MULTIMODAL CUES IN THE SOCIALIZATION OF JOINT ATTENTION IN YOUNG CHILDREN WITH VARYING DEGREES OF VISION:

Getting the POINT even when you can't see it

by

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Abstract

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MULTIMODAL CUES IN THE SOCIALIZATION OF JOINT ATTENTION IN YOUNG CHILDREN WITH VARYING DEGREES OF VISION: Getting the POINT even when you can't see it

Thesis directed by Professor Brenda Schick

Research on joint attention and language learning has focused primarily on cues requiring visual access. However, this narrow focus cannot account for the emergence of language among some congenitally blind children who develop language on the same developmental timescale as their sighted peers. Findings from this longitudinal, retrospective study of parental input to two blind children, two partially sighted children and two sighted children, who all had successful language outcomes, suggest that there is a process of socializing joint attentional engagement that can exploit some early predispositions toward social interaction that are available regardless of visual limitations. Parents in this study employed specific ATTENTION-ELICTING CUES and ATTENTION-DIRECTING CUES that included various types of verbalizations, gestures, actions, and physical directions to establish and maintain joint attentional interactions that scaffold the acquisition of language. Through the use of these multimodal culturally prescribed ways of summoning attention and directing it to shared locations, parents made manifest their communicative intent and entrained in their children the understanding that paying attention is important. The parents also very consistently talked about what they or their children were doing, thus clarifying referents within their on-going activity. While all of the attentional cues identified in this study were in the repertoires of all parents, parents generally employed the types of cues that afforded

the most effective and efficient access for their child's degree of vision. In addition, parents provided attentional cueing in a manner that reflected their child's increasingly fluid participation in joint attentional engagments. Specifically, parental cueing decreased as children's understanding of attentional management increased, and as they developed sufficient language skills to use the content of speech alone to guide their attentional focus. Using an observational, descriptive approach, findings from this study are framed in terms of parameters of possibility rather than generalizations with the goal of highlighting input factors that could have contributed to the successful language outcomes of children who had varying degrees of vision. This study expands the boundaries of traditional accounts of joint attentional engagement by examining a wider range of attentional cueing options and potential routes to language learning and knowledge transfer.

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CHAPTER ONE

Introduction

The capacity of humans to exploit visual information has been evolutionarily honed to an exquisite degree (Kobayashi & Kohshima, 1997; Marr, 1982). While infants enter the world with more finely tuned auditory skills, vision quickly takes over as the motivator of learning, the integrator of the senses, and the most efficient access to pertinent environmental and social information (Langton, Watt, & Bruce, 2000; Haith, 1998). Processes involving vision are strongly implicated in the quintessential human capacity, the ability to communicate with others using language. All theories of language *use,* those that treat language as behavior rather than strictly grammatical competence, (Tomasello, 1995) suggest that vision plays a critical role in accessing cues to the meaning, form, and function of language. However, these theories do not account for how blind children learn language. They would likely suggest a *perilous route* (Fraiberg, 1977) to language for those who lack vision. Strikingly, according to some research this appears not to be implacably the case. Some studies of congenitally blind children without concurrent cognitive deficits find that blind children say their first words and acquire most aspects of language on a timetable roughly commensurate with their sighted peers (Landau & Gleitman, 1985; Mulford, 1988). What is known about how they might do this is less understood. A central concern of this study is how language may acquired without benefit of vision, the very sense deemed crucial for making the initial connections between words and their referents in the environment.

Conti-Ramsden (1994) has suggested that studies of atypical learners can have implications for understanding developmental processes in general. Indeed, children who have deficits that limit access to the well studied routes to language, generally adopted by typical children, provide potential tests of the possibilites for adaptation and the efficacy of alternative pathways to learning. The ability of the young brain to adapt to deficiencies by using different pathways is well established (Stiles, 2000). Research also shows that frequently there is more than one path in a developmental trajectory (Grossmann & Johnson, 2007) and that multiple inputs frequently converge to strenghten the targeted ability (Turkewitz & Kenny, 1982). Despite these general understandings a more specified input variety, and particularly, the effect of various inputs to young language learners remains understudied.

Hence, the central concern of this study is to look closely at the various types of input that are generally made available to all children in fostering the crucial connection between word and referent and, in concert, to document children's typical and identifiable responses to these inputs. Specifically, this study compares how children with varying degrees of vision acquire the ability to match the words they hear to their intended referents in the environment aiming to yield insight into not only how congentially blind children manage this, but also to provide knowledge about elements of the developmental language learning process that may be overlooked in typical populations because of the pervasive pull of the human visual system.

There is continuing controversy in the literature regarding the putative normalcy of blind children's language. While there is evidence that some blind children are successful language learners (Landau, 1983; Landau & Gleitman, 1985; Mulford, 1983), there is also documentation of marked language delay among blind children (Andersen, Dunlea, & Kekelis, 1984, 1993; Webster & Roe, 1998). These differences in findings suggest that it is unlikely that blindness per se poses "an insurmountable barrier"[1] to the development of language because of lack of direct experience. It also does not seem to be the case that blind children, in general, "talk about objects and actions and events…in just the same way as sighted children" (Landau, 1983, p. 66) as predicted by innatists (Chomsky, in Piatelli-Palmarini, 1980, p. 171). The discrepancy in reported language achievements of blind children can be taken as an opportunity to explore why these differences might arise. Indeed, in recent years, as a result of a general shift away from positing an either/or solution to the nature-nurture issue, child language researchers have begun to focus more on the individual differences that, on older views, were considered experimental noise (Perez-Pereira & Conti-Ramsden, 1999). The fact that some children can learn language without the benefit of vision, and reports documenting wide within group differences in their language abilities, suggests that a promising research direction would be to examine factors that might lead to felicitous outcomes (Warren, 1994).

A factor confounding results in previous studies of language learning in blind children is the presentation of findings as generalizations that are based on very small sample sizes or samples containing wide, largely undescribed variation among study participants (Perez-Pereira & Conti-Ramsden, 1999). This study attempts to mediate these concerns by providing a longitudinal and descriptive analysis of six children who at three-and-one-half years had already reached language milestones and facility well within expectations for typically developing children. Thus, it was possible to go back and analyze the input that may have supported their successful outcomes. The findings of this study are restricted to describing the adult input to these six children who have

[1] John Locke (1690) predicted that blindness would inhibit language development because he saw all knowledge as based on direct perception of the world.

varying degrees of visual access (two blind from birth, two partially sighted, and two sighted). Data collection for this study included 12 other parent-child dyads that included a visually impaired child and 2 other parent-child dyads that included a sighted child. All parent-child dyads were videotaped at regular intervals during approximately the same time period. The dyads in this study were specifically selected because the parents were particularly attuned to their children, and their children were receptive, successful language learners based on MLU and preschool play-based assessments at 42-months of age. Hence, the results may provide insight into some types of parental input that might enhance language learning. It is hoped that the observational findings gleened from the naturalistic toy play setting employed in this study might receive further research attention to determine their generalizability within the language development literature.

In addition, many studies of adult input to children do not give evidence that children have received the specified input. Detecting intake of information is reported by clinicians as especially difficult for parents of blind children (Perez-Pereira & Conti-Ramsden, 1999). In response to this concern, this study attempts to document evidence of engagement in joint activities that include language directed to the child.

The primary goal of this study is to describe and analyze input factors that could have contributed to successful language outcomes in the children in this study. Hence, results are framed in terms of parameters of possibility, rather than generalizations, with the expectation that examining some previously overlooked routes to language can not only shed light on how blind children might learn language, but also highlight some unexplored avenues that are available to sighted children as well.

