, can I?'
4. Is filled with phatic responses such as 'yes', 'oh', 'mmmm' and 'I see' to indicate the adult is listening and attending to what the child is saying.
5. Does not simply use questions to get children to speak, but rather uses meaningful contributions from the adult to the conversation context.
6. Whenever possible uses naturally occurring conversational slots so that the adult's language fits in with other activities and the child's increasing ability to participate in verbal and non-verbal interactions.

As we shall see later in the data analysis, these characteristics arise within the language of the parents. To sum up, then, we have seen that CDS can be viewed as a highly specialized language, having affective qualities necessary to engage the child in language, and one which allows the child to remain focused on the provider of the input thereby maximizing language learning.

2.4. Halliday's functions of language

As was mentioned at the outset of this paper, the clear functional purpose of language is to send and receive linguistic signals. Various approaches to the analysis of such functional language have been proposed. Scollon (1976) examined the language output of a one-year old, Brenda, for a wide variety of components, one of which was intonation. He gives a list of illocutionary acts that Brenda's intonation is believed to express. These acts range from reference to assertion to direct directive

and so on to translative (Scollon, 1976). Such an extensive list proved too large to be used in the present study. Though Scollon's study is a fascinating one, it focuses on the output of the child rather than on the input she is exposed to, which is the focus of the present study.

In his discussion of the development of speech acts in infants, Atkinson (1982) provided an outline and comparison of three inventories of functional categories, one by Dore, one by Carter, and one by Halliday. Halliday's system was chosen for use in this study because it provides a taxonomy which appears to be conceptually 'cleaner,' providing less overlapping of functions than the other systems exhibit.

In his study of the functions language may contain, Halliday (1977) examined the English language acquisition of one child, Nigel, from about six through eighteen months of age. Halliday's basic premise in the study was that the language infants use could be described in terms of certain functions. The functions Halliday (1977, pp. 19–20) proposed were:

1. The *instrumental* function is the function that language serves of satisfying the child's material needs, of enabling him to obtain the goods and services he wants. This is the 'I want' function of language.
2. The *regulatory* function is related to this, but it is also distinct. It is the function of language as controlling the behaviour of others, something which the child recognizes very easily because language is used on him in this way: language is used to control his own behaviour and he soon learns that he can turn the tables and use it to control others. The regulatory is the 'do as I tell you' function of language.
3. The *interactional* function is what we might gloss as the 'me and you' function of language. This is language used by the child to interact with those around him, particularly his mother and others that are important to him, and it includes meanings such as generalized greetings ''Hello,'' ''Pleased to meet you.'' And also responses to calls ''Yes?'', as well as more specific forms.
4. Fourthly there is the *personal* function. This is language used to express the child's own uniqueness; to express his awareness of himself, in contradistinction to his environment, and then to mould that self-ultimately, language in the development of the personality. This includes... expression of personal feeling, of participation and withdrawal, of interest, pleasure... We might call this the 'here I come' function of language.
5. Fifthly, once the boundary between the child himself and his environment is beginning to be recognized, then the child can turn towards the exploration of the environment; this is the *heuristic* function of language, the 'tell me why' function, that which later on develops into the whole range of questioning forms that the young child uses.
6. Finally we have the *imaginative* function, which is the function of language whereby the child creates an environment of his own. As well as moving into, taking over and exploring the universe which he finds around him. The child also uses language for creating a universe of his own... This we may call the 'let's pretend' function of language.

7. Later on there is in fact a seventh to be added to the list: but the initial hypothesis was that this seventh function, although it is the one which is undoubtedly dominant in the adult's use of language, and even more so in the adult's image of what language is, is one which does not emerge in the life of the child until considerably after the others. This is the one that we can call the *informative* function of language, the 'I've got something to tell you' function.

At this point, it is necessary to add a comment regarding this taxonomy of functions. Because Halliday came up with this taxonomy of function by observing Nigel's use of language, these functions are initially intended to be descriptive of what children might use language for. In this study, I am attempting to turn the tables, as it were, by using these functions to describe the speech that the subject's parents and siblings use with him. Although Halliday does not analyze the speech of adults specifically, the preceding comments in his description of the seventh function, the *informative*, certainly suggest that he has thought about what adults use language for. Since he does so, I am adding this function to his initial list of six because I am specifically interested in the kind of functions these adults and children use with and around the subject.

Although it would be possible to create a different taxonomy of functions that might be applied to any language in normal communication, the one that Halliday has produced clearly is meant to encompass normal language use. To facilitate the discussion, I will assume that these seven functions are sufficient to describe both the language that infants hear in their environments and are, consequently, the functions which could be noted in the language they acquire and then produce.

In addition to such issues, examining the type of interactions each parent has with an infant with respect to the qualities of CDS those interactions might contain is certainly relevant to a functional analysis of the L1 acquisition process. Essentially what such a taxonomy of functions provides is a way of quantifying the various aspects of CDS. This in turn allows a more discrete analysis of a given utterance than may have been possible before.

One other set of criteria could possibly have been used to analyze the data of this study, namely, Dickinson and McCabe's criteria discussed in Section 2.2. Those criteria relate to the language the child is exposed to and to how the child responds. Though they would possibly have rendered equally interesting results, I considered the set of Hallidayan criteria to be of more use as an analytic tool given its division of language into specific functions, which I found to be a good match for the recorded data.

3. Method

3.1. Introduction

This section first presents the research design used in this study. Next, a description of Halliday's taxonomy of language functions and how they are utilized in this

study are given. A second method of analysis is present and discussed. Following this, the subject of this study is described along with the data-gathering procedure and some concerns about that process.

3.2. Research design

The case study presented herein was primarily done using a naturalistic approach. Because as much information as possible regarding the subject was sought, a long-term plan was established with the parents after their consent was received.

3.3. Subject

The subject, Hikaru (H), born on October 20, 1996 (19 months old at the beginning of the study), is the youngest son of a Japanese couple living in a small mid-Western college town. At the time of data collection H's father was a doctoral student and his mother was a homemaker who, in addition to caring for H, cared for his two older siblings, a boy, Tadahiro (usually called Ta-kun), at the initial time of the study, seven years of age and a girl, Sakura (usually called A-chan), five years of age.

H, an active child, was chosen because I knew he would be growing up in and virtually surrounded by the Japanese language. I thought that this home would simulate as much as is practically possible in this area of the United States a Japanese L1 environment. Although H's older siblings used English in school and have become essentially bilingual over the years they have been living in the United States, Japanese was the language used in the home. H's mother and father are never heard to use more than a few words of English (heavily Japanese-accented) for the duration of the study: *hello*, *lucky*, *cheese*, and *Jesus*, for example (see Appendix B for the complete list). Apparently, these were somehow special to H or his family (or the context of the conversation) and therefore appear from time to time in the data. It should be noted that most of the non-Japanese words seen in the data are not uncommonly seen in typical Japanese, having been borrowed from other languages such as English and, in one case, *pan* 'bread,' from Portuguese. Hence, to say that these are instances of English is, perhaps, not completely accurate. The pronunciation of these words, at least the English words, by the family members is typically heavily-accented and therefore not necessarily representative of normal English L1 input.

Aside from the rare instances of English usage scattered throughout the data, H's parents used only Japanese in the home and assured me that H's older siblings did not use English with him. This was a rather closely enforced rule in the home and went so far as to include the television programming the children were exposed to: essentially Japanese children's programs on videotape. Therefore, it can be assumed for the purposes of this study that his English input from the environment was minimal and had insignificant impact on any results or conclusions.

At this point I would like to state that although the first idea I had for this study was to examine a child's language acquisition in a foreign language environment, the frequent silence of the subject and the relatively few and limited utterances he did

produce during the recording sessions necessitated a slightly different focus for this study. Instead of looking primarily at what the subject produced, I began examining the parents' language and found it to be far more fascinating from a functionalist perspective. There seemed to be a decidedly different kind of language directed at the subject from both parents. This then became the focus of this study,

I chose a Japanese family and their child for study for three reasons. The first consideration was practicality. I needed to be able to gather data on an infant as reliably and easily as possible. Since this family was well-known to me and was very willing to help me in this case study, and since they had had other experience gathering data from one of their other children, I knew I had access to willing, eager, and interested participants. This family had assisted me in a previous study, so I knew that they would be reliable assistants for the data-gathering process.

Secondly, beyond these issues of practicality, I saw the opportunity to go beyond a mono-lingual (typically, English) examination of the developmental process of meaning and compare previous research done with English-speaking children to that of a child raised in a (mostly) Japanese-speaking environment. If parallels could be found in these different linguistic groups, then another page in the book of universal theory could be highlighted, if not completely written.

Finally, because I have had and continue to have intimate connections with the Japanese language and culture in a teaching capacity, I was very interested to see what implications this study would have for the teaching of language to young children, an area of special interest to me. I acknowledge that language teaching is perhaps not always of immediate concern to linguists, but because this study deals with aspects of how infants acquire language, I believe there may be potentially important implications from the outcomes of this study for the field of language teaching.

The fact that some of the background research mentioned in this paper was done on very young infants (birth to 12 months) may raise the question of whether results from that research can be appropriately used with a child who was already about 19 months old at the beginning of the study. Since H did not have a large repertory of words and certainly few, if any, examples of telegraphic speech or two- or three-word holophrastic utterances at the time this study began, it seemed likely that the research would cover a time in his language development when meaningful utterances, words, and complete phrases would become more frequent, thus providing an observable pattern of development.

Additionally, attempting to study the development of meaning appears to be more appropriate with older infants. Oller's discussion of 'Semanticity' refers to 18-month-olds (2000, p. 278), and he believes that humans begin to develop the power to 'command information free of context within symbol systems... shortly after infants begin to build their lexicons in the second year of life' (281).

3.4. Data gathering procedure

H's parents tape recorded his speech during normal interactions with him over a period of twelve months from June 4, 1998 to June 21, 1999. At the beginning of the tape recording sessions H was about 19 months old. Although the parents were

asked to record H as regularly as possible, this instruction could not always be strictly followed. The time between recordings varied from 3 to 15 days and toward the end of the recording sessions, there were larger gaps of up to more than a month. During some of the last recording sessions, there were large gaps of silence which accounted for the sometimes sparse data. Every effort was made to salvage whatever useful data appeared on these tapes.

The method for recording consisted of the parents' placing a very high quality cassette tape recorder (SONY WM-D3 Walkman Professional with a high quality stereo condenser microphone) in close proximity to H at times when he appeared to be vocally active, engaging him in conversation, and recording him until he had uttered what his parents considered to be representative of his productive ability at the time. The result was a series of ten 90-min cassette tapes, each of which was returned for examination as it became full. These tapes were then transferred to the mini-disc format (SONY MiniDisc Deck MDS JE440) since its capability of isolating any given section of data and replaying it indefinitely facilitates careful transcription and analysis. High quality headphones (SONY MDR V600) were used during all transcription work. The raw data are presented in a numbered format with English gloss in Appendix A.

A final comment is perhaps in order here. It will be noted that I, the researcher, was not physically present during the recording sessions except at the very outset. The main reason I did this was to ensure that there was no extra English language influence on the subject. Although I can speak Japanese to a moderate degree, I felt that if I were present, there would be a greater chance that H's parents would use English with me, which might inadvertently but adversely influence H's Japanese output. Additionally, I was confident that H's parents would have little difficulty using the tape recorder or getting H to produce usable output because they had worked with me on a previous project that required very similar procedures. As it turned out, there were only one or two minor problems in this respect, but these did not alter the results of this study.

3.4.1. Problems in and limitations of the data: transcription concerns

Although some of the data were transcribed using IPA symbols that were considered to be as close as possible to the sounds uttered by the infant, there is some doubt, as Oller (2000, 1986) and Ingram (1989) note, as to the accuracy of transcribing a child's utterances with symbols that are intended for use with adult speech. This is the problem of shoe-horning: trying to force a model to fit a certain situation. In addition, because only one person, the researcher, transcribed the data, errors in accurate transcription are not impossible.

Because of these concerns, IPA symbols are used sparingly for allophonic accuracy and only to clarify or specify a specific utterance by the parents when there is relatively high probability of the accuracy of the transcription. The subject's (H) utterances are, however, all given in IPA symbols that were deemed as close as possible to what he actually said. Otherwise, a conventional phonemicization of the Japanese is given along with an approximate English gloss for all the utterances produced by the rest of the family members. The accuracy of any unclear Japanese

words or phrases was carefully checked by my wife, a native speaker of Japanese. Naturally, any and all errors or inaccuracies are my responsibility alone.

3.4.2. Absence of video recording

Because obtaining the most natural data possible was the goal of the recordings, and since the researcher was unable to be physically present with the family for the length of the study, only a tape recorder was used. Videotape would have undoubtedly provided additional useful data regarding, especially, objects handled or referred to, relative proximity of speakers to the subject, facial expressions, direction of gaze, and disambiguating who said what. This was, unfortunately, beyond the capabilities of the present study because another important goal in the study was to be as unintrusive on the family as possible considering the length of the study. Future study that would incorporate the use of relatively unobtrusive video cameras is suggested.

4. Data analysis

4.1. Introduction

Once the data of the family members were transcribed into a conventional phonemicization (with an English gloss) and into phonetic script for the subject, they were all placed into a table format and numbered for ease of reference. The numbering is of two types: (1) the data sets are numbered from 1 to 32 and represent the different recording sessions (Appendix C—only partial); and, (2) a consecutive numbering of utterances from the beginning of the first data set to the end of the last data set. All these data can be found in Appendix A. In addition to the raw data, the final column in Appendix A presents the function(s) believed to be represented by each utterance. It is these data and the functions contained therein which will now be examined.

4.2. Analysis

Each utterance in the data set was examined in its local context (the utterance immediately preceding it) to determine its most likely function according to Halliday's descriptions of language functions. Some utterances were coded with two or more functions because it was often clear that while the form of the utterance may have suggested a certain type of function, what was likely intended given the context was another function. Occasionally, no coding is made of an utterance because what was said was unclear or because the utterance was merely a laugh or some sort of grunting or squirming noise which carried no clear overt intentional function. This is not to say that the speaker had no intention; the fact is, however, that more information than was available was necessary to assign a function to this type of utterance.

Before proceeding further, it should be noted that according to the coding parameters which follow, three functions, the instrumental, the personal, and the imag-

Table 2
Composite of entire data set[a]

Function count/speaker	Inst	Reg	Inter	Pers	Heur	Imag	Inform	Total/speaker
M	0	271 (27%)	325 (33%)	0	250 (25%)	0	153 (15%)	**999** (51%)
F	0	358 (42%)	186 (22%)	0	205 (24%)	0	109 (13%)	**858** (44%)
B	0	6 (13%)	20 (44%)	0	4 (9%)	0	15 (33%)	**45** (2%)
S	0	7 (17.5%)	12 (30%)	0	1 (2.5%)	0	20 (50%)	**40** (2%)
Total/function	0	**642** (33%)	**543** (28%)	0	**460** (24%)	0	**297** (15%)	**1942**

Speakers: M—mother, F—father, B—brother, S—sister.
Functions: Inst—instrumental function, Pers—personal function, Inform—informative function, Reg—regulatory function, Heur—heuristic function, Inter—interactional function, Imag—imaginative function.
[a] A chi-square was run on the four functions (REG, INTER, HEUR, INFORM) for mother (M) and father (F), producing a 2×4 table with 3 degrees of freedom. The chi-square result was 51.273; significance level, $p \leqslant 0.001$.

inative, were not found in the language of the family members. Although no simple explanation for the absence of these three functions immediately presents itself, there may be unique cultural and idiosyncratic reasons for their absence. These will be discussed in the final section, but see '(d)' in the Summary of Table 2, Section 4.2.1 below for an initial discussion of this phenomenon. It may be that the nature of parent–child interactions adheres more to the 'here-and-now' nature of language which is expressed in the regulatory, interactional, heuristic, and informative functions than in the three missing ones.

Abbreviations used to coding the Hallidayan functions of utterances are:

INST—the instrumental function
REG—the regulatory function
INTER—the interactional function
PERS—the personal function
HEUR—the heuristic function
IMAG—the imaginative function
INFORM—the informative function

To demonstrate how the coding was performed, the following examples (taken directly from the raw data in Appendix A) are offered. No examples of the instrumental, personal, or imaginative functions are given since they were not found to be present in the data from any of the family members (M—Mother, F—Father, B—elder Brother, and S—elder Sister). The examples given are all from F's speech, but the coding process is the same regardless of speaker.

(a) Regulatory utterances, such as #14, are coded thus if they contain direct or indirect commands.

14 F: omeme to ittegoran, omeme. F: Say, 'Eye, eye.' REG

(b) Interactional utterances, such as #16, were those in which the speaker had attempted to call the subject, to rephrase what the subject had said, to comment about something the subject had said, and so on.

16	*F*: *hikaru chan*,	F: Hikaru, ('chan' is a term of endearment)	INTER

(c) Heuristic utterances were those with direct questions, such as #22, or indirect questions (rephrases asking for clarification, for example).

22	*F*: *otosan no*, (.) *kore wa*?	F: (Is this/it) Father's? What about this (one)?	HEUR

(d) Informative utterances, such as #25, were those in which the speaker simply presented factual information or gave some explanatory commentary to either the tape recorder (for the benefit of the researcher) or to another family member.

25	*F*: *ma*, *rokuon chu no desu*.	F: Well, we're in the middle of recording.	INFORM

(e) Some utterances were coded with more than one function since the utterance could be interpreted in more than one way given the particular context. This multifunction coding is indicated by the likely functions separated by a slash mark(s). The following (#33) is an example of such an utterance. The context of the interaction between F and H was that they were planning to go outside, so F uttered a statement which appeared to be interactional since he called H and suggested that they BOTH go outside. The other intent of this utterance was, of course, that it was an order for H to accompany his father outside since H really had little choice in the matter. This second coding for the regulatory function was therefore thought to be reasonable.

33	*F*: *soto demasho hikaru*.	F: Let's go outside, Hikaru.	INTER/REG

4.2.1. Functions in the data sets

The tables found in Appendix C show the number and percentage of utterances of the various functions for each speaker, excluding H. Each table presented there is organized in the following manner:

(a) The top row of each table shows the seven possible functions for each utterance.
(b) The leftmost column of the table indicates the speaker: M (mother), F (father), B (elder brother), or S (elder sister).
(c) The rightmost column indicates total number of utterances per speaker.
(d) The bottom row of each column indicates the total number of utterances of a specific function.

(e) For each cell that contains data within a table, the top number indicates the actual utterance count within the raw data while the bottom number in brackets indicates the percentage that number represents out of the total number of utterances for the speaker.
(f) Summary comments regarding which speaker dominates the data set vis-à-vis number of total utterances (i.e. who has the greatest percentage) and which function is most prevalent in each data set immediately follow each table.

In order to facilitate a discussion of such a large amount of data that would be meaningful vis-à-vis the hypothesis of this study, all the data sets were included in the composite table, Table 2, which provides a complete overview of all functions and speakers in the study. Following Table 2 is a summary of findings based on an examination of those data from several perspectives.

Summary: Several points stand out in the analysis of Table 2:

(a) The data which were captured by the tape recorder suggest that M spoke more often than did F. Though this may not reflect a completely accurately comparison between the total amount of time M and F spent or spend respectively interacting with H over the course of an entire day, it does suggest that M may have been the most prominent speaker in H's world during the recording sessions, though only by a margin of 7%.
(b) The most prominent function noted in F's speech, by 18% over the next most prominent function, is the regulatory function. This suggests, and is confirmed in many places throughout the data, that F is more likely to use commands to try to engage H in a language interaction than M is. It also suggests, and is confirmed throughout the data, that the exchanges between F and H are of shorter duration and contain less of the give-and-take seen in interchanges between M and H.
(c) Both B and S exhibit relatively large percentages of interactive function use which suggests that, although neither sibling has much formal spoken communicative interaction with H during the entire data set, when they do communicate with him they use the interactional function far more than they use the regulatory function. Additionally, the informative function is used by these siblings to a much greater extent than it is used by the parents. This may have implications for the influence older siblings have on their younger siblings both in the kind of interaction they have with the younger siblings and in the type of language they use during those interactions.
(d) Three functions were not found at all in the data: the instrumental, personal, and imaginative functions. Given the fact that these three functions by definition, especially the personal and imaginative functions, are typically used by parents or caregivers to indicate much more complex ideas and language than a young child would be likely able to comprehend (or, likely, generate), it is perhaps not surprising that they do not appear in the language of the parents. Of course, the presence of these three apparently absent functions cannot be ruled out categorically; it may be rather that language bearing these functions

was present during conversations that were not recorded, though this is unlikely given the broad range of times and settings in which the data were gathered.

There is one other possible explanation for the lack of, at least, the imaginative function. Because the parents in this study have specific religious beliefs regarding the nature of what literature their children may read, many of the fictional stories and characters that other children read about (Harry Potter books, for example) are not read in the home. This would naturally limit, though not eliminate, the amount of language containing the imaginative function around the subject.

(e) The functions which do appear in the language of M and F are, perhaps, not very surprising in that by definition these functions are directly related to the language so often used with infants: giving commands (regulatory function), language used to keep conversations going (interactive function), asking questions (heuristic function), and giving information (informative function).

4.2.2. Graphs comparing the functions

The following graphs (Figs. 2–17) are presented to give a graphic representation of the numerical data presented in Table 2 and the data from the full 32 data sets found in Appendix C. Where a graph contains a great deal of data, thereby rendering it rather dense in appearance, separate graphs are also provided which break down these larger graphs into specific components for ease of reference. The information

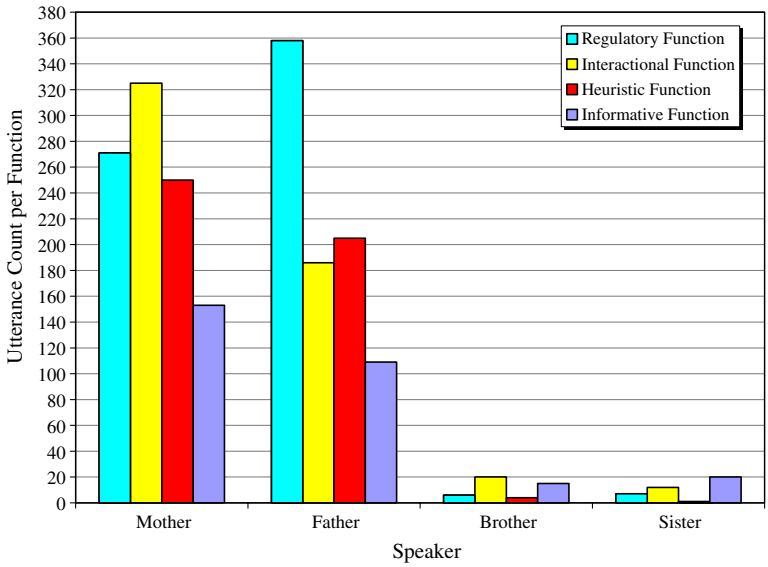

Fig. 2. Total number of utterances per function per speaker.

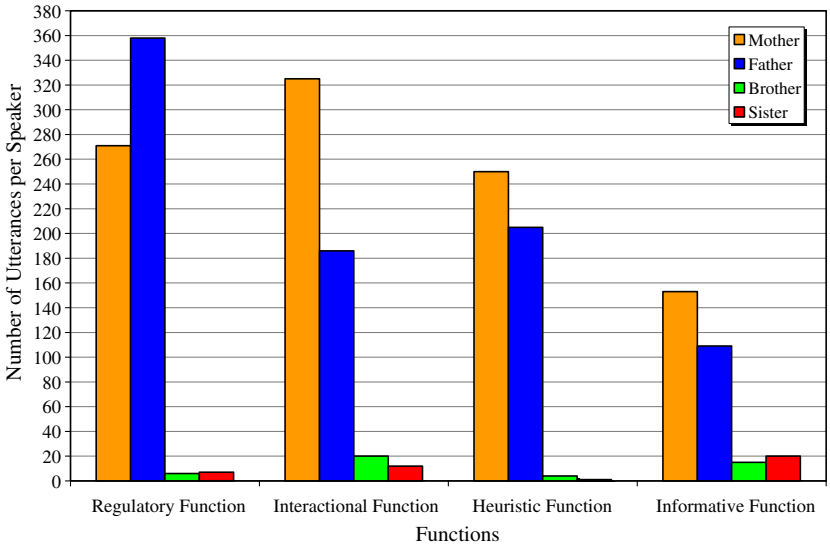

Fig. 3. Total number of utterances per speaker per function.

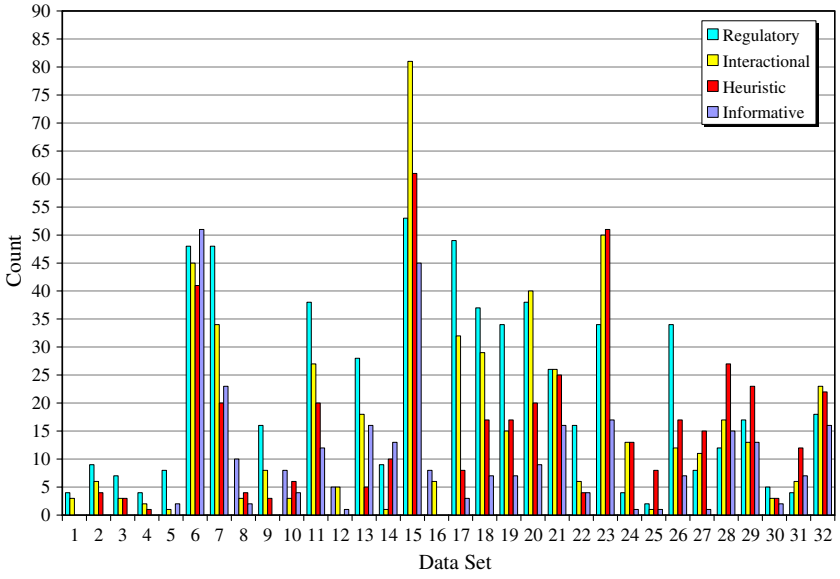

Fig. 4. Function count per data set.

contained in Fig. 4 (which is based on Table 2 and shows actual utterance count of each function in each data set) is also represented by Figs. 5–8 (each shows the

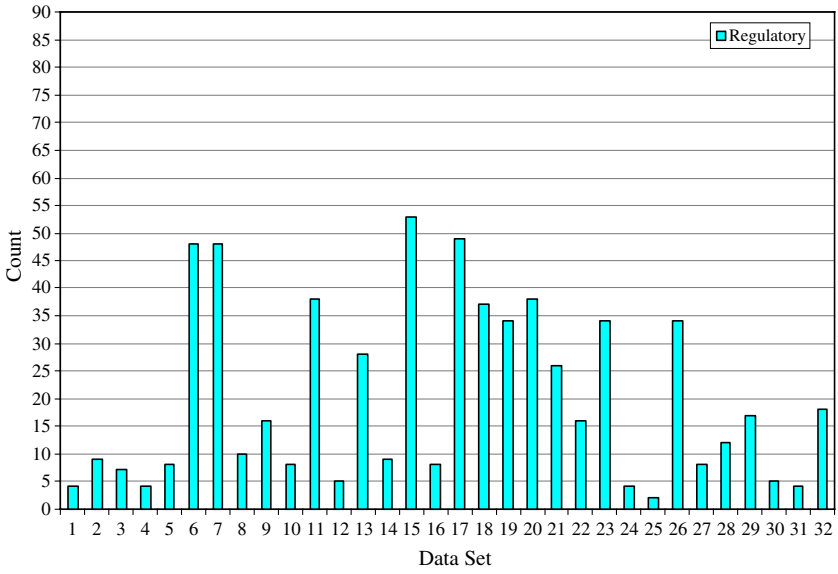

Fig. 5. Regulatory function per data set.