An implication of social pragmatic theories is that differential input influences the course of language development, and specifically, that reduced opportunity for establishing joint attention would negatively affect the emergence of first words. On this view, shared understandings promoted through mutual focus on perceptually available objects and actions are fundamental to the process of learning words (Nelson, 1996, 2006; Tomasello 1999, 2003). Hence, it is possible that the opportunities for establishing joint attention are reduced in interactions that do not include visual access to important cues to establishing word-referent relationships. However, it is also possible that parents of blind children, who are especially attuned to their children's communicative needs, find alternative perceptual avenues to engage their children in the triadic joint attention episodes that support language learning. While there have been a number of studies documenting the language production of blind children, less attention has been given to the types of input that might substitute for or enhance the visually directed inputs that typically satisfy the defining terms of joint attentional relations. This study widens the boundaries of previous parental input studies by exploring and contrasting the availability of both visual and nonvisual types of input.

Presumably, blind children who are successful language learners engage in triadic joint attention episodes that scaffold language, but these engagements have not been documented. Documenting alternative routes to the establishment of triadic joint attention is important for two reasons: (1) if the establishment of triadic joint attention is associated with successful language development in blind children as it is in sighted children, then learning more about its nonvisual forms can inform parents and teachers about specific ways to enhance language learning for blind children, and (2) documenting episodes of triadic joint attention in blind children can tell us more about the range of forms through which it can be established and the variety of multimodal cues that may be informative. These alternative forms are certainly available to sighted children as well, however, for sighted children, the salience of vision may mask the effect (real and potential) of alternative sources of input. It is possible that there are factors that have not been previously explored that have the potential to influence language development in all children. Indeed, it is likely that all sorts of parental input garner the child's attention and facilitate the linking of words with objects and actions in the world (Bloom, Tinker & Scholnick, 2001; Nelson, 1996; Werner & Kaplan, 1963). Because the focus of prior research has been on cues requiring visual access, alternative possibilities have received little consideration. To address this gap in the research, this study takes an integrative approach (McCune, 1992; Thelen & Smith, 1994) seeking to document the various types of verbalizations, gestures, actions, and physical directions that serve as nonvisual sources of input, sources that potentially provide alternative routes to language.

In summary, the fundamental concern of this study is to provide documentation of the nonvisual ways in which parents of children who are successful language learners engage with their children in activities that foster their child's ability to make the connection between words they hear and what they perceive in the world around them. Sighted children appear to make this connection primarily by participating in *joint attentional engagements* with their caregivers. *Joint attentional engagements* are usually defined in terms of visual access. Since blind children who are successful language learners do not have visual access, they provide an opportunity to highlight alternative modes of establishing a facilitative language learning environment. Documentation of these alternative modes would support language development theories that: (1) suggest that the quality of social interaction is key to the child's success in using language, and (2) postulate flexibility in the language-learning child.

CHAPTER TWO

Literature Review

2.1 Theoretical Background

Many studies have focused on the critical importance of access to eye gaze, head turning, pointing and other visually available gestures in establishing and maintaining triadic interactions that foster language development (Baldwin, 1995; Baron-Cohen, 1995; Brookes & Meltzoff, 2005; Butterworth, 1991; Butterworth & Grover, 1990; Churcher & Scaife, 1982; Corkum & Moore, 1998; Hobson, 1993; Scaife & Bruner, 1975; Tomasello, 1995). Indeed social-pragmatic theorists posit that for language to emerge, it is necessary for communicative interaction to occur in a triadic relationship, specifically an adult-child relationship that is *about* something, typically an immediately available object or action (Tomasello, 1995). Researchers have found that the amount of time spent in this triadic joint attention state correlates positively with later vocabulary size. However, most of this research documenting the importance of early triadic relationships in fostering language development defines the triadic interaction in terms of eye gaze toward visually accessible people and objects (Tomasello & Farrar, 1986; Tomasello & Todd, 1983). Hence, these studies do not account for the emergence of language in those congenitally blind children whose language use is roughly commensurate with their sighted peers.

2.1.1 The problem of language learning

The quintessential problem in language learning, the conundrum all theories of language development address, was posed by the philosopher Quine (1960). His famous hypothetical question frames the issue of 'referential indeterminacy'; how can a linguist in an alien land who hears a native speaker uttering *gavagai* as a rabbit runs by, be certain that *gavagai* means *rabbit*? Clearly, there are an infinite number of possibilities including variously descriptive actions (scurries, hops, limps), a reference to its lopped ears, or mottled color, or a morphologically complex designation for running rabbit or scared rabbit, etc. Nevertheless, in some way, the child must relate what is being said to what is happening, and more specifically, to what the language-learning child perceives within the immediate environment. Within the framework of social pragmatic theories, I will first address the issue of referential indeterminacy and then the issue of perceptual availability. For blind children both of these considerations have special implications.

2.1.1.1 The issue of referential indeterminacy: Constraining the possibilities

So how is it possible to identify the referent of a spoken word or words from the infinite possibilities available in the array of objects and events at hand? Social pragmatic approaches to language learning suggest that this connection is fostered through interchanges between adult and child where shared attention is directed toward particular objects and events within the observable environment (Nelson 1996; 2007; Tomasello 1999, 2003). In other words, when children participate in interactive social situations, the context of the engagement serves to constrain the possibilities for achieving a communicative common ground. Indeed, one of the most consistent findings in the study of children's early language acquisition is the crucial role of *joint attentional engagements.* Specifically, how parents use language within *joint attentional engagements* measureably influences their child's early language abilities (Carpenter et al, 1998). Bruner (1983) provided evidence that children's comprehension and learning of language is scaffolded by 'joint attentional formats' in which both the child and the adult have a common understanding of some circumscribed area of experience. In other words, for young language learning children to understand an act of linguistic reference, the parent and child must connect the linguistic expression to a common ground.

While Tomasello (1999, 2003) believes that the child's understanding of the adult's communicative intentions is key to word learning, Bloom and Tinker (2001) emphasize the communicative effort of the child as the driving force toward word learning. In any case, there is agreement among social pragmatic theorists that while philosophers think determining the referent of a word is impossibly confounded, parents and children seem to be able to handle this issue with relative ease. There are several reasons why.

Most basically, social pragmatists believe that language learning is grounded in the social act of communication, not solving the abstract problem of matching specific words to referents in the world.[2] Word learning is not an isolated task; it takes place in interaction with others spurred by the fundamental goal of affecting another's actions and thoughts (Bloom & Tinker, 2001; Nelson, 1996, 2007; Tomasello, 1999, 2003). In other words, the process of word learning is constrained by the child's general understanding of what is happening in the available context of a communicative situation when an adult utters a word. The following four types of typical parent-child interactions suggest why children manage to learn words with relative ease. However, whether visually impaired children benefit from these facilitative interactions is less clear.

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[2] That Quine (1960 p. ix) himself understood this is evident in the fact that he specifically excluded from his hypothetical logical thought problem any intersubjective cues or culturally or situationally relevant information.

First, there is evidence that infants are social beings from the beginning of life (Haith, 1998). During the first year of life, infants typically engage with their caregivers in chains of turntaking interactions that set up expectations for predictable and contingent responses (Bahrick & Watson, 1985; Bateson, 1979; Snow, 1972). They also participate in routines that allow them to build, overtime, a nonlinguistic familiarity with the goals, sequences and objects involved in such interactions (Bruner, 1983; Nelson, 1986; Ninio & Bruner, 1978). The repetitive nature of these routines allows the child to predict a sequence of events within a given routine. In turn, this predictive power allows the infant to use attentional resources to focus on language forms and co-occurring salient actions and objects (Tomasello & Akhtar, 1995). Tomasello (1992) maintains that routines scaffold early word learning because "they create, with no need of a conventional language whatsoever, a shared referential context within which the language of the adult makes sense to the prelinguistic child" (Tomasello, 1992, p. 70). In other words, within games and routines reference is made clear and is reinforced through the activity of repetitive interchanges.