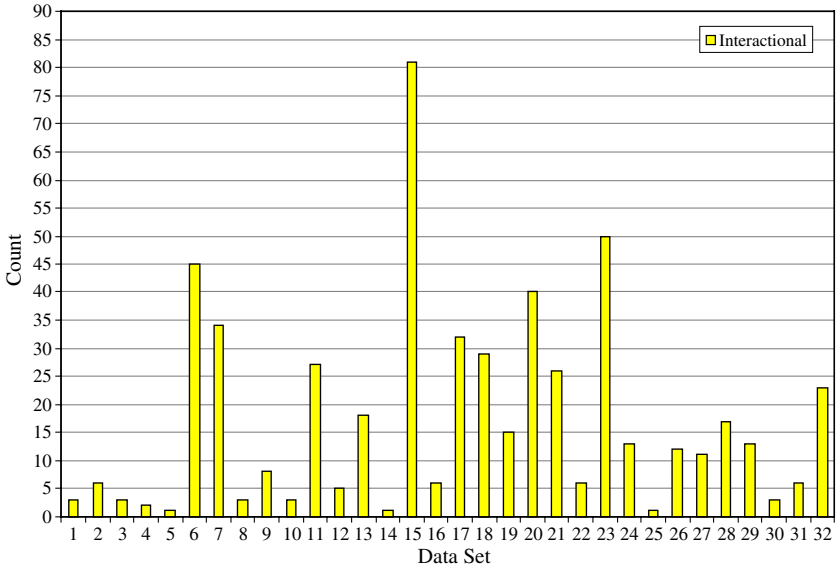

Fig. 6. Interactional function per data set.

utterance count of one function in each data set). Similarly, the information in Fig. 9 is broken down into separate graphs, Figs. 10, 12, 14 and 16. Figs. 11, 13, 15 and 17

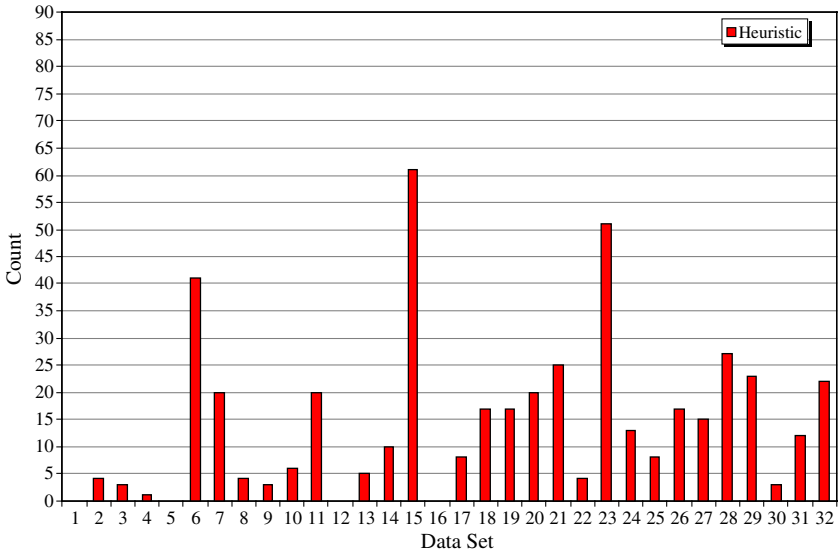

Fig. 7. Heuristic function per data set.

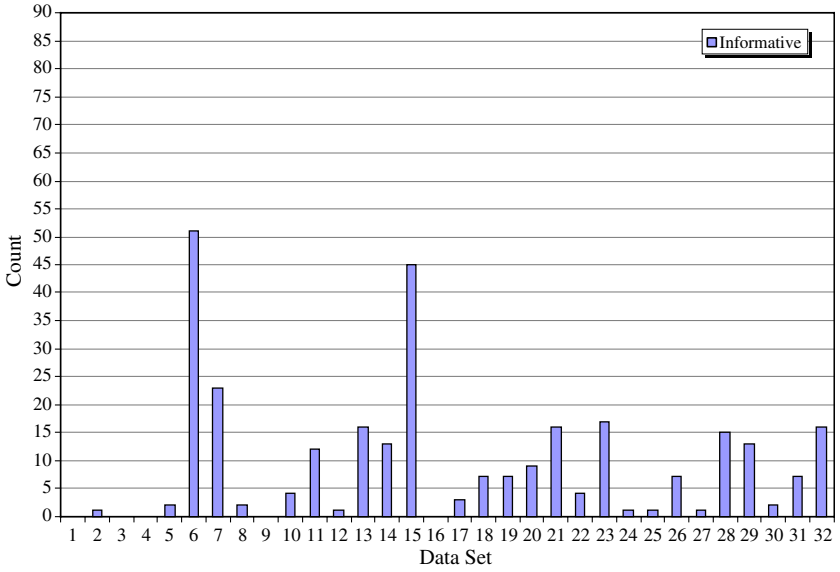

Fig. 8. Informative function per data set.

are given to compare actual utterance count with the percentages of the same utterance count.

As we examine Fig. 5, it is clear that when the regulatory function is present, it accounts for either a relatively substantial amount of parental CDS (30+ utterances)

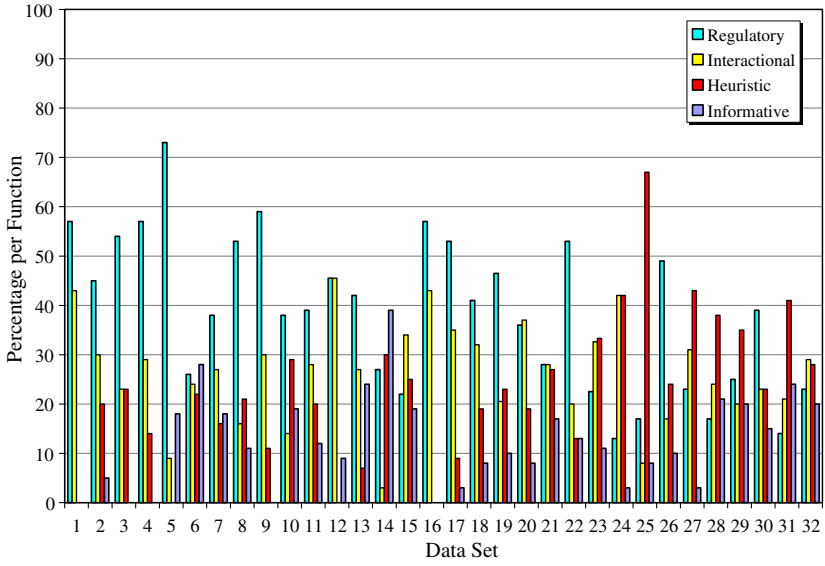

Fig. 9. Percentage of functions per data set.

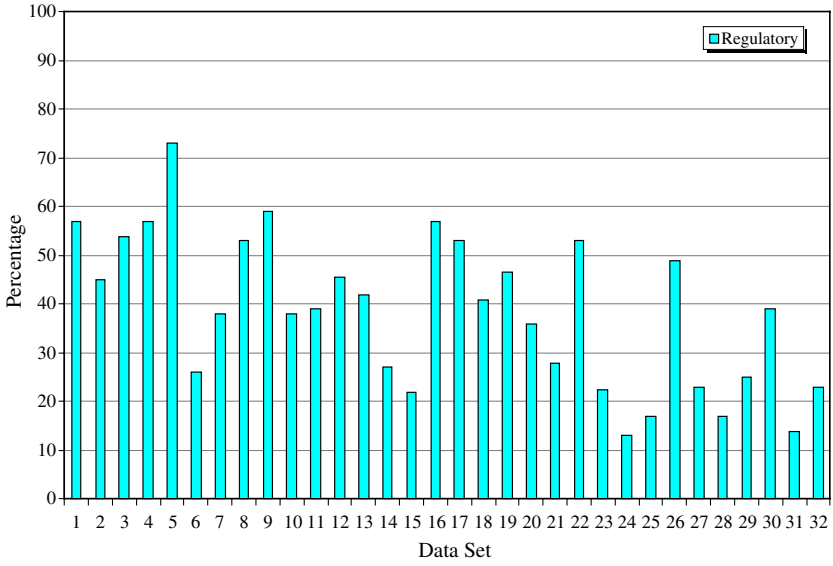

Fig. 10. Percentage of regulatory function per data set.

or a relatively small amount (~10 or fewer utterances). There does seem to be a clustering of data sets (11–23) which contain, on average, higher amounts of utterances bearing the regulatory function. Towards the end of the data collection period the

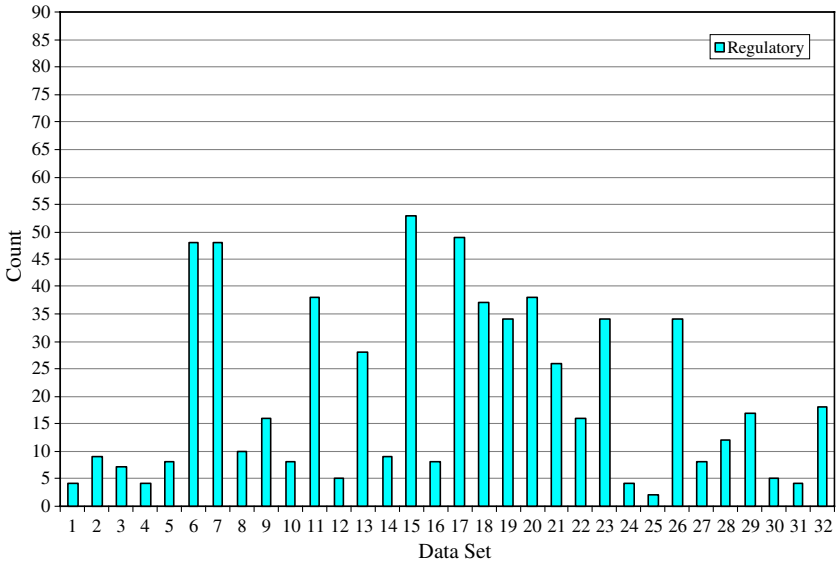

Fig. 11. Count of regulatory function per data set.

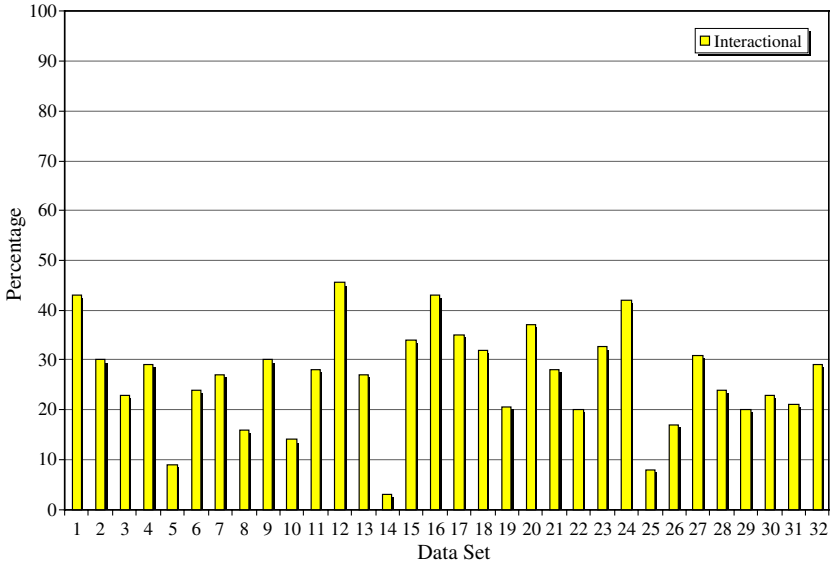

Fig. 12. Percentage of interactional function per data set.

number of utterances which carry the regulatory function seems to decrease somewhat. This may result from an increase in language which carries other functions,

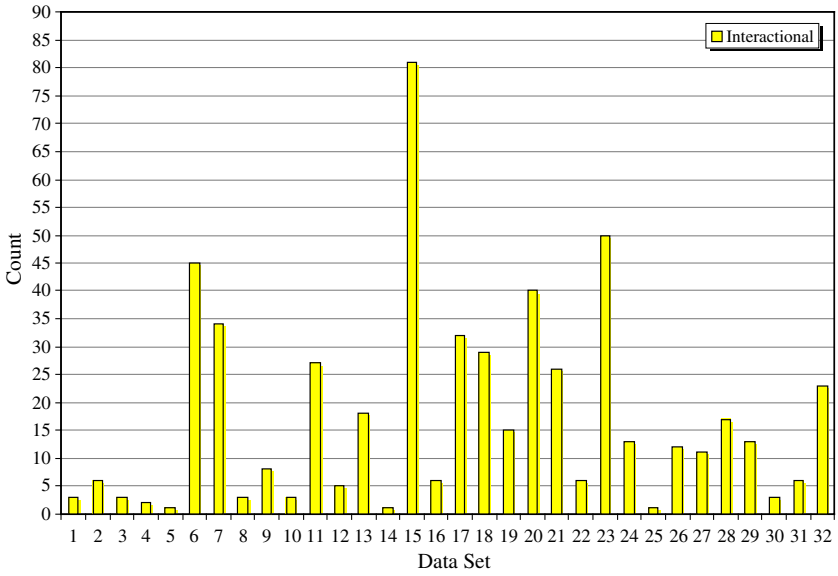

Fig. 13. Count of interactional function per data set.

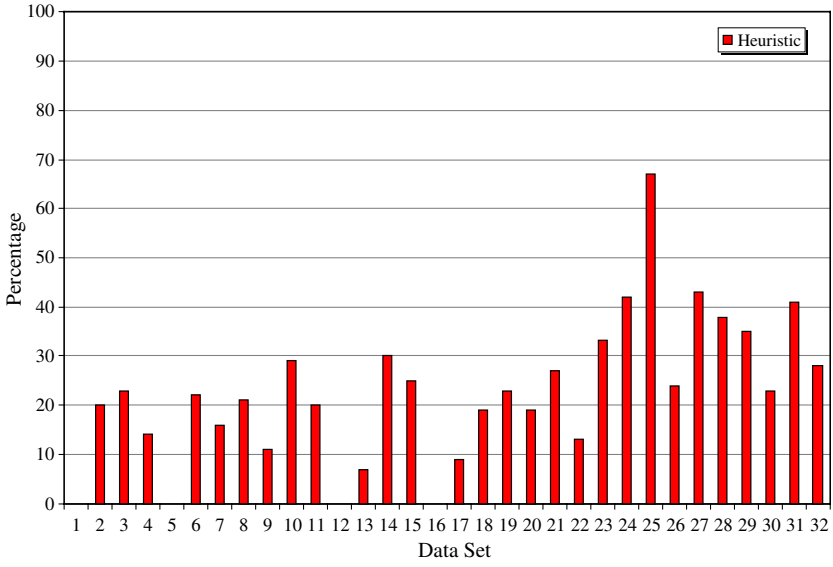

Fig. 14. Percentage of heuristic function per data set.

as we shall see. Perhaps this indicates a shift in the kind of language the parents use as the subject's language develops.

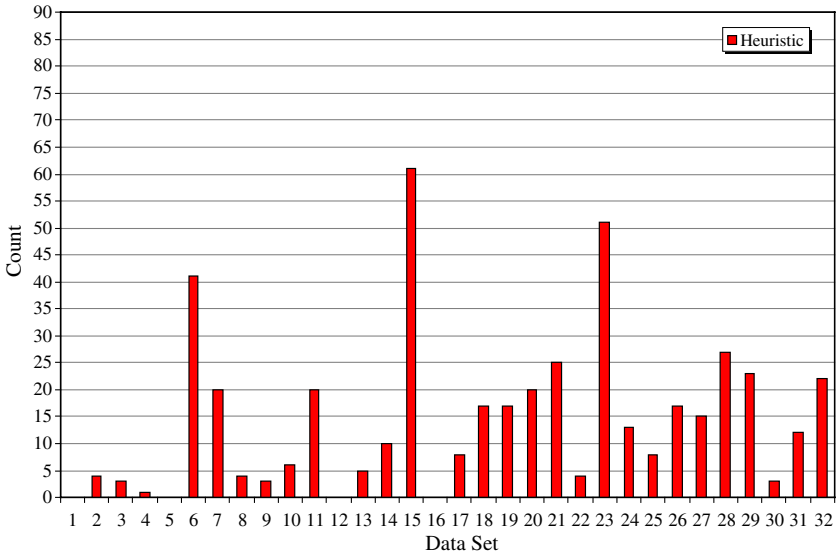

Fig. 15. Count of heuristic function per data set.

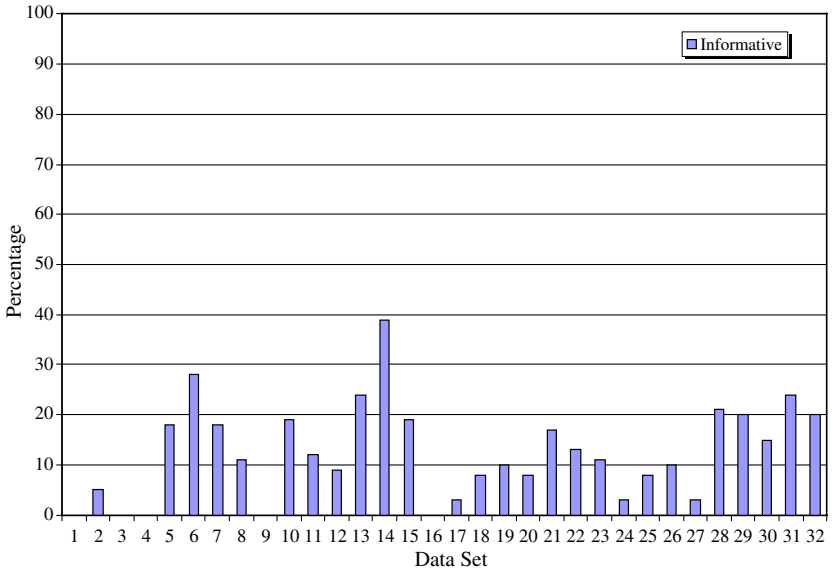

Fig. 16. Percentage of informative function per data set.

In Fig. 6, we note, once again, a slight clustering towards the center of the graph of data sets (15, 17–21, and 23) which carry larger amounts of interactional function

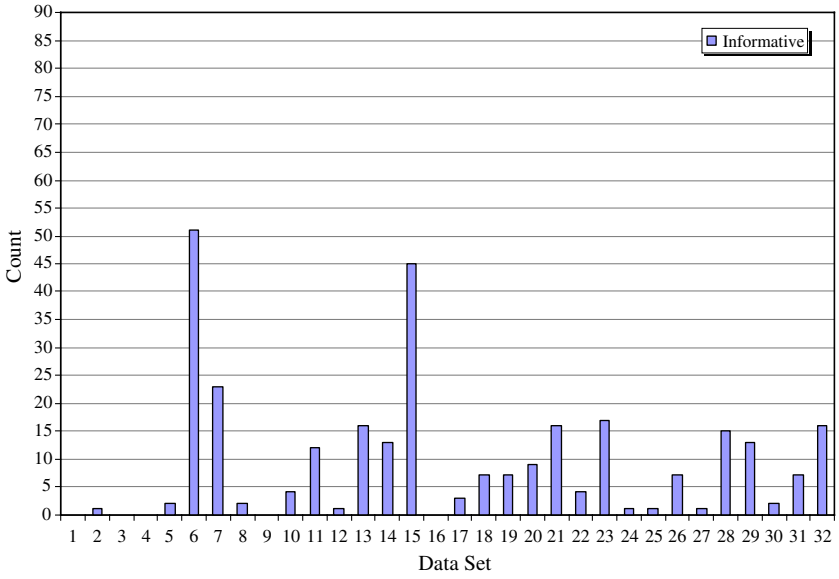

Fig. 17. Count of informative function per data set.

content. We also note that when the interactional function is present, it can be quite prominent (note data sets 6, 15, and 23). There is somewhat of a decrease in utterance count towards the end of the data collection period as was also noted in the regulatory function. This may also reflect and result from an increase in the presence of language containing other language functions, notably, the heuristic function.

Immediately evident in Fig. 7 is the increasing usage of language carrying the heuristic function over the course of the study. Although there are a few data sets in which larger quantities of language bearing the heuristic function can be seen (data sets 6, 15, and 23), the general increase seen from about data set 17 onward is of special interest. The increase seen in the heuristic function coincides well and interestingly with the decrease in the previous two functions. This certainly suggests that as the subject matures, the nature of the language directed at him changes to accommodate new or increasing linguistic demands.

Examination of Fig. 8 produces somewhat different conclusions compared with those noted in the previous three discussions. The informative function appears prominent in only two data sets (6 and 15) and is almost non-existent at the beginning of the study. There is a very slight increase in language that carries this function over the course of the study, but the change is not as dramatic as that seen with other functions. Perhaps this is not very surprising since this function, the 'I have something to tell you' function, clearly is of less utility to an infant until that infant can fully understand that information is being directly presented to the infant. What is interesting, however, is that the informative function is theorized by Halliday only to become influential until after all the other functions have developed. That this function is present at all, then, seems perhaps unusual and unanticipated.

When we compare the pair of graphs above (Figs. 10 and 11) and those following, we note that the graph showing percentages of functions in each data set provides perhaps an even better understanding of how each function performs in the CDS to which the subject is exposed in this study.

The percentage of heuristic function graph above shows a gradual diminution of percentage over the course of the study. As was mentioned earlier, this may be due to a gradual increase in other functions. Of course, it is certainly the case that the heuristic function plays an important role in parental CDS in this study as is evident from the observation that there is a relatively substantial percentage of this function throughout the study.

One obvious point we note in examining the differences between the actual count and percentage graphs (Figs. 12 and 13) of the interactional function is that the percentage of the interactional function appears to be fairly consistent across the study, with the exception of data set 14. This suggests that the function plays a crucial and consistent role in the language of the parent or parents. This consistency also suggests that this function may be indispensable to the social and linguistic relationships that exist between child and parents.

A comparison of Figs. 14 and 15 shows a decided increase in the heuristic function percentages over the duration of the study. A possible reason for this increase is that as the child develops his linguistic ability, the parents are able to ask him more questions, both direct and indirect, and that they are more interested in probing his reactions to their questions. This may result in large amounts of language containing the heuristic function. It also suggests that the parents expect not only more answers but also more complex answers to their questions since, presumably, they believe he can better understand and respond to their questions as he matures over time.

As previously mentioned, the informative function does not show as dramatic an increase over the course of the study as some of the other functions do. The percentage graph (Fig. 16) shows a relatively consistent percentage ($\sim$20%) of the informative function except for the lack of it at the outset of the study. This speaks neither to its great importance nor its lack thereof. Because this function is believed to be more important later in life once a child has more or less developed the other functions, it is reasonable to assume that it does not have much impact on the subject's early language development. However, that it is present at all and that three other functions are not is somewhat surprising.

4.2.3. Selected data in chronological order

Next, Table 3 presents in chronological order selected data from all of the data set tables. To facilitate analysis of these data according to important issues in this study, the following data were selected and placed for comparison within the table. Column (1) shows the number of the data set; column (2), the dominant speaker, always the Mother or Father, and the percentage of domination within the data set; column (3), the dominant function (by percentage); column (4), the next dominant function (by percentage); and, column (5), the total utterance count for the data set.

In Table 3 the term 'dominant' is used simply to indicate that either a particular speaker produced more utterances than any other speaker in a data set or a

Table 3
Data sets in chronological order

(1) Data set number	(2) Dominant speaker	(3) Dominant function	(4) Next dominant function	(5) Count
1	M (86%)	REG (67%)	INTER (33%)	7
2	F (90%)	REG (44%)	INTER (28%)	20
3	M (54%)	REG (71%)	INTER (14%)	13
4	F (71%)	REG (60%)	INTER (20%)	7
5	F (55%)	REG (83%)	INFORM (17%)	11
6	M (81%)	INTER (27%)	HEUR (25%)	185
7	M (78%)	INTER (33%)	REG (31%)	125
8	F (53%)	REG (70%)	INFORM (20%)	19
9	M (52%)	INTER (43%)	REG (36%)	27
10	F (100%)	REG (38%)	HEUR (29%)	21
11	F (66%)	REG (51%)	INTER (22%)	98
12	F (100%)	REG = INTER (45%)	REG = INTER (45%)	11
13	M (49%)	REG (42%)	INTER (30%)	67
14	F (97%)	INFORM (38%)	HEUR (31%)	33
15	M (53%)	INTER (38%)	HEUR (23%)	240
16	F (71%)	REG = INTER (50%)	REG = INTER (50%)	14
17	M (52%)	REG (60%)	INTER (27%)	92
18	M = F (49%)	M-INTER (41%); F-REG (43%)	M-REG (39%); F-INTER (25%)	90
19	F (85%)	REG (48%)	HEUR (24%)	73
20	F (50%)	REG (39%)	INTER (35%)	107
21	F (73%)	REG (34%)	INTER (28%)	93
22	F (93%)	REG (57%)	INTER = HEUR = INFORM = (@14%)	30
23	M (93%)	INTER (35%)	HEUR (34%)	153
24	M (100%)	INTER = HEUR (42%)	INTER = HEUR (42%)	31
25	F (100%)	HEUR (67%)	REG (17%)	12
26	F (83%)	REG (53%)	HEUR (28%)	70
27	F (100%)	HEUR (43%)	INTER (31%)	35
28	M (93%)	HEUR (41%)	INTER (26%)	71
29	F (52%)	HEUR (44%)	INFORM (24%)	66
30	F (69%)	REG (44%)	HEUR = INFORM (22%)	13
31	M (90%)	HEUR (42%)	INTER (23%)	29
32	F (72%)	HEUR (30%)	REG = INTER (25%)	79

particular function was more prevalent than any other function. Use of the terms ‘dominance’ or ‘dominant’ is not intended to refer to how these terms are used in their syntactic sense.

Some data sets contained data that showed that either two speakers or functions were numerically equivalent. This is indicated by the equals sign (=).