Researchers studying language development in blind children have suggested that for them, playing simple games and establishing routines is particularly important because these situations require contingent and consistent audible, readable, and predictable actions that highlight what cannot be seen (Preisler, 1997). Peters (1994) suggests that the infusion of language into daily routines and occurrences, providing a sort of 'eventcast' of on-going activities, helps blind children connect language to what is going on around them that is not available through vision. Other researchers who have found deficiencies in the language of blind children have noted that parents of blind children do not provide as much description to their blind children as do parents of sighted children (Andersen, Dunlea & Kekelis, 1993). These researchers suggest that more research is needed to determine the relationship between early routines and facilitation of language in early interactions.

Second, children appear to learn words easily because they actively try to understand what a word means within familiar contexts. Lois Bloom and colleagues (Bloom, 1993; Bloom, 2000; Bloom & Tinker, 2001; Bloom, Margulis, Tinker, & Fujita, 1996) emphasize the child's role in learning language. They believe that the child, not the adult, creates the word-learning situation through efforts to communicate wants and needs. In other words, the referents tend to be what the child, in the moment, desires, and their own motivation makes them clear. This approach, then, assumes that caregivers frequently follow-in to the child's focus of interest. Whether they do on a consistent basis has been the subject of much research (Aktar, Dunham, & Dunham, 1991). One of the most consistent findings from research on input to atypical children, and blind children specifically (Perez-Pereira, & Conti-Ramsden, 1999) is that caregivers follow-in to their child's focus of interest much less than parents of typically developing children (Conti-Ramsden, 1994). Instead they tend to be directive in their interactions with their children presumably in an effort to stimulate them. Directiveness, defined as caregiver use of language to direct or control the child's behavior, has generally been associated with reduced language outcomes even in typical language learners (Furrow, Nelson, & Benedict, 1979; Newport, Gleitman, & Gleitman, 1977).

In addition, there has been concern from researchers, caregivers, and professionals who work with blind children that they tend to be passive (Bigelow, 1995; Fraiberg, 1977). Thus, instead of putting forth effort to engage with others and explore the world around them, they learn to expect others to meet their needs. However, parents who are particularly attuned to the needs and wants of their blind child may find ways to encourage their efforts to communicate with them. How they might do this has received little research attention.

Third, Nelson (1986, 1996, 2009) suggests that words are learned in particular situations for communicative purposes. For example, the parent's use of the word *drink* at mealtime is embedded in the general context of the stable, reoccurring *event* of drinking. The infant attaches meaning to what is communicatively relevant in the total context of this event (see also Bloom & Tinker, 2001). Nelson's view is especially pertinent to how some blind children might learn language particularly well. In Nelson's view, an event relates to more than a word and a particular (usually visual) referent. The child initially participates in the event as a whole unit and only gradually separates the objects and actions that are inherent to it. Her emphasis is on what children do in the everyday events of their lives. Blind children, if they are physically involved in events, may experience them in much the same general way as sighted children.

Fourth, *joint attentional engagements* provide opportunities that facilitate the linking of words and their referents. Research has shown a positive relationship between time spent in joint attention with an adult and language development (Carpenter, Nagell & Tomasello, 1998; Tomasello & Farrar, 1986; Tomasello & Todd, 1983; Tomasello, Mannle & Kruger, 1986). Between 9 and 12 months infants begin coordinating triadic interactions that include both objects and other people, thus creating a 'referential triangle' in which the child and adult share attention toward the same entity or action. In other words, the interaction between adult and child is *about* something. It is the *about* in the referential triangle that supports the understanding of the language produced. The shared intersubjective nature of the joint attention situation gives relevance to the words used and supports a linkage with co-occurring objects and actions. Although much has been made of the power of ostensive *pointing* within triadic joint attentional interactions, Tomasello has more recently proposed that the language learning potential within *joint attentional engagements* does not require ostensive marking (Tomasello, 2003, Tomasello & Kruger, 1992). His following example illustrates this point:

> An American visitor to Hungary is approached by a native speaker in a train station. When the native speaker starts talking in Hungarian it is unlikely that the American visitor will understand the communicative intentions expressed in a completely foreign language. However, if the American visitor goes to the ticket window in the train station and tries to buy a ticket, (setting up a joint attentional frame), it is possible that the visitor will be able to comprehend the communicative intentions expressed in some Hungarian words or phrases because "the two interactants share an understanding about each other's interactive goals in terms of gaining information about train schedules, obtaining a ticket, exchanging money, and so forth—*goals expressed directly through the execution of meaningful and already understood actions* such as the actual exchanging of ticket and money. " (Tomasello, 2003, p. 24, my emphasis)

Thus, mutual familiarity with the goals, sequences and objects embedded within the situation (in Nelson's terminology, *event*) of buying a train ticket assists in linking relevant utterances with salient objects and actions. This train station situation is analogous to the situation children face in initial language learning. There have been some experimental studies of word learning in nonostensive contexts (Tomasello & Barton, 1994; Tomasello & Kruger, 1992), but there has been little consideration given to specifically how children might learn words nonostensively in *the meaningful and already* *understood actions* available in the *joint attentional engagements* of on-going familiar routines and play.

Studying how successful language learning blind children make connections in the on-going *joint attentional engagements* of daily life might prove particularly informative. Joint attention has traditionally been defined in terms of eye gaze (Tomasello & Todd, 1983). Since this particular behavior cannot be available to blind children, it is important to establish: (1) what alternative ostensive means might be used to engage blind children in joint attentional states, and more importantly; (2) how blind children might learn words in nonostensive contexts where they are engaged with caregivers in everyday on-going activity.

All of the above responses to the issue of referential indeterminacy obviate the problem by situating the word-learning problem within the facilitating interactions of adult and child. This, of course, implies that input makes a difference. But what kinds of input are facilitative? There has been research designed to find correlations between the parent's language use and the child's productions (Gallaway & Richards, 1994). The interaction between gesture use and language has received recent attention (Goldin-Meadow, 2003). But surprisingly, although adult-child engagement within activity is the focus of the social pragmatic approach, there has been little attention given to the kinds of actions and activities within *joint attentional engagements* that provide opportunities for word learning. This study focuses on the opportunities for language learning that children encounter in toy play with their parents.

2.1.1.2 The issue of perception: an expanded view of what is 'perceptually available'

The initial word-learning problem for the child is to relate what is being said to what is happening, and more specifically, to what the child can perceive. Given the dominance of vision in humans (Marr, 1982), this bodes poorly for those born without vision. Indeed, in an early characterization of the ability of blind children to understand word meanings, Cutsforth (1951) claimed that because the blind child lacked visual access, the concepts underlying the words he/she hears must be empty. He surmised that blind children's use of visual words indicated that they use visually based concepts instead of concepts based on other sensory experiences more meaningful and familiar to them, and thus not reflecting their own experience.

Interestingly, another view strongly rooted in visual perception makes blindness appear to be less of an obstacle. The social-ecological approach to language acquisition combines social and perceptual bases of knowledge. Zukow-Goldring (2001) views adult-child interactions as cycles of reciprocal perceiving and acting. For example, she has found that when parents direct their infant's attention with finely tuned demonstrating gestures language comprehension is enhanced more than when verbal messages alone are offered.