Even a cursory glance at the data in Table 3 shows that the regulatory and interactional functions predominate as either the dominant or next dominant function. In order to more clearly analyze and understand the chronologically ordered data in Tables 3 and 4 was created. In Table 4 the data in column 5 of the Table 3 (Count) are presented again in column (5) but in descending order, in order to determine who and what function(s) were most prevalent in the data sets which had the most utter-

Table 4
Data sets in order of utterance count

(1) Data set number	(2) Dominant speaker	(3) Dominant function	(4) Next dominant function	(5) Count
15	M (53%)	INTER (38%)	HEUR (23%)	240
6	M (81%)	INTER (27%)	HEUR (25%)	185
23	M (93%)	INTER (35%)	HEUR (34%)	153
7	M (78%)	INTER (33%)	REG (31%)	125
20	F (50%)	REG (39%)	INTER (35%)	107
11	F (66%)	REG (51%)	INTER (22%)	98
21	F (73%)	REG (34%)	INTER (28%)	93
17	M (52%)	REG (60%)	INTER (27%)	92
18	M = F (49%)	M-INTER (41%); F-REG (43%)	M-REG (39%); F-INTER (25%)	90
32	F (72%)	HEUR (30%)	REG = INTER (25%)	79
19	F (85%)	REG (48%)	HEUR (24%)	73
28	M (93%)	HEUR (41%)	INTER (26%)	71
26	F (83%)	REG (53%)	HEUR (28%)	70
13	M (49%)	REG (42%)	INTER (30%)	67
29	F (52%)	HEUR (44%)	INFORM (24%)	66
27	F (100%)	HEUR (43%)	INTER (31%)	35
14	F (97%)	INFORM (38%)	HEUR (31%)	33
24	M (100%)	INTER = HEUR (42%)	INTER = HEUR (42%)	31
22	F (93%)	REG (57%)	INTER = HEUR = INFORM = (@14%)	30
31	M (90%)	HEUR (42%)	INTER (23%)	29
9	M (52%)	INTER (43%)	REG (36%)	27
10	F (100%)	REG (38%)	HEUR (29%)	21
2	F (90%)	REG (44%)	INTER (28%)	20
8	F (53%)	REG (70%)	INFORM (20%)	19
16	F (71%)	REG = INTER (50%)	REG = INTER (50%)	14
3	M (54%)	REG (71%)	INTER (14%)	13
30	F (69%)	REG (44%)	HEUR = INFORM (22%)	13
25	F (100%)	HEUR (67%)	REG (17%)	12
5	F (55%)	REG (83%)	INFORM (17%)	11
12	F (100%)	REG = INTER (45%)	REG = INTER (45%)	11
1	M (86%)	REG (67%)	INTER (33%)	7
4	F (71%)	REG (60%)	INTER (20%)	7

ances. The rationale here was that, although there were many data sets, the ones which contained a lot of language would likely be the ones which would be the most profitable for examination. Naturally, all data sets were analyzed, but it proved to be more interesting to examine the larger data sets because there was a better comparison between the kinds of language used by the various family members in the study.

Many interesting facts present themselves when Table 4 is examined. First, we note that M is the dominant speaker of the four data sets which contain the largest number of utterances. Additionally, those four data sets all have the interactional function as dominant. The total number of utterances in these four data sets is 703 or about 36% of the entire data set. Though the interactional function is not the only one found in this large portion of the entire data set, it is the function which dominates (sometimes

quite strongly) the language used by M. This certainly suggests that when H is surrounded by major amounts of language, much, if not most, of it comes from M and is of an interactional nature. Interestingly, when the table is further examined, we note that F dominates the next three largest data sets and predominantly uses the regulatory function therein. This rather stark distinction between the language that M and F exhibit is suggestive of the roles they play when interacting with H. That is, one may surmise that M, through the interactive nature of her conversations with the subject, is more interested in sustaining the interaction between them. This may allow H to learn to interact with his environment better. On the other hand, the regulatory nature of F's interaction with H tends to suggest that topics are not sustained as long, which may consequently lessen the time H has to interact with his environment. That the data sets indicated here are from throughout the entire data set suggests that this distinction is not merely a chance occurrence and that the nature of the language M and F use with H is fairly consistent. Of course, variation in functional language use does arise, as an examination of the individual data sets shows.

4.2.4. Functions in data sets dominated by M

The following two Tables 5 and 6 were created by dividing Table 4 into those data sets that were dominated by M and those dominated by F. As in the previous table, both of these tables show the data sets in order of highest to lowest utterance count.

Noteworthy points in Table 5 are:

(a) Of the 13 data sets where M is the dominant speaker, the interactive function is most prominent in 7 (including #18). In 4 other data sets, the regulatory function is most prominent. In the remaining 3 (including again #18), the heuristic function is most dominant.

Table 5
Functions in data sets dominated by M

(1) Data set number	(2) Dominant speaker	(3) Dominant function	(4) Next dominant function	(5) Count
15	M (53%)	INTER (38%)	HEUR (23%)	240
6	M (81%)	INTER (27%)	HEUR (25%)	185
23	M (93%)	INTER (35%)	HEUR (34%)	153
7	M (78%)	INTER (33%)	REG (31%)	125
17	M (52%)	REG (60%)	INTER (27%)	92
18*	M = F (49%)	M-INTER (41%); F-REG (43%)	M-REG (39%); F-INTER (25%)	90
28	M (93%)	HEUR (41%)	INTER (26%)	71
13	M (49%)	REG (42%)	INTER (30%)	67
24	M (100%)	INTER = HEUR (42%)	INTER = HEUR (42%)	31
31	M (90%)	HEUR (42%)	INTER (23%)	29
9	M (52%)	INTER (43%)	REG (36%)	27
3	M (54%)	REG (71%)	INTER (14%)	13
1	M (86%)	REG (67%)	INTER (33%)	7

* This data set is shown in this table and the next because, although M and F have equal number of total utterances and therefore share dominance here, they exhibit different percentages of function usage.

Table 6
Functions in data sets dominated by F

(1) Data set number	(2) Dominant speaker	(3) Dominant function	(4) Next dominant function	(5) Count
20	F (50%)	REG (39%)	INTER (35%)	107
11	F (66%)	REG (51%)	INTER (22%)	98
21	F (73%)	REG (34%)	INTER (28%)	93
18*	M = F (49%)	M-INTER (41%); F-REG (43%)	M-REG (39%); F-INTER (25%)	90
32	F (72%)	HEUR (30%)	REG = INTER (25%)	79
19	F (85%)	REG (48%)	HEUR (24%)	73
26	F (83%)	REG (53%)	HEUR (28%)	70
29	F (52%)	HEUR (44%)	INFORM (24%)	66
27	F (100%)	HEUR (43%)	INTER (31%)	35
14	F (97%)	INFORM (38%)	HEUR (31%)	33
22	F (93%)	REG (57%)	INTER = HEUR = INFORM = (@14%)	30
10	F (100%)	REG (38%)	HEUR (29%)	21
2	F (90%)	REG (44%)	INTER (28%)	20
8	F (53%)	REG (70%)	INFORM (20%)	19
16	F (71%)	REG = INTER (50%)	REG = INTER (50%)	14
30	F (69%)	REG (44%)	HEUR = INFORM (22%)	13
25	F (100%)	HEUR (67%)	REG (17%)	12
5	F (55%)	REG (83%)	INFORM (17%)	11
12	F (100%)	REG = INTER (45%)	REG = INTER (45%)	11
4	F (71%)	REG (60%)	INTER (20%)	7

* This data set is shown in this table and the previous because, although M and F have equal number of total utterances and therefore share dominance here, they exhibit different percentages of function usage.

(b) In 4 of the 7 data sets where the interactive function is most prominent, the next most prominent function is the heuristic function. In the remaining 3 data sets, the regulatory function is the next most dominant. In the 4 data sets where the regulatory function is most prominent, the next most prominent function is the interactional function.
(c) What these previous two descriptions point out is that in the vast majority of the data sets where M dominates, the interactional function is very prominent and therefore highly influential vis-à-vis the input H receives from M. When the interchanges M has with H are examined, we note that language carrying interactional and heuristic functions appears to generate substantially more and varied linguistic output from H than does the language F uses with H.

4.2.5. Functions in data sets dominated by F

Noteworthy points in Table 6 are:

(a) Of the 20 data sets where F is the dominant speaker, the regulatory function is most prominent in 15 (including #18). In 4 other data sets, the heuristic

function is most prominent. In the remaining data set, the informative function is most dominant.

(b) In 9 of the 15 data sets where the regulatory function is most prominent, the next most prominent function is the interactional function. In 5 other data sets, the heuristic function is the next most dominant. In 3 other data sets, the next most prominent function is the informative function. Two data sets (#16 and #4) contain equal numbers of two functions and are therefore counted twice.

(c) The other data sets, where some function other than the regulatory is most prominent, exhibit a wider variety of combinations of functions than do the similar data sets where M is the dominant speaker. This suggests that, while F may use much more of the regulatory function in general, he does use perhaps more varied or special language in his interactions with H than M does. This may parallel the idea mentioned earlier (Snow, 1995, p. 183; see Section 2.2) that fathers are, in general, more likely to bring new information into the child's world than are mothers.

(d) What these previous descriptions point out is that in the vast majority of the data sets where F dominates, the regulatory function is very prominent and therefore affects the input H receives from F in specific ways. When the interchanges F has with H are examined, we note that although F urges H to say things, some of which might be new to H's world, he is not able to keep the interchange going as long as M can and must, therefore, keep trying to get H to say different things. He seems much less likely to comment on what H has uttered either by offering other information or by asking questions.

4.3. Subject responses to the dominant speaker

Now that we have examined the functions contained in the CDS used by the main caregivers (M and F), an examination of the responses from H to the dominant speaker at given times may give us a glimpse of the effectiveness of that CDS on the language production (if not directly on acquisition) which H exhibits. With this in mind, a re-examination of the data sets should give a representative view of how H reacts to certain functions/CDS used by his parents.

Table 7 takes the data from the study and juxtaposes them thus: column (A) lists the 32 data sets; column (B) indicates the total number of CDS utterances produced by all speakers in each set; column (C) lists which speaker was dominant (either M or F) and which function was dominant; column (D) gives the number of utterances produced by H that appeared to contain any function; and column (E) shows the ratio of total number of CDS utterances in the data set to total number of H's utterances (CDS:HU ratio) in the same data set, that is, the ratio of column (A) to column (C).

Following the table are three graphs, Figs. 20–22, which graphically display the information in Table 7 in important ways, highlighting certain elements. (Please note that the asterisk in the following table highlights that in data set #4 a true ratio could not be calculated because H produced no utterances. In order to keep data set con-

Table 7
H's utterances in the data sets

(A) Data set	(B) Total parental utterance count	(C) Dominant speaker—dominant function	(D)Total H's functional utterances	(E) CDS:HU ratio: (A)/(C)
1	7	M—REGULATORY	4	1.75:1
2	20	F—REGULATORY	8	2.5:1
3	13	M—REGULATORY	3	4.33:1
***4**	**7**	**F—REGULATORY**	**1 (0)**	***7:1 (0)**
5	11	F—REGULATORY	1	11:1
6	185	M—INTERACTIONAL	47	3.94:1
7	125	M—INTERACTIONAL	33	3.79:1
8	19	F—REGULATORY	5	3.8:1
9	27	M—INTERACTIONAL	10	2.7:1
10	21	F—REGULATORY	11	1.91:1
11	98	F—REGULATORY	25	3.92:1
12	11	F—REGULATORY = INTERACTIONAL	8	1.38:1
13	67	M—REGULATORY	28	2.39:1
14	33	F—INFORMATIVE	17	1.94:1
15	240	M—INTERACTIONAL	42	5.71:1
16	14	F—REGULATORY = INTERACTIONAL	6	2.33:1
17	92	M—REGULATORY	37	2.49:1
18	90	M and F—INTERACTIONAL = REGULATORY	37	2.43:1
19	73	F—REGULATORY	30	2.43:1
20	107	F—REGULATORY	52	2.06:1
21	93	F—REGULATORY	45	2.07:1
22	30	F—REGULATORY	15	2:1
23	153	M—REGULATORY	92	1.66:1
24	31	M—INTERACTIONAL = HEURISTIC	20	1.55:1
25	12	F—HEURISTIC	6	2:1
26	70	F—REGULATORY	25	2.8:1
27	35	F—HEURISTIC	19	1.84:1
28	71	M—HEURISTIC	38	1.87:1
29	66	F—HEURISTIC	34	1.94:1
30	13	F—REGULATORY	6	2.17:1
31	29	M—HEURISTIC	12	2.42:1
32	79	F—HEURISTIC	32	2.47:1

tinuity, an utterance count of 1 for H was used. See part (e) in the discussion of Table 7 below for additional discussion of this unusual case.)