In additon, the social-ecological approach is based on Gibson's ideas about perception (Gibson, 1970; Reed, 1988). In Gibson's view "animals and their niches form a complementary relationship whereby animate and inanimate elements in the environment *afford* or offer unique advantages and disadvantages to each creature" (Zukow-Goldring & Ferko, 1994, p. 174). Zukow-Goldring and Ferko give the example of a puddle of rain water offering splashing, jumping, slipping to a person and something swim-in-able, land-on-able, or drown-in-able for a variety of insects. All animals perceive what the physical world affords by detecting invariance in the perceptual array. While visual access to environmental invariance is emphasized in this approach, the utility of environmental affordances is applicable to other senses as well, and a key to blind children's success in learning language may lie in their caregivers helping them to perceive invariance through nonvisual means. Affordances provided during interactions may include actions of the parent that highlight word-referent relationships through auditory and tactile means that may be available to the blind child.

As Gibson's theory of affordances suggests, we see things in relation to their possible uses, and therefore never as a disembodied observer (Gibson, 1979). Likewise our perception of the other person, as another agent, is never of an entity existing outside of the situation, but rather of an agent in a pragmatic context that illuminates the intentions (or possible intentions) of that agent.

For example, parents typically use ATTENTION-ELICITING CUES as part the infant's socialization into early routines and games. Subsequently, their function is extended to encourage attention to the connections between speech and objects and actions in on-going activity. Dyadically interactive games and routines are structured through physical guidance. Thus, in infancy the child hears various preparatory words and emotive expressions as s/he is physically guided through the actions of games and routines. For example, the parent says *ready* as s/he places a cloth over the child's head in preparation for *peek-a-boo* (Bruner & Sherwood, 1976). On hearing *ready* the child learns to still in anticipation. This verbal prompting along with physical guidance is an early embodied pairing of language and action in the world. Through engagement in these mutual actions, the child learns that when a parent makes a particular kind of verbalization, his or her role is to wait for something to happen. This ritualized behavior provides a structure for socializing the child's attention to the purpose of speech. Thus, the use of ATTENTION-ELICITING CUES may be particularly helpful when children are at the beginning stages of language learning by providing an anticipatory frame. Children have learned to respond contingently to these cues with an expectation of something of interesting to come. During the period of early word learning, instead of the dyadic physically guided actions involved in games and routines, children are encouraged to direct their attention to something away from the body, thus inviting the triadic interactions that are necessary for the emergence of language (Tomasello, 2003).

Using ATTENTION-ELICITING CUES may be especially important for the blind child to provide an assist in maintaining continuity in communicative exchanges. The sighted child has immediate visual access to the movements of others around him that might signal engagement; he can see when the adult is about to do something. On the other hand, the blind child is often startled by actions that cannot be seen and hence, anticipated. Given a gentle signal that something is about to occur may avoid disruption of the parent's communication. In addition, ATTENTION-ELICITING utterances are typically accompanied by facial expression. While blind children miss this concurrent visual input, there is evidence that vocal expression is even more powerful in garnering the attention of young children than facial expression (Fernald, 1993; Mumme, Fernald, & Herrera, 1996). Indeed, all ATTENTION-ELICITING utterances are delivered with an identifiable tonal quality and prosody that are particularly engaging for the child (Morgan & Demuth, 1996). This emotive voice quality is equally available to blind and sighted children. Hence, lack of access to visual facial cues may not be of critical consequence for blind children during early language learning.

The social-ecological approach stresses the role of caregivers in directing the child's attention to important aspects of on-going events within daily activity. "Caregivers use gestures to mark the relation between what is being said and what is happening. The focus of attention is gradually shifted from simply noticing animate beings and objects to the opportunities they may afford for action" (Zukow-Goldring & Ferko, 1994, p. 171). While some research has shown that caregiver's use of gestures to focus attention during the initial stages of language development contributes to the emergence of the lexicon and correlates with later vocabulary size (Adamson, Bakeman, & Smith, 1988; Goldin-Meadow, 2003; Tomasello, 1988; Zukow, 1989, 1990), how caregivers use language in daily on-going events to scaffold the child's language has received less attention (Bloom & Tinker, 2001). This study aims to document how caregivers couple language with on-going actions on the child and on objects, thus making affordances perceivable to blind children through tactile and auditory avenues.

The social-ecological approach also emphasizes the parent's use of language in synchrony with the manipulation of objects. When either the parent or the child is acting on or demonstrating in some way the affordances of an object of mutual interest, concurrent language is frequently a natural part of the mutual activity, thus reducing referential ambiguity (Zukow-Goldring & Ferko, 1994; Gogate, Bahrick, & Watson, 2003). Hence, the language a child hears is frequently about something with which the child has direct contact, and thus, may be directly perceivable even to blind children.

In summary, all social pragmatic approaches suggest that input plays a crucial role in scaffolding language use. They position the interactional, communicative function as the primary motivator for language use in the early phases of development. In studying the course of language development in relation to communicative interactions, researchers have focused on documenting the child's course of communicative efforts and language output. The particular types of input that might influence the child's language use have received less attention. While some researchers have looked at individual types of input, there is a lack of attention to the multiplicity of input forms ubiquitous in daily interactions that are infused with language. Parents use not only canonical gestures and specific verbal deictic expressions in conjunction with highlighting word-referent relations, they perform actions on the child and actions on objects while using words referring to these actions and objects as they are jointly engaged with the child.

2.2 Review of the literature on language development in blind children

As already discussed, some blind children appear to develop language commensurate with their sighted peers, but there are wide differences in language outcomes within the whole population of blind children, even considering only those without concurrent deficits that might affect language (Kekelis & Andersen, 1984; Moore & McConachie, 1994; Perez-Pereira & Conti-Ramsden, 1999; Warren, 1994). In light of these disparate findings, it is important to consider individual differences in input that might shed light on how successful outcomes might be achieved. However, there have been surprisingly few studies of input to blind children, and fewer that address issues of possible efficacy in practices.

2.2.1 Methodological and design issues

Reviews of the literature on language development highlighting the effects of blindness suggest that existing studies are fraught with conflicting results and methodological problems (Andersen, Dunlea, & Kekelis, 1984; Perez-Pereira & Conti-Ramsden, 1999; Warren, 1994). Some of the issues leading to this conclusion are intrinsic to the demographics of the blind population itself.

First, the population of children born blind without concurrent cognitive issues is extremely rare; a far greater number of blind children are affected by multiple adverse conditions that would confound relationships between vision and language. It is often difficult to detect and assess additional deficits at birth, and their effect on cognition and language may not be evident until children do not reach typical milestones.

Consequently, obtaining large numbers of study participants for statistical analysis is particularly difficult. Second, incidence figures are affected by discrepancies in criteria used to define blindness in different countries, and the threshold for blindness is not the same in all countries. For example, in the United States an individual is considered blind with a visual acuity after correction of equal to or less than 20/200, while in the United Kingdom the figure is 3/60 and in Spain 1/20. Third, over the years there have been changes in both identification and intervention practices that would affect the conclusions of various studies. Fourth, acuity levels cannot be determined at birth and can change over the first few years of life and beyond. Fifth, the various causes of blindness call into play issues that need to be accounted for. For example, prematurity associated with retinopathy of prematurity (ROP) makes age comparisons on the first few years of life problematic. Studies have not accounted for prematurity in a uniform manner, some adjusting actual birth age to full-term age and others not.

Methodological issues affecting the validity of many studies of blind children include omission of crucial information such as age of diagnosis and a history of interventions. Some studies include comparisons of sighted children age-matched to blind children using tasks and evaluative tools appropriate only to the sighted. In addition, comparison among studies is complicated by the fact that different researchers use different categories to analyze data. This is particularly apparent in studies of first words. Most importantly, studies of blind children have tended to use between subject cross-sectional designs inappropriate for small numbers of subjects. Many of these studies unjustly present their data as applicable to the general population of blind children. Also these cross-sectional studies, based on normative group statistics, hide informative individual differences. In addition, cross-sectional studies cannot inform issues of developmental change. Hence, there is a clear call for longitudinal studies that track development of factors related to language development and highlight individual variations in attaining successful language outcomes (Perez-Pereira & Conti-Ramsden, 1999; Warren, 1994).