The next three figures graphically display the ratios in Table 7 above. The method for calculating these ratios was to simply take the total number of utterances from both parents and divide that by the total number of functional utterances H produced in the particular data set. The figures show along the *x*-axis the following information which may be helpful to the reader: the data set number (1–32), the dominant speaker in each data set (M or F), and the dominant (highest percentage)

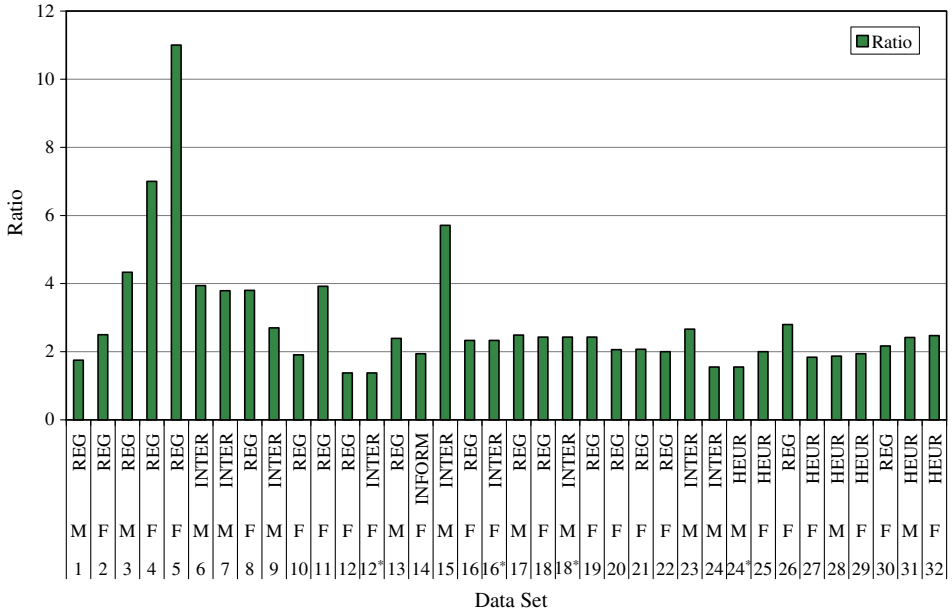

Fig. 18. Ratio of number of CDS to H's utterances per data set (*-indicates data sets represented twice due to equal dominance of functions).

function in each data set. Fig. 18 shows the ratios arranged chronologically by data set. Fig. 19 gives the ratios according to speaker, while Fig. 20 shows the ratios according to dominant function.

A few interesting points arise out of an examination of the data in Table 7 and its associated graphs, Figs. 18–20.

(a) When examined for observable trends in the data chronologically, it is interesting to note that the regulatory function is dominant in the first 5 data sets, which also contain some of the highest CDS:HU ratios. This trend of higher ratios for specific functions does not continue over time, however. This suggests that, aside from a possible early relationship between the regulatory function and a high CDS:HU ratio, there is no single function that appears to foster high CDS:HU ratios in any crucial way.

(b) When these ratios are examined according to speaker (Fig. 19), we note that F is the dominant speaker in the data sets which contain the two highest CDS:HU ratios. Both of these data sets also happen to show dominance by the regulatory function. The average CDS:HU ratio for data sets dominated by M is 2.85:1, while the average CDS:HU ratio for data sets dominated by F is 2.79:1. At first this may not seem to be an important difference at all. However, when we re-examine the data sets and the number of utterances contained in each, we note that data set #5 which contains the 11:1 CDS:HU ratio only has 12 utterances total. This very small data set therefore skews the data greatly. If data set #5 is

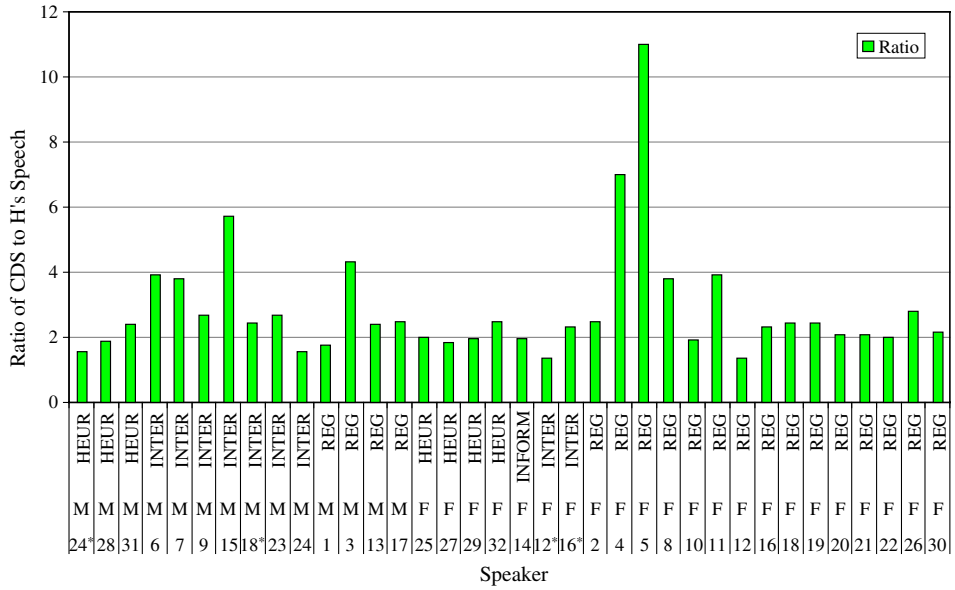

Fig. 19. Ratio of CDS to H's utterances per speaker (*-indicates data sets represented twice due to equal dominance of functions).

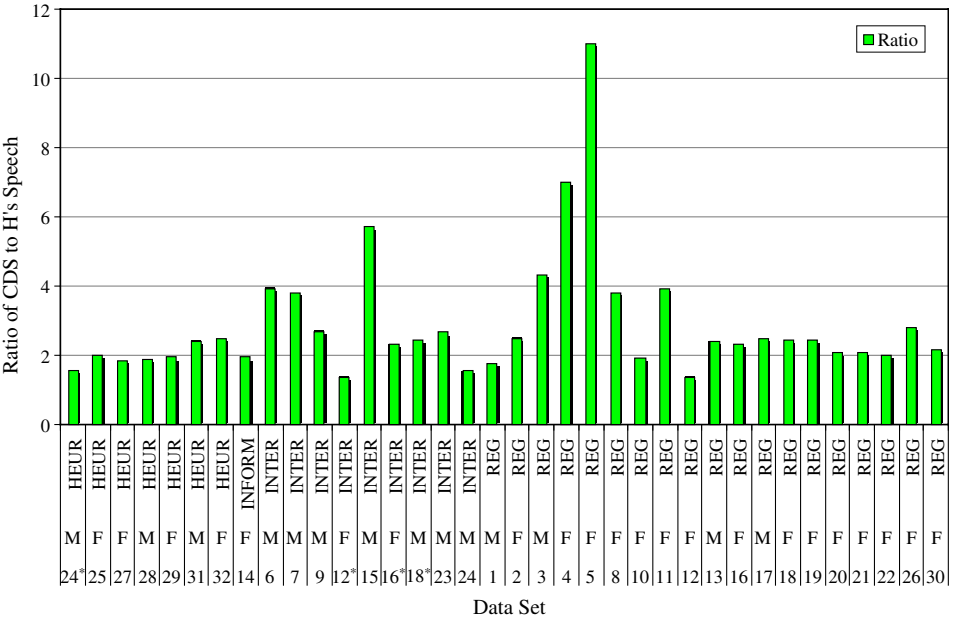

Fig. 20. Ratio of CDS to H's utterances per function (*-indicates data sets represented twice due to equal dominance of functions).

excluded in this calculation, the previous average CDS:HU ratio of F's parental CDS to subject utterances falls from 2.79:1 to 2.33:1, which is substantially lower than the average for the data sets dominated by M. Although no data should be excluded because they are problematic, it is clear that inclusion of this particular data set would produce averages that suggest a much different comparison of how H might be responding to M and F.

(c) As to the presence or absence of specific functions, it should be noted that Fig. 19 highlights the fact that while the regulatory and interactional functions dominate data sets throughout the entire study, the heuristic functions appears dominant only from data set 25 onward. This does not mean that no questioning language was noted earlier than data set 25; rather, it may suggest that later in the study H is more likely to produce language or do things that cause his parents to question him more than they may have prior to this.

(d) We also note a more regular CDS:HU ratio from about midway through the study until the end. Additionally, we note that this CDS:HU ratio stability occurs with little variation due to dominant function. We may surmise from this observation that the subject's response to different types of parental language is minimal because, perhaps, the subject increasingly understands and can respond to the parents' language.

(e) If we examine the CDS:HU ratio per function, the following results obtain. The regulatory function produces an average CDS:HU ratio of 3.12:1. Once again, however, two data sets (#4 and #5) skew this ratio. As was mentioned above, data set #4 does not in fact even provide a ratio (or rather, the ratio is infinity) since there are no subject responses to the seven parental CDS utterances contained therein. Rather than delete the data set completely, an artificial ratio of 7:1 was created by arbitrarily assigning one utterance to H for that data set. Data set #5, which also contains a very small number of total utterances, produces a very large CDS:HU ratio of 11:1. If these two problematic data sets are not calculated in the average ratio for the regulatory function, a CDS:HU ratio of 2.22:1 is obtained. The interactional function produces an average CDS:HU ratio of 2.98:1, with the heuristic function producing a 2.02 CDS:HU ratio and the informative function producing a 1.94 CDS:HU ratio. Unfortunately, since only one data set exhibited dominance by the informative function, we cannot truly call its 1.94 CDS:HU ratio an *average* ratio. Nevertheless, what falls out of this analysis (assuming we revise the calculations of CDS:HU ratio averages mentioned above) is that the interactional function shows the highest CDS:HU ratio compared to that of the other functions. This suggest rather strongly that H is surrounded, on average, by more language when the interactional function is dominant than when any other function dominates a language interchange.

If we examine the figurative 'other side of the coin,' the number or utterances H produced according to dominant function (Fig. 21), we note that the interactional and regulatory functions produced similar counts (318 vs. 309). Yet it took twice as many data sets to produce the lower regulatory total than the interactional total

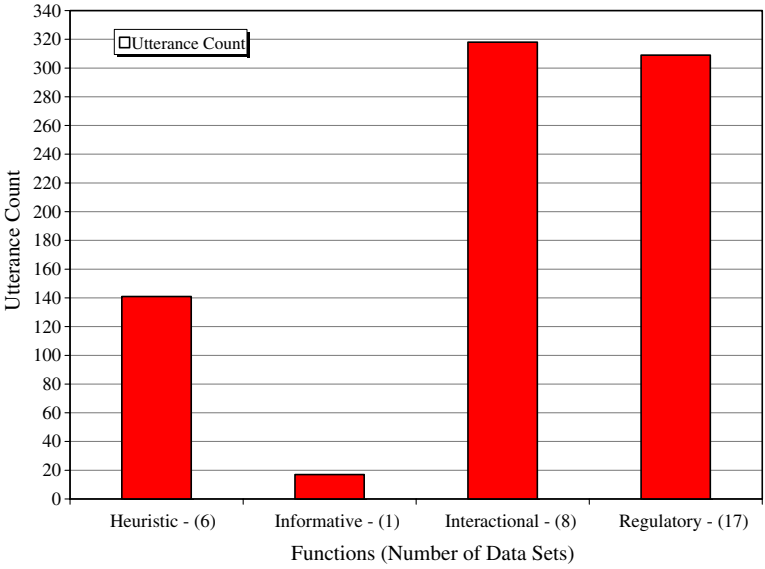

Fig. 21. H's utterance count by function.

(17 vs. 8). One possibility for this situation is that the interactional function, when the dominant function in a data set, is responsible for more language output from H (approximately double) than when the regulatory function appears dominant in a data set. Perhaps this is not surprising when one considers that interchanges between parent and child which are of an interactional nature would logically include more utterances per speaker because there is more statement/question and comment than in a regulatory interchange which is typically a command followed by a single response. It is also reasonable, then, that interactional interchanges may allow the child more opportunity to create language than do regulatory ones.

The following chart (Fig. 22) also shows H's utterance count according to function, speaker, and data set. The important points to note are (from the left) that H's utterance count rises to its highest level when M is the dominant speaker the interactional function is the dominant one in the data set. We also note that F most often dominates data sets which contain a majority of the regulatory function.

As can be readily seen from the preceding two figures, H produced the greatest number of utterances in the data set (number 23) where the interactional function was most prevalent. Although the regulatory function was also quite prevalent in the entire group of data sets, H did not produce as much language per data set when it was the dominant function as when the interactional function was dominant. Fig. 22 also highlights the fact that M was the dominant speaker is all but one of the data sets where the interactional function was dominant. The numbers in these final two charts certainly indicate the following trend: when H produced substantial amounts of language, it was more often in a situation where the interactional function was dominant and the mother was the dominant speaker.

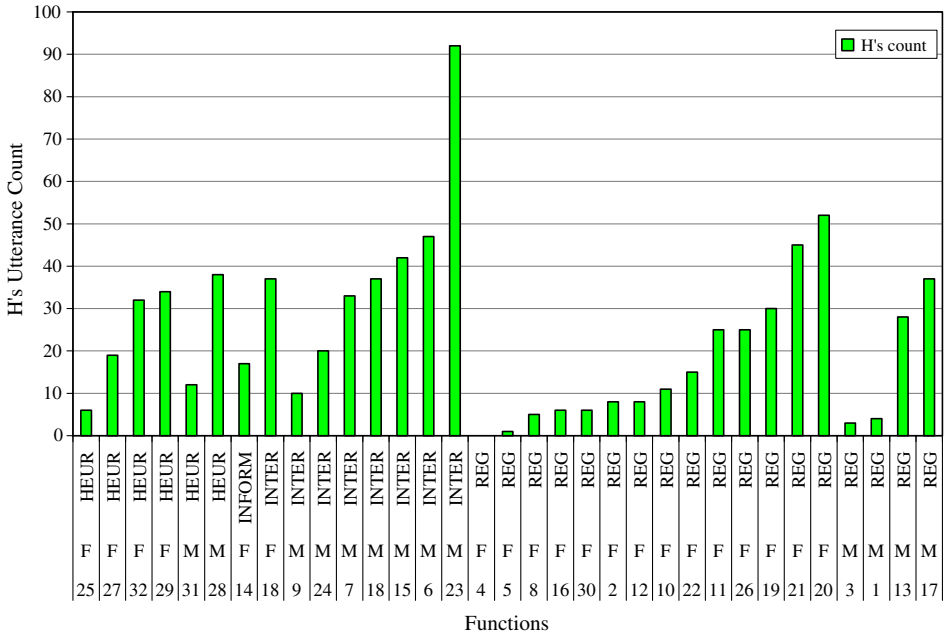

Fig. 22. H's utterance count by function in each data set.

In summary then, the data analysis points to differences between the kinds and relative amounts of functions that the various family members, especially M and F, use with the subject. In general, M uses more interactional function language with H than F does, while F uses more regulatory function language with H than M does. This results in a difference between the average CDS:HU ratios that M and F exhibit (2.85:1 vs. 2.33:1). That M's ratio is higher suggests that she is able to engage H in language interchanges in which H receives more language than he does when interacting with F. This also suggests that M's language is perhaps more important to H's language development from a social interactionist perspective than F's (or the other family members') language is. Put another way, M's language fosters H's language development in more direct ways due to its greater interactional function content, which appears to be a prominent factor in the relative amount of language H produces.

5. Summary and conclusions

5.1. Introduction

In this section, I will discuss how the findings from the previous section affect the current understanding of CDS. First, I discuss whether and how the results of this

study support the initial hypotheses of this case study. Next, I present a new perspective from which to view what CDS does for the developing child vis-à-vis language acquisition. Finally, I suggest areas for further research.

5.2. Hypotheses revisited

The results of the analysis of the data collected for this study do partially support the initial hypotheses. The following comments take the hypotheses in turn.

(a) The CDS used by the mother with her child in this study will be quantifiably different in content and quantity from the language that other family members use with the subject.

This hypothesis appears to have qualified support. The CDS used by the mother turned out to be, in fact, quantifiably different from that used by any other family member. Notably, the mother's CDS differs from that of any other family member because it contains more of the interactional function. Additionally, the mother's language was observed to generate more output (number of utterances) from the subject than did the father's.

One concern that some readers may express regarding the outcomes of this study is that what I have examined in this study is essentially the difference(s) between women's and men's language. While this distinction was not the main thrust of my study, it is certainly the case that such differences may in fact explain some part of the results. Citing Tannen's recent work on the differences between men and women vis-à-vis interactional styles, Talbot (1998, p. 98) lists this group of 'binary oppositions' which characterize men's and women's styles of talk. No verbs were given for each quality or characteristic, so I have supplied (probably) appropriate verbs.

Women	Men
(Show) Sympathy	(Engage in) Problem-solving
(Develop) Rapport	(Like to) Report
(Practice) Listening	(Practice) Lecturing
(Are more) Private	(Are more) Public
(Strive for) Connection	(Strive for) Status
(Are more) Supportive	(Are more) Oppositional
(Value) Intimacy	(Value) Independence

Such oppositions suggest that, traditionally, women take on or find themselves in the nurturing role of mother. I considered, therefore, that such a woman might be more likely to use language which contains Hallidayan functions such as the Interactional (the 'you and me' function). Likewise, I surmised that a man, traditionally taking the controlling role of father, might more likely use language containing the Regulatory (the 'do as I tell you') function. My findings do reflect a situation in

which some of these oppositions exist, but such oppositions, generalizations perhaps, may be overly simplistic and do not show what else might be going on in the interchanges between parent and child. The parents in this study used several, though not all of the Hallidayan functions.

The general characteristics I just mentioned may be true of men and women in Western societies, but the subjects in this study were Japanese. In Japan such oppositions may not necessarily be the same or exist at all. Japanese men and women have different styles of communication and interaction with each other and with their children than do Western parents. While living in Japan for several years, I have personally observed many families in Japan which bear out such (often striking) differences. For example, fathers can often seem harsh and distant, almost non-participants in their children's upbringing, while mothers are typically comforting and sympathetic to the child's slightest problem or want, sometimes to the point of doting on them. Naturally, parental attitudes can vary widely even in a society as homogenous as that of Japan. However, I believe that the parents in this study were similar to one another in overall interactional attitude toward their child. In some respects though, the parents in this study are atypical. Both parents were with their children perhaps more than is usual for many parents in Japan where the father, due to work pressures, may typically only interact briefly with his children while he is leaving for work or late at night after he returns home and just before they go to bed. This often leaves the raising of the children essentially to the mother.

In this family, however, since the father was a doctoral student, he was home from suppertime almost every day. He was also often available to his youngest child (the subject) during the day when he did not have classes. The mother was typical of most Japanese mothers, intent on giving her children the best education possible whatever that may entail. This drive to aid their children among Japanese mothers has resulted in the somewhat derogatory term 'kyoiku mama' or 'education Mother.' The mother in this study was certainly typical in this respect.

Nevertheless, the data show that the mother and the father in this study produced different kinds of language with their youngest child. The tables included in my paper show these details. Essentially, the mother used more interactional language, while the father used more regulatory language with their child. The Tannen oppositions mentioned above relate to adults, but this study shows that perhaps these oppositions or distinctions or contrasts start being inculcated into children or, at least, have an influence on children shortly after birth as the parents engage in interactions which contain different types of functional language. My analysis of the parents' CDS reveals another realm in which these differences exist. Perhaps the broad 'cultural' distinctions we see in male and female speech are partly based, indeed, on the interactions infants have with their male and female caregivers.

(b) Though all functions of language may be present in the linguistic input to which the child is exposed, a specific subset of those functions, the interactional and regulatory functions, will dominate the interactions between mother and child and will be less prominent in the language uttered by other family members.

The second hypothesis appears to have less support than the first. The CDS to which H was exposed (at least the recorded data) in fact did not contain all of the possible functions of language as proposed by Halliday, according to the analysis which was performed on that CDS. Also, while the interactional and regulatory functions were very prominent in the mother's language and did technically dominate the mother's CDS, the heuristic and informative functions also appeared fairly often. Therefore, this first part of this hypothesis has only limited support and would need to be revised to reflect accurately the observed data.

The second part of the second hypothesis does have some support. Table 2 shows that the mother does use more interactional language than the father does and also shows that her use of the interactional and heuristic functions is quite different from that of the other family members. However, both the brother and the sister use the interactional function quite more than the father does, at least in terms of percentages. In the case of the regulatory function, the father uses far more of this type of language than any other family member, but the mother's speech is much more likely to contain the regulatory function than either brother's or sister's language.

Overall then, the two hypotheses have some limited support suggesting, albeit tentatively, that CDS used by the mother in this study does contain a subset of the functions proposed by Halliday, and that her CDS is to some degree (importantly) different from the CDS other family members use with the subject, especially due to its higher content of language containing the interactional function.

In retrospect, other hypotheses could have been posited. For example, given the kind of language which makes up the various functions, one might hypothesize that over the duration of the study, an increase in the heuristic function would be seen due to the ever increasing curiosity and linguistic development of the subject. In fact, just such an increase in the heuristic function is noted, as can be seen in Fig. 14. Whether the reason for this increase is that suggested is not immediately clear. We do note in Table 7, however, that 7 of the last 9 data sets are dominated by the heuristic function. We also note that in these data sets, H produces relatively substantial amounts of data in response to the language directed at him. While the heuristic function is not the dominant one in the data sets where the largest numbers of H's utterances are seen (data set #6—47 utterances, Interactional function; #15—42 utterances, Interactional function; #20—52 utterances, Regulatory function; #21—45 utterances, Regulatory function; #23—92 utterances, Regulatory function), H does produce an average of 23 utterances in those data sets in which the heuristic function dominates.

Other such retrospective hypotheses that might be constructed from an examination of the results are:

(a) The personal ('here I come') function will be seen only minimally, if at all, since at the beginning of L1 acquisition, language directed at the developing child from the parents does not likely contain references to themselves. Rather, that language will logically contain references about the child and be more of an interactional nature. Consequently, no or very little language that represents the personal function will be observed. That this situation obtained is not surprising.

(b) The imaginative function ('let's pretend'), though logically observable in the output of children, will not be found in the language the parents use with their child unless they are reading books or are in play settings where they are generating language that refers to imaginary characters or situations. Again, that this result obtained is not surprising. One other possible reason for the imaginative function being absent is that mentioned in the analysis of Table 2 (Section 4.2.1 above).
(c) The instrumental function ('I want'), like the previous two, will not be noted because the parents are more likely to use language of a regulatory nature whenever they address the child in order to get him to do something rather than using language which tells the child what they, the parents, want (e.g. I want a piece of your cookie, or I want a new toy.) This situation was observed in the data; its presence should not be surprising given the nature of the function.

5.3. A new perspective on CDS

In part 2 of this study the discussion of what constitutes CDS and why it is a valuable asset in the linguistic development of children was presented. Recalling the general descriptions of the language directed by adults at young children (CDS) given by Harris (1990, pp. 200–201), we note (in a summarized form) that it

1. is slightly more complex than the language the child uses,
2. deals with the child's interests in the 'here and now,'
3. is semantically related to the child's language so that the child will recognise the connection between her own communicative intentions and the language structures presented by the adult. This can be done by repetition, expansion, or recasting of the child's utterance,
4. is filled with phatic responses to show the adult is paying attention,
5. uses meaningful contributions from the adult to the conversation context,
6. uses naturally occurring conversational slots so that the adult's language fits in with other activities and the child's increasing ability.

The results of this study showed that four of Halliday's seven functions appeared to be present in the language the parents used with their child. They were: (a) the Regulatory function—the 'Do as I tell you' function, (b) the Interactional function—the 'Me and you' function, (c) the Heuristic function—the 'Tell me why' function, and (d) the Informative function—the 'I've got something to tell you' function.

If we compare Harris's descriptions of CDS and the Hallidayan functions observed in the language of the parents in this study, we note that all but the first of Harris's stated characteristics of CDS seem to fall roughly into Halliday's interactional function. If Harris's descriptions are accurate concerning what CDS is typically considered to be, then the Hallidayan taxonomy of language functions may provide additional and therefore (possibly) more accurate descriptions of CDS.

For example, the regulatory function, which was certainly prevalent in this study as is witnessed by the large number of data sets in which it was the dominant function, appears to play a role not specifically referred to by Harris's descriptions of CDS. This suggests that a functional analysis of CDS is perhaps better suited to obtaining a clearer picture of CDS than previous traditional descriptions have been.

In a more speculative vein, if Oller's proposed 'infrastructural system' model of language (Section 2.1.4) were used as a pattern for formulating a revised functionalist/social interactionist model of how CDS relates to language acquisition based on the observations in this study, we might posit that functions, such as those defined by Halliday, would be the *operational categories* of language. Each function could be theorized as being made up of the *infrastructural model* components of each function: perhaps, for example, sentence types (interrogatives, declaratives, imperatives), which would fit naturally into the various functions. These in turn would be made up of *the prime parameters* (the smallest units in the model): for example, vocabulary, intonation, gestures, and phonetic and phonological components.

Such a model would, in effect, use a system of language functions to describe what children come to be able to do with language (as Halliday, of course, did). This could be seen as a metric for language acquisition. Unlike Halliday's study which only examined the output, however, this system could apply to both output and input, both sides of the learning matrix.

Continuing this discussion of models of CDS, Kent's (1992) description of what he believes takes place in the acquisition of the phonology of a language contained a flowchart, which was discussed earlier (Section 2.1.2). Using that as a template for a functionalist/social interactionist explanation of how the environment (replete with functional CDS) and genetic factors might interact, the following flowchart (Fig. 23) would result.

		Social Interactionist influences • FUNCTIONAL CDS		
Genetic Factors		=		
• Audition: Universal (innate) speech sounds Categories	→	Attentional Subsystem becomes tuned to FUNCTIONS	→	FUNCTION discrimination
		> =		
		Orienting Subsystem		
		=		
• Speech Motor Function: Developmental anatomy of speech apparatus; early movement synergies	→	Modification by perceptual experience of FUNCTIONAL language	→	FUNCTIONAL language output

Fig. 23. The interaction of genetic factors and functional CDS.

What is different in this flowchart (compared to Kent's original) is that instead of simply ascribing to the input a vague role, functional CDS is seen as the prime input. This function-laden input then interacts with the innate and developing systems for perception and production. As the attentional subsystem encounters the various functions of language from the parents (through interaction), output is modified through experience with and in the language. As more and more functions are discerned by the child, more and finer functional usage/output results.

Though this sort of theorizing about how a child interacts with the CDS in his/her environment still requires much more empirical data before more concrete statements can be made regarding the veracity of such models, what I believe is worthwhile here is the idea that the input to which an infant is exposed contains meaningful language (the functions found in CDS) which triggers the innate subsystems of language to begin to work their magic resulting in language acquisition.

Primary among the results of this study is the fact that the CDS observed in this study contains a specific set of language functions. Moreover, the CDS here appears to be most effective in fostering language acquisition when it contains the interactive, heuristic and regulatory functions in relatively equal balance. The reaction of the subject to speech which contained mostly regulatory function utterances was less language and less meaningful language in those situations. However, when interactions where a variety of functions was present, the implication is clear: when used in combination, the regulatory, heuristic, and interactional language functions may help the budding language learner cope with his environment and learn to express him/herself more fully than when single functions dominate the linguistic interaction.

5.4. Implications for further research

Several lines of research suggest themselves from the results of this study. First, longitudinal research which would follow several infants during a similar period of time (or longer) in their language development is suggested. With a larger number of participants from varying ethnic and linguistic backgrounds, a broader and more accurate view of the relationship of CDS input to language development may be achieved. Second, how CDS affects other areas of language acquisition should be examined as well. For example, although the current study does not examine the relationship between CDS and syntax, this is surely one area that could be examined. The current study has examined the social/interactional input the child receives during language acquisition, but this same input is supposed to be responsible for appropriate syntactic development. Exactly how and which functions of language may be responsible for syntactic development may provide a more humanistic approach to understanding how syntax develops than currently exists.