2.2.2 Prelinguistic development in blind children

It is well established that visual information plays an important role in the acquisition and use of prelinguistic communicative behaviors that are generally seen as necessary for establishing a social bond that supports language use (Bates, Canaioni, & Voterrra, 1975). Within the first few months of life, using eye gaze and facial expression cues, infants become participants in chains of turntaking interactions and dyadic routines that allow them to predict the contingent reactions of caregivers (Meltzoff, 1988; Meltzoff & Moore, 1993; for a review see Haith, 1998). Als, Tronik, and Brazelton (1980) found that blind infants participated less in these types of interactions. They also noted that blind children often still and quiet in response to caregiver speech, a reaction that can be interpreted as inattention and passivity. (Burlington, 1964). Without the anticipated feedback of delightful responses, caregivers may discontinue interactional play. In addition, parents can become worried about their child's general cognitive abilities, and the resulting anxiety can inhibit them from continuing the very interactions that foster cognitive growth. Perez-Pereira and Conti-Ramsden (1999) suggest that although there are other sensory cues, especially sound and touch, that can be used to engage infants in reciprocal interactions, the caregivers' own strong visual orientation may make it difficult to use alternative avenues to engage in these dyadic exchanges. While input effects of using alternative avenues to dyadic engagement in blind children have not been studied in relation to later language skills, early attunement to the child's communicative drive is a likely key to successful language outcomes.

During the latter part of the first year caregivers typically play games, establish routines, and use specific attention-directing behaviors. These activities begin extending the infant's sphere of attention out of the dyadic focus toward objects and actions in the immediate environment (Dunham & Moore, 1995). Some researchers have found that blind children and their parents engage in fewer conventional social games and routines (Als, Tronick & Brazelton,1980; Preisler, 1991; Rowland, 1983; Urwin, 1984). In addition, researchers have noted that even when parents do engage their blind children in early games and routine, the games they play may be more limited to vocal rhyme and singing games than social games involving objects such as 'give and take' with interesting toys which incorportate word-referent connections. Over-reliance on repetitive vocal games has been associated with poor language later language outcomes (Norgate, Collis, & Lewis, 1998).

However, Perez-Pereira and Conti-Ramsen (1999) have suggested that there are common reciprocal games that can effectively extend the blind child's focus outward (a.g., *This little piggy*). In addition, blind children do participate in games like *peek-a-boo* (personal observation) which highlights what these games are really about. For blind children, and likely even for sighted children, *peek-a-boo* is not about *peeking*, it is about establishing playful, predictable routines where actions, language and emotive affect all invite social engagement. The blind child feels the cloth placed on his head, hears the rising prosody of his parent's question (*Where:::'s Matteo?)* and anticipates with observable pleasure the tactile sensation of the cloth being removed and the sound of falling prosody in her answer (*There::'s Matteo.)*.

The games and routines that are common toward the end of the first year involve triadic joint attention by inviting mutual focus on something on the child's body or something very nearby. But also around this time children begin to orient to objects in the line of sight provided by a *point*. Blind children are not privy to the reciprocal advantages of *pointing* which provides access to objects of interest to another and directing others to objects of one's own interest (Preisler, 1991; Rowland, 1983). *Pointing* extends the possibilities for attracting a child's attention to objects and actions away from the body, thus allowing the child access to information about a wider range of stimuli. In addition, adult *points* are typically presented simultaneously with verbal labels or directions providing an opportunity for the child to connect objects with words. Sighted children learn the attention-getting power of *pointing* by observing and participating in its effects (Werner & Kaplan, 1963), and they then have the opportunity to use *pointing* themselves to direct the attention of others to distant things they need or want. Blind children do not use *pointing* behaviors (Preisler, 1991; Rowland, 1983), hence it is more difficult prelinguistically for them to let others know their desires or direct the attention of others to distant objects. Presumably, blind children do not spontaneously use *pointing gestures* because they do not see adults using them. Young blind children are also not very receptive to learning this behavior (personal observation), presumably because its purpose is to establish a line of sight for someone else, not only necessitating an understanding of what a line of sight affords, but also why the other person might need this information.

Blind children also have difficulty directing the attention of others because of mobility issues. On average they crawl and walk later than sighted children; the median age for crawling is 10 months and 15 months for walking (Warren, 1994). Hence, their opportunities to explore their environment and show their preferences to others by moving to objects of interest are delayed. While there has been surprisingly little study of motor development in blind children, available studies suggest two plausible reasons for delayed locomotion. First, blind children tend to resist lying in a prone position which has been linked to effective development of motor strength and coordination that supports crawling and walking (Adelson & Fraiberg, 1974; Warren, 1994). The second reason relates to motivation; when vision is intact, the infant can see objects in the distal environment, and is likely lured to move toward contact.

Do other senses afford a lure? There apparently have been no studies regarding olfaction in stimulating locomotion, although such studies could prove interesting. Studies exploring the motivating force of audition in blind children indicate that they begin to crawl shortly after they begin to reach for sounds late in the first year (Fraiberg, 1968). Since most sighted children move toward objects they can see much earlier, they have more opportunity to display their interests, thus encouraging caregivers to follow into their focus of attention and retrieve objects to share with others.

In conclusion, the avenues available for caregivers to establish triadic relations with blind children and blind children's own uses of deictic cues are limited and delayed in comparison with sighted children. Given that much research suggests that engagement in joint triadic interaction scaffolds language use in children, exploring more thoroughly how and how often, blind children engage in triadic interactions might further inform the importance of this relationship (Bigelow, 2003).

2.2.3 The emergence of first words in blind children

There is much discrepancy in the literature regarding initial word learning in blind children. Early studies found a delay of several months in the emergence of first words (Burlington, 1961; Fraiberg, 1977; Norris, Spaulding, & Brodie, 1957; Reynell, 1978). However, Mulford (1988), in a later analysis of data from fourteen studies, found that acquisition of first words in blind children did not show a marked delay, the youngest children being 9;0 months and the mean age for all data was 14;7 months. Mulford suggested three possible reasons for her more positive findings. First, in reviewing the data from earlier studies it was clear that, although the mean age for the group indicated some degree of delay, there were blind children whose language onset was well within typical expectations. She conjectured that the variation was likely due to unidentified confounding concurrent cognitive deficits. Indeed, this confound is related to her second explanation of the discrepancy in findings. During the years spanning the early and later studies there was a major change in the cause of blindness. Retinopathy of prematurity (ROP), an early frequent cause of blindness due to the administration of high amounts of oxygen to save the lives of premature babies, was much less represented in later studies after the negative affects of high dosages were realized. Thus, in the earlier studies, language delays may have been due to general developmental delay related to prematurity or to a general impairment of the nervous system. Thirdly, she pointed out that early studies were fraught with methodological problems. She delineated a host of concerns including a lack of control for the following factors: degree of blindness; difficulty in accurately diagnosing visual acuity in young blind children; age of onset of blindness; lack of accounting for prematurity; the heterogeneity of the blind population; use of cross-sectional rather than longitudinal data to show changes in development; use of tasks typically used with sighted children, but that are not appropriate for blind children; inadequate accounting for the comparability of tasks used to assess language behaviors; use of different criteria for assessing actual first word use; and insensitivity to the emotional needs of blind children. In addition, many studies included observational conjecture rather than empirically grounded designs.

In summary, there are enough variations and gaps in the available data from blind children that it is difficult to make strong claims about how their early language development might differ from sighted children. Certainly, congenitally blind children are at risk for delayed or deviant language, but it is also clear that some blind children, most likely those who have benefitted from intervention, achieve language milestones commensurate with their sighted peers. Using the most controlled studies available, the current view in terms of age of acquisition of first words is that blind children without concurrent cognitive deficits do not differ greatly from their sighted peers in their rate of development at the onset of language use (Bigelow, 1990; Dunlea, 1989; Landau & Gleitman, 1985; Mulford, 1988). However, more data is needed to strongly support this conclusion and to offer reasons why some children seem to do particularly well. Even in Mulford's account, wide individual differences in the age when first words appear are obscured by the emphasis on group means. The range of variation has not been studied in relation to caregiver input, availability of extended support systems, or environmentally related factors.

2.2.4 Patterns of language usage in the first words of blind children

Some studies of the language of blind children have found differences from the language of sighted children in the style of first word usage, the content of first words, the use of perceptual words, and their use of imitative language. There is much inconsistency among research findings sometimes resulting from methodological differences, sometimes from the selection of particular populations of visually impaired participants, sometimes from theoretical bias, and sometimes because overtime access to sevices and the employment more researched-based pedagogical methods have resulted in better outcomes for visually impaired children.

2.2.4.1 Styles of blind children's first word usage

Interest in the style of first word usage in blind children was motivated by whether differences in style might reflect differences in attention to variously available stimuli and the perceivable realities of blind children. Nelson's (1973) seminal work categorizing and grouping the types of words children first produce resulted in a (somewhat unwarranted) dichotomous framing. The first fifty words of the children in her study were assigned to the following categories: nominal, action words, modifiers, personal-social expressions, and function words. Children who exhibited a prevalence of noun labels were grouped into a *referential* category; and children whose early vocabularies contained fewer noun labels and more personal-social expressions, pronouns and function words were grouped into an *expressive category*. In accordance with her *functional core hypothesis,* Nelson suggested that the *referential-expressive distinction* reflected differences in how children view the purpose of language at the onset of their first productions, thus showing that individual children follow different routes to the acquisition of language. Specifically, referential children with referential styles viewed language as a means to label and talk about objects in their environment, and expressive children view language as a means to engage with others. Researchers studying the emergence of language in blind populations suspected that blind children might view language differently, and hence take different routes to language based on their different environmental experience in which people had higher salience and availability than objects.

Some studies of early language style indicate a tendency for blind children to fall into Nelson's expressive category (Andersen, Dunlea, & Kekelis, 1984, 1993; Dunlea, 1989), and this tendency is frequently noted in summaries of the language of blind children (see Hoff, 2001). It is possible that several factors might bias young blind children toward an expressive style. Since the visual mode is unavailable to blind children, they may become more attuned to a verbal processing modality. Blind children have less access to information necessary for identifying whole objects. Their social needs may bias them toward verbal communication in the absence of visual cues to social information (i.e., facial expression and gesturing), so language takes on a primarily social function rather than a referential one. Parenting style may also lead to a bias toward an expressive style. Parents of blind children (and most other atypically developing children) tend to be more directive in their language to their children, to reinforce verbal imitation, to ask few questions, to rely on social routines rather than calling attention to diverse forms of interacting, and they tend to avoid using language to draw attention to object properties and functions (Andersen, Dunlea, & Kekelis, 1993). Indeed, blind children may tend to adopt an expressive style by default because a referential style is less available to them. Mulford (1988) suggests that studies of early language style in blind children are inconclusive because some studies have found a lack of function words and a higher percentage of action words than found in sighted children which is inconsistent with an expressive style. In addition, she suggests that categorizing blind children's initial language productions in such a dichotomous manner hides nuances that might be informative.

2.2.4.2 The content of blind children's first words

What do blind children use their first words to talk about? Several researchers have found a greater preponderance of specific nominals and action words, and a lower number of general nominals (Andersen, Dunlea, & Kekelis, 1984; Bigelow, 1990; Mulford, 1988; Peters, 1987). They suggest that blind children tend to use proper names for specific individuals such as parents, siblings, pets, and toys that are familiar to them rather than generalized naming of objects. Blind children's specific nominals consist of a relatively high number of object words that potentially refer to more general categories, but their use appears to be restricted to a single referent. For instance, Bigelow (1987) reported that one of her study participants restricted her use of the word *bunny* to a particular toy rabbit. She did not extend the word *bunny* to other toy rabbits or to perceptually similar objects (i.e., another stuffed animal or another object with a furry surface). Bigelow suggests that this limited reference is a reflection of the blind child's lack of opportunity to apply a word to other instances of the more general category. In other words, the toy rabbit was the only representative of the category available, so it was the only rabbit the child could talk about. In Bigelow's view, if the child came upon another rabbit presumably the child would be able to label it correctly.

Taking another perspective, Andersen and collegues (Andersen, Dunlea, & Kekelis, 1984; 1993) and Dunlea, (1984; 1989) argued that the failure to extend nominals beyond a specific referent was an indication of the detrimental affects that lack of vision might have on the formation of categories underlying the comprehension of early words. In support of this claim, Dunlea (1989) offered as evidence the fact that blind children have fewer lexical extensions and overextensions than sighted children. Dunlea reported that blind children's overextensions were mainly based on perceptual features such as texture and shape. For instance, one blind child indicated that the word *cookie* not only applied to cookies and crackers, but she also used the word *cookie* when she was feeling small rough surfaces on a piece of paper, sniffing a sweet fragrance from a pine tree, or feeding herself small bits of food.

While Landau and Gleitman (1985) pointed out that one must be careful about imputing too much to a child's failure to extend a word to a new token in any given situation, it is noteworthy that most studies of blind children's early language have suggested that their language frequently appears tied to particular contexts or referents. While it is reasonable to suppose that blind children's opportunities to generalize might be restricted, this does not mean that they are incapable of decontextualizing words. They may have the capability, but it may be restricted due to reduced access to external information. Bigelow (1987) points out that context-bound words are both common and variable in the vocabularies of sighted children. Urwin's (1984) analysis of early words is in accord with Bigelow that it is most likely that blind children's problems do not stem from an inability to form concepts, but from the reduced opportunity they have to encounter more than one instance of a concept. As Landau and Gleitman (1985) suggest, the important question is whether the blind child is able to generalize when the appropriate circumstances (perhaps tactile rather than visual resemblance) arise. This is clearly an area worthy of more exploration.

Regarding the semantic content of general nominals. Mulford (1988) found that blind children appear to have fewer terms for animals than sighted children, but more terms for household items. As Mulford (1988) pointed out this seems related to the differences between the typical experiences of blind and sighted children. Blind children's experience of animals is restricted to the few kinds of animals in the environment and to toy animals (which haptically bear little resemblance to the real thing), whereas sighted children have access to pictorial representations of animals in books, movies, or on television, and therefore are exposed to a far greater range of animals. Furniture, on the other hand, may be more salient and relevant for blind children because they come in contact with different kinds of furniture and must store accurate representations of where it is in order to move through their environment often with verbal directions from their caregivers. For sighted children, furniture is just part of the general landscape of their environment and therefore, less important to them. Bigelow (1987) found fewer words in the initial vocabularies of the blind children she studied for objects that are large and objects that cannot be rotated. Findings from both Mulford (1988) and Bigelow (1987) suggest that the opportunity to tactilely explore objects frequently, not surprisingly, contributes to learning their labels. In addition, it is also likely that in coming in contact with or performing actions on familiar objects in the environment, the caregivers concurrently use their labels.