Naturally, any conclusions which might be drawn from this study need to be tempered by the fact that the subject for this study was learning Japanese. Much of the research cited in this study was done with English-speaking infants. As was mentioned earlier, the syntactic difference between Japanese and English may play an as yet unknown role vis-à-vis language functions and language acquisition. Therefore, it is suggested that further research should include replicating this study using

English-speaking infants. If such research produced results similar to those of this study, the contention that language functions in CDS are crucial to language acquisition would gain further empirical support.

CDS is the first and arguably the most important factor related to successful language development that an infant encounters at the beginning of its life. While later linguistic encounters with other extended family members, friends, classmates, and strangers may help add to a child's language in terms of new vocabulary and more complex structures and ideas, the initial CDS encounters with parents or primary caregivers comprise the base on which all other language rests. Ensuring that this base is constructed of the best type of language, that is, CDS which contains a rich combination of language functions, is the challenge facing all parents and caregivers.

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Appendix A. Numbered entries of the transcript of subject H, recorded from June 4, 1998 to June 21, 1999

A.1. Transcription conventions

Transcription conventions used in data from Gass et al. (1999, pp. 45, 46) (with slight modifications identified by ∗):

(1) intonation/punctuation
- ? rising intonation
- . falling intonation
- , nonfinal Intonation (slight rise)
- no punctuation at clause or utterance end indicates transcriber uncertainty

(2) other
- (?) or ( ) incomprehensible word or phrase (due to background noise)
- (all right) a word or phrase within parentheses indicates that the transcriber is not certain that s/he has heard the word or phrase correctly

[indicates overlapping speech; it begins at the point at which the overlap occurs

= means that the utterance on one line continues without pause where the next = sign picks it up (latches)

y- a hyphen after an initial sound indicates a false start

(.) a dot within parentheses indicates a brief pause

((laugh)) nonlinguistic occurrences such as laughter, sighs, that are not essential to the analysis are enclosed within double parentheses

(3*) an English gloss of the Japanese is given following each instance.

(4*) occasionally phonetic transcription in square brackets [ ] is used for greater clarity of utterance or to show contrast between the speech of interlocutors.

	Raw data (First data set, 6/4/98, 9:35 PM) H (age): 1;7.15 (year;months.days)	English translation (First data set, 6/4/98, 9:35 PM) H: 1;7.15	Functions (First data set)
1	H: [ʃ].	H: [ʃ].	
2	M: hikaru ikenai.	M: Hikaru. That's bad!	INTER/REG
3	H: ((cries.))	H: ((cries.))	
4	M: ((scolds S for something))	M: ((scolds S for something))	REG
5	H: [ba, ba, ba,] ((M is reading a book in Japanese to H.)) ((high-pitched squeals and a few grunts.))	H: [ba, ba, ba,] ((M is reading a book in Japanese to H.)) ((high-pitched squeals and a few grunts.))	INTER
6	M: ((continues reading a story about a fire engine.))	M: ((continues reading a story about a fire engine.))	
7	H: [waʃʃ, waʃʃ, waʃʃ, waʃʃ,] (.) [waʃʃ, waʃʃ, waʃʃ, waʃʃ. waʃʃ, waʃʃ,]	H: [waʃʃ, waʃʃ, waʃʃ, waʃʃ,] (.) [waʃʃ, waʃʃ, waʃʃ, waʃʃ. waʃʃ, waʃʃ,]	INTER/PERS
8	M: ((making sounds of a fire engine,)) bu, bu, bu, bu.	M: ((making sounds of a fire engine,)) bu, bu, bu, bu.	INTER
9	H: [wu, wu,] ((laughs and squeals.)) [aʃ, aʃ, aʃ] ((squeals many times.))	H: [wu, wu,] ((laughs and squeals.)) [aʃ, aʃ, aʃ] ((squeals many times.))	INTER/PERS
10	M: ((scolds H for doing something to S.))	M: ((scolds H for doing something to S.))	REG
11	H: ((laughs.))	H: ((laughs.))	
12	M & F: kaeshinasai. dame.	M & F: Give it back! Bad!	REG
13	H: [wu wu wuw].	H: [wu wu wuw].	INTER/PERS

Appendix A (*continued*)

	Raw data (Second data set, 6/9/98, 10:30 AM) H: 1;7.19	English translation (Second data set, 6/9/98, 10:30 AM) H: 1;7.19	Functions (Second data set)
14	F: omeme to ittegoran, omeme.	F: Say, 'Eye, eye.'	REG
15	H: ((squeals and laughs. B and S talking in background.))	H: ((squeals and laughs. B and S talking in background.))	
16	F: hikaru chan,	F: Hikaru, ('chan' is a term of endearment)	INTER
17	H: ((laughs.))	H: ((laughs.))	
18	F: ((scolds other children.))	F: ((scolds other children.))	REG
19	H: ((laughs.))	H: ((laughs.))	
20	F: omeme wa?	F: What about (saying) 'Eye?'	HEUR/REG
21	H: [ʃ, ʃ, ʃ]	H: [ʃ, ʃ, ʃ]	INTER
22	F: otosan no, (.) kore wa?	F: (Is this/it) Father's? What about this (one)?	HEUR
23	H: [ʃ, ba], [ʃ, ʃ, ʃ] ((squeals.))	H: [ʃ, ba], [ʃ, ʃ, ʃ] ((squeals.))	INTER
24	M: ((says something in background to F.))	M: ((says something in background to F.))	
25	F: ma, rokuon chu no desu.	F: Well, we're in the middle of recording.	INFORM
26	H: [ʃ, ʃ, ʃ, ʃ] [bʃ, ga, ha,] (.) [wa,] ((continues babbling this sound many times.))	H: [ʃ, ʃ, ʃ, ʃ] [b, ga, ha,] (.) [wa,] ((continues babbling this sound many times.))	INTER
27	B: ((talking in Japanese in background.))	B: ((talking in Japanese in background.))	
28	H: ((high-pitched squeal)) [i]	H: ((high-pitched squeal)) [i]	PERS
29	F: hikaru chan omeme. ((F then scolds B for something.))	F: Hikaru, (say) 'Eye.' ((F then scolds B for something.))	REG
30	H: ((cries.))	H: ((cries.))	
31	M & F: ((talking together and then they both say,)) ikemasen.	M & F: ((talking together and then they both say,)) Bad!	INTER/REG
32	H: ((squeals.))	H: ((squeals.))	
33	F: soto demasho hikaru.	F: Let's go outside, Hikaru.	INTER/REG
34	H: [ba]?	H: [ba]?	HEUR/REG
35	F: ba.	F: Ba.	INTER
36	H: [ba]? ((getting ready to go outside.)) (.)	H: [ba]? ((getting ready to go outside.)) (.)	HEUR/REG
37	F: dochi no kutsu?	F: Which shoes?	HEUR
38	H: [i, i, i,]? ((they go outside.))	H: [i, i, i,]? ((they go outside.))	REG

(*continued on next page*)

Appendix A (*continued*)

	Raw data (Second data set, 6/9/98, 10:30 AM) H: 1;7.19	English translation (Second data set, 6/9/98, 10:30 AM) H: 1;7.19	Functions (Second data set)
39	F: soto ni demasho. hikaru, oide, kochi.	F: Let's go outside. Hikaru come. This way.	INTER/REG
40	H: ((humming to himself,)) [ba]? ((spoken very loudly.))	H: ((humming to himself,)) [ba]? ((spoken very loudly.))	INTER
41	F: baibai wa?	F: (Can you say) Bye-bye?	HEUR/REG
42	H: ((humming to himself again, then he utters high-pitched squeals.))	H: ((humming to himself again, then he utters high-pitched squeals.))	
43	M & F: ((talking in background.))	M & F: ((talking in background.))	
44	H: ((begins fussing.))	H: ((begins fussing.))	

(Interested readers should contact the author if they wish information regarding the entire data set. Publishing considerations precluded including the entire set of raw data.)

Appendix B. Non-japanese words found in the data

Word/phrase	Phonetic transcription (IPA)	Speaker	Date first noted in data	Position (#) in data
Bye-bye	[baʃʃbaʃʃ]	F	6/9/98	41
cheetah	[ʃita]	F	6/13/98	45
Pan ('bread' in some Romance languages)	[pan]	F	7/7/98	72
lucky	[ʃʃki] / [ʃakʃi]	F	7/16/98	81
tape	[tepʃ]	M	7/18/98	129
tape recorder	[tepʃʃekoda]	M	7/18/98	131
*Pooh	[pu:]ʃ	M	7/18/98	158
*Winnie the Pooh and the honey tree	[wʃniʃpuΦn*ʃhʃnitʃi]	F	7/18/98	159
balloon	[baʃʃn]	M	7/18/98	183
mic(rophone)	[maʃʃkʃ]	M	7/18/98	250
lion	[raʃʃon]	S	7/18/98	253
juice	[ʃʃsʃ]	M	7/22/98	326

Appendix B (*continued*)

Word/phrase	Phonetic transcription (IPA)	Speaker	Date first noted in data	Position (#) in data
*dressed up	[dorʃstapʃ	B	7/22/98	340
camp	[kjampʃ]	S	7/30/98	481
up	[apʃ]	M	7/30/98	487
bed	[bʃʃdo]	M	7/30/98	499
thank you	[ʃΦkju]	F	8/2/98	529
papa	[papa]	F	8/2/98	547
banana	[banana]	M	8/9/98	569
video	[bideo]	B	8/9/98	578
violin	[baʃʃoʃin]	F	8/9/98	659
power	[pawa]	B	8/9/98	686
baton	[batan]	F	8/21/98	714
hello	[hʃʃo] / [haʃo]	F	8/21/98	720
*Freidrich	[ʃʃridorihi]	F	8/21/98	722
curtain	[katʃn]	F	8/21/98	767
*chain	[ʃen]	B	8/21/98	781
*bring back	[bʃriʃgʃbakʃʃ]	M	8/21/98	782
*promise	[pʃromisʃ]	M	8/21/98	784
cooler (air conditioner)	[kʃʃa]	F	8/24/98	813
*Restamin (medicine)	[ʃʃstamin]	M	8/30/98	835
dynamic	[danʃʃamik]	F	8/30/98	846
*Moon	[mun]	M	8/30/98	891
*taking turns.	[tekin taʃnʃ]	B	8/30/98	965
cake	[keiki]	M	8/30/98	1027
one, two, three	[wan] [tsʃ] [sʃʃi]	M	9/8/98	1153
four, five	[fo:] [faʃʃv]	M	9/8/98	1159
chicken	[ʃikin]	M	9/15/98	1251
cheese	[ʃizʃ]	M	9/15/98	1296
*Jesus	[ʃizasʃ]	M	9/15/98	1307
*ouch, yuck	[aʃʃʃi] [jak]	M	9/28/98	1436
cookie	[kʃk:i]	F	10/2/98	1636
happy	[hap:i]	F	10/2/98	1642
cracker	[kʃʃakʃa]	F	10/2/98	1650
*No thank you	[no ʃΦkju]	F	10/2/98	1663
*enough	[inʃf]	F	10/2/98	1665
*puppy	[pap:i]	M	10/15/98	1871
no	[no]	M	2/8/99	2047
pen	[pʃn]	F	2/10/99	2089
straw	[sʃtoʃa] / [sʃtoʃo]	M	5/20/99	2307
orange juice	[oʃʃnʃ ʃʃs]	M	5/20/99	2319

*Not typically found in Japanese.

Appendix C. Tables showing all data sets

Table legend:

Speakers:	Functions:	
M—Mother	INST—Instrumental	HEUR—Heuristic
F—Father	REG—Regulatory	IMAG—Imaginative
B—Brother	INTER—Interactional	INFORM—Informative
S—Sister	PERS—Personal	

The following examples from Tables A, B and C show two important boxes.

(1) Data #1
6/4/98
H: 1;7.15

Table A
Data set #1

Data #1 6/4/98 H: 1;7.15	INST	REG	INTER	PERS	HEUR	IMAG	INFORM	Totals/speaker
M		4 (67%)	2 (33%)					6 (86%)
F			1 (100%)					1 (14%)
B								
S								
Totals/function		4 (57%)	3 (43%)					**7**

Summary: M dominates this data set. The regulatory function is most prominent, but there are very few data seen in this recording session.

Table B
Data set #2

Data #2 6/9/98 H: 1;7.19	INST	REG	INTER	PERS	HEUR	IMAG	INFORM	Totals/speaker
M		1 (50%)	1 (50%)					2 (10%)
F		8 (44%)	5 (28%)		4 (22%)		1 (6%)	18 (90%)
B								
S								
Totals/function		9 (45%)	6 (30%)		4 (20%)		1 (5%)	**20**

Summary: F dominates this data set. The regulatory function is most prominent, but there are still very few data seen in this recording session.

Table C
Data set #3

Data #3 6/13/98 H: 1;7.23	INST	REG	INTER	PERS	HEUR	IMAG	INFORM	Totals/speaker
M		5 (71%)	1 (14%)		1 (14%)			7 (54%)
F		2 (33.3%)	2 (33.3%)		2 (33.3%)			6 (46%)
B								
S								
Totals/function		7 (54%)	3 (23%)		3 (23%)			**13**

Summary: M dominates this data set but only by one utterance. The regulatory function is most prominent, but there are very few data seen in this recording session.
(Interested readers should contact the author if they wish information regarding the entire set of tables. Publishing considerations precluded including the entire set of tables.)

(1) The upper left hand box in each table provides the following information:
  (a) data set number
  (b) date the data set was recorded
  (c) age of the subject, H, in years, months, and days.

(2) **7**
(2) The lower right hand box gives the total number of utterances produced by the speakers in each data set.

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