Cutsforth's (1951) earlier claim (mentioned above) that a lack of visual access would preclude the understanding of visual concepts was based on a word association study of 26 congenitally blind subjects, ages 8 to 21 years of age. The task required participants to respond with the first quality they thought of when they heard the names of words varying on their degree of sensory imagery. Fifty percent of the responses of the blind participants were names of visual qualities such as *red* for blood. Their extensive use of visually based words without material experience indicated to Cutsforth that their words were necessarily devoid of meaning. He concluded that "a predisposition toward unwarranted use of meaningless visual terminology demonstrates a strong tendency toward unreality in which valid relationships are utterly disregarded. The inevitable result is that nothing but incoherent and loose thinking is possible" (Cutsforth, 1951, p. 69). He called the blind child's use of language without prior concrete experience *verbalism*. Of course, Cutsforth's conclusion that word meaning is derived solely from sensory experience is unreasonably limiting. There is evidence that perceptual concepts can arise from internal processes (Barsalou, 1999), and certainly, Cutsforth's blind study participants could have learned that *red* is a descriptively meaningful quality of blood and that many other substances also have this particular quality. Indeed, they may have been taught this more explicitly than would ever be thought necessary for sighted children.

In addition, later studies found results conflicting with Cutsforth's findings and conclusions (Civelli, 1983; Demott, 1972; Harley; 1963). For example, in the Demott study (1972) sighted and blind groups of children were compared on two measures devised to separate understood meanings and verbalisms. For the verbalism measure Demott required participants to match objects with a list of their labels and give a definition of each object. For a quantification of verbalism, he subtracted the number of objects correctly identified from the number of words correctly defined. For the meaning measure he presented participants with 15 pairs of opposing adjectives (slow/fast; happy/sad) and asked them to judge words representing concepts on a five-point scale on how closely they were aligned to each pair of polar opposites. Results showed no significant differences between the sighted and blind groups suggesting that blind children do not ascribe widely different meanings to concepts from sighted children. In further support of this conclusion, Demott (1972) noted that even for visually oriented words such as *fire* and *cloud* the results held. He concluded that verbalism does not appear to be a typical feature of the language of blind children, and that "blind youngsters, just as sighted children, learn the meanings of many words through their verbal context and their use within language discourse "(Demott, 1972, p. 7).

Dokecki (1966), in a review of the concept of verbalism, also pointed out the importance of language itself in creating meaning, and that it is not only from sensory experience that words gain meaning. He noted that a word has meanings based on associations attached to a group of verbal responses through prior learning. He sighted Deese's (1962) proposal that "the word for which we seek meaning is in part an associative concept, encompassing the distribution of associated words to the given word (p. 527 in Dokecki, 1966). Implicit in this view is that words still have meaning despite the lack of an empirical referent. This view is consistent with the current thinking underlying the ability of Latent Semantic Analysis (LSA) to generate representations of linguistic input allowing meaning comparisons that are not simply direct co-occurrence associations (Landauer & Dumais, 1997). Indeed, it would be interesting to compare the similarity coefficients generated by LSA with descriptions of words and situations described by the blind as a final blow to simplistic and negative concept of verbalism applied to the language of the blind.

2.2.4.3 Blind children's use of perceptual words

The preceding discussion pertains to one of the most well-known studies on the acquisition of meaning in blind children, Landau and Gleitman's (1985) research with a congenitally blind girl, Kelli, regarding her understanding of visual terms. Results primarily from their study of this one child have often been generalized to the blind population in general in support their conclusion that, "blind children do talk about objects and their locations in space, actions, and events, and do so in just the same way as sighted children at the same linguistic level (Landau, 1983, p. 66). On their view, the key to their success supports a learning mechanism quite different from the one underlying LSA. However, the following statement agrees with the premise of LSA that language learning is not fully grounded in experience in the world, "The findings from this inquiry taken as a whole give little support to the view that first language attainment is explainable as a straightforward derivative of information provided in the environment of the learner" (Landau & Gleitman, 1985, p. 3). But for Landau and Gleitman, the key to success in language learning is through sentential syntactic cues. Their work with Kelli was the basis for their theory of *syntactic bootstrapping.* Through an analysis of the situational context, Laudau and Gleitman (1985) maintained that Kelli could not deduce the meanings of visual verbs as distinct from other verbs from context alone.

In postulating the *syntactic bootstrapping hypothesis,* Landau & Gleitman (1985) argued that the syntactic contexts, specifically the subcategorization frames of the verbs themselves, along with innate categories of lexical concepts provide the most plausible basis for understanding and using these terms. In one study, they concluded that Kelli used and interpreted the perceptual verbs *see* and *look* as if they meant haptically *be aware of* and *haptically explore*, respectively, thus indicating that the terms had distinct meaning for her that reflected an awareness of the difference in agency between the two verbs. They also suggested that Kelli was aware of different features when the verbs were used with a sighted person as agent. For example, (at age 4;8) Kelli knew that sighted adults could not see an object that was behind a barrier, although they could have felt it. As further evidence, they pointed to the fact the blindfolded children asked to *look* at an object, did not switch to a haptic modality, but rather oriented their covered eyes toward the object. (It is important to note, of course, that the prior experience of unavailable sight, lacking in sighted children, is not comparable to the experience of a blind child well adapted to her mode of sensory access.)

While the use of visual terms in blind children may lend some support to the view that word meanings can be extracted from information embedded in language itself, it is not clear that this study obviated the impact of direct experience of the external word or substantiated the necessity for innate knowledge of lexical categories. Study of environmental influences and the possibilities of extracting information from the linguistic environment without postulating a priori knowledge have still not been adequately explored using the potential insights that may be afforded by studying blind populations.

2.2.4.4 Blind children's use of imitation

A consistent finding among studies exploring the emergence of language in blind children is that they use a marked amount of imitative speech (Dunlea, 1989; Perez-Pereira, 1994; Pereira & Castro, 1997; Peters, 1987, 1994; Urwin, 1984). These imitations appear to be unanalyzed chunks of language that are used in specific contexts with their meaning embedded in these contexts. While these researchers have reported similar prevalence figures, their interpretations of its purpose are different. Some consider imitative speech to be prima facie a negative feature of language devoid of a developmental function. Others propose that imitative speech may serve to assist in comprehending language and promote social interaction.

Early studies of blind children's language taking a psychoanalytical stance described their imitative speech as *parroting* or speaking without understanding. More recently researchers studying autism have compared the frequent use of imitative speech in blind children to the *echolalia* common in autistic children (Hobson, Brown, Minter & Lee, 1997). Some more recent studies focused on blind children's language (Dunlea, 1989; Andersen *et al.*, 1984, 1993) also considered imitative speech Dunlea

(1989) and Andersen *et al.* (1984, 1993) found that the unanalyzed chucks of imitative speech observed in the blind children they studied were later segmented into their appropriate constituents, however, they did not suggest that this represented an assistive developmental strategy. While they did acknowledge that imitative speech does occur in typically developing sighted children as well, they stated that there was no developmental role or useful function in their blind children's imitative speech. Other researchers have pointed to positive functions of imitative speech in typically developing children (Tomasello, 1999; Tomasello, 2003). For example, Snow (1981) states, "The judicious use of imitations on the part of the language learner might constitute a very effective strategy for performing communicatively far above his linguistic level, and might at the same time provide the learner with linguistic material which is susceptible to segmentation and further analysis" (Snow, 1981, p. 211).

In accordance with Snow's (1981) view, Peters (1994) suggests that imitative speech serves the function of promoting understanding of social situations and objects and events in the world. She noted a high use of imitative and contextualized speech in one visually impaired boy in his interactions with his father between 20- and 30-months of age. In analyzing the father's input, she found that he used a communicative strategy of scripting events in the child's environment, a kind of 'eventcast.' Thus infusing language into the child's daily routines and activities provided a way for the child to identify particular situations and participate in on-going routine activity using imitative expressions when he identified a situation as corresponding to a familiar routine. In addition, Peters (1994) found that this child learned to produce initiations for planning and directing his own activity. Thus, his imitative language served to scaffold his cognitive ability in addition to promoting social interaction with his father.

Research by Kitzinger (1984) and Urwin (1984) also supports this positive view of imitative speech.

2.2.5 The use of directive input to blind children

The use of a directive caregiver input style with atypical language learners has been a very consistent finding among researchers studying language development in various populations: physically impaired (Barrera & Vella, 1987), developmentally delayed (Davies, Stroud, & Green, 1988), hearing impaired (Meadow, 1980), specific language delayed (Bondurant, Romeo, & Kretschmer, 1983), and atypical children in a daycare setting (Girloametto, Weitzman, & Van Lieshout, 2000). The general assumption in this research has been that directive language is used primarily to control the child's attention and behavior rather than using language to promote a reciprocal communicative and informative exchange. Consequently, there has been a tendency to view directiveness in a negative light associating its use with insensitivity and intrusiveness (Pine, 1992). Agreeing with this stance, Kekelis and Anderson (1984), Moore and McConachie (1994), and Preisler (1991) identified a directive parental style from the finding that the parents in their studies used more imperatives and fewer declaratives.

Work by Perez-Pereira and Conti-Ramsden (2001) takes a different view. In their longitudinal study of the use of directives, they found that parental use of directives varied with developmental time for both blind and sighted children with use of directives decreasing when children were approaching three years. Thus, they suggest that the use of directives is more prevalent at earlier stages of development. In order to further explore the functional use of parental directives, Perez-Pereira and Conti-Ramsden (2001) analyzed the specific content of the directives used by parents in their study to ascertain whether directives might be used for purposes other than behavioral control. Hence, they examined imperative forms for utterances containing descriptions of objects and events in the environment, information about location, or how, why, or when to do something (e.g., *First pick it up with your hands and then do not drop it until it is inside the bowl.*). They found that parents of blind children used significantly more descriptions within their directives than parents of sighted children.

Perez-Pereira and Conti-Ramsden (2001) also examined dialogue sequences containing directives. Specifically, they analyzed the proportion of directives that were followed by another directive. Findings indicated that directives to blind children tended to occur in clusters within dialogue sequences, suggesting that counting single occurrences may not capture the full role of directives. They concluded that repeating or elaborating on directives might provide a context for the blind child. Without visual support for interaction, language can be a tool for contact and an aid in creating contexts for dialogue. They suggest that further research needs to explore this possibility by considering a more complex role for directives and descriptives in dialogues between blind children and their parents. As discussed above, researchers examining input to atypical learners have assumed a negative effect for directiveness. However, it may be the case that descriptive directives are particularly important for blind language learners. Specifically, they may be a way of establishing joint attention and encouraging engagement in conversational interaction.

For the blind child the question is how to 'get' language without the visual access that is generally deemed crucial for connecting the flow of human sounds heard to what is happening in the environment. In this review, I have focused on some of the issues that have been addressed regarding the early stages of language learning in blind children. There has been a call for current longitudinal research on the population of blind children both on broad developmental issues and on subsets of specific characteristics (Perez-Pereira, M., & Conti-Ramsden, G., 1999; Warren, 1994). In particular, most of the research on blind children has concentrated on the problem areas rather than eploring the resources available to blind children that allow some achieve to some language milestones at a commensurate pace with their sighted peers. In addition, research on language learning blind children can inform theories of language acquisition, but in order to do so it is necessary to explain what blind children *do accomplish* in language acquisition and *how they might utilize other sensory input* in order to determine how vital a role visual input actually plays in acquiring language.

To shed light on these issues this study longitudinally tracked, in blind, partially sighted, and sighted language learners, the types of verbalizations, gestures, actions, and physical direction used with in *joint attentional engagements* for the purposes of (1) eliciting and (2) directing attention (3) to a referent or common ground (4) in order to provide new information about objects and actions of mutual focus. While much study has involved specific verbal and gestural input to children at the beginning stages of language learning, the general premise of this study is that much involved in making WORD-REFERENT CONNECTIONS is fostered in on-going activity where the parent melds language with the objects in the current focus of the child using a variety of linguistic forms, gestures, actions, and physical directions.

2.2.6 Joint Attention in blind children

At least in part because the study of joint attention has almost exclusively been framed in terms of visual access, how blind children might participate in *joint attentional engagements* has receive little research attention. Bigelow's (2003) study of two congenitally blind infants aged 13- to 21 months and 23- to 30-months defined joint attention on two levels, one based on liberally contrued behaviors and the other on more conservatively construed behaviors. Liberally construed joint attention behaviors involved the infants' use of language (e.g., labeling an object while acting on it in response to adult request), while conservatively construed joint attention involved more explicit awareness of the adult's mutual engagement (e.g., repeated giving and taking of an object). Bigelow suggested that the delays in joint attention she found in the two infants she studied were related to the affordances provided by vision, particularly in the attainment of ecological self-knowledge that forms the basis of perspective-taking. She found instances of conservatively construed joint attention were marked by exclusively initiation by the adults. Indeed, it has been noted by others that blind infants are particularly dependent upon adults to initiate and describle physical and social affordances in the environment that are unavailabe through vision. Later on language obviates this need and blind children can more easily initiate and request information in joint interactions.

Tadic, Pring, & Dale (2009) investigated more general attentional processes in children with varying degrees of visual impairment (16 with profound impairment, 16 with partial impairment and 17 sighted ranging in age from 10 to 36 months) without specifically addressing social processes. In an observational study of children undergoing a semi-structured developmental assessment they conceptualized attention not in terms of joint engagement, but in terms of *establishing, maintaining* and *shifing* attention flexibly toward objects. *Establishing attention* was defined as the child's ability to respond to an adult's attempt to elicit attention toward a toy when the child was not currently attending to the adult or the relevant object. *Maintaining attention* was defined as the child's ability to respond to an adult's attempt to hold the child's attention on a toy after the child's attention to the toy had been established. *Shifting attention* was defined as the child's ability to respond to an adult's attempt to shift the child's attention from a object with which the child was currently engaged to a novel object. They found that compared to the sighted children in their study, the children with visual impairment, especially if profound, exhibited difficulties regulating their attention between people and objects, establishing, maintaining and shifting their attention. Interestingly, the noted that a number of the visually impaired children, both at the profound and partially sighted impairment levels, reached ceiling level performance on their tasks, thus matching the level of the sighted children. They also reported the most variance in the performance of the profoundly blind participants. This suggests that adequate attentional control is certainly possible through nonvisual means. In addition, contrary most studies of blind and partially sighted children they found that, for both groups, attentional abilities, particularly for establishing and maintaining attention, were less well developed than those in their sighted cohort. They suggested that shifting attention may be more perceptually driven compared to the processes involved in establishing and maintaining attention, thus even a little sight advantages the child with some sight. In addition, they suggested that establishing and maintaining attention are more socially driven and, therefore, may be particularly difficult for any visually impaired child, since shared attention to the object is required.

Preisler (1991) found that children with visual impairment had difficulty engaging in joint attention. Although they could interact dyadically with a parent aided by the parent's affective attunement, they were unable to co-ordinate their attention at the same time toward an object in the external world. Preisler also noted that the visually impaired infants in his study were attentive to the sounds of the environment and reacted to those sounds by establishing frozen bodily and facial postures. Preisler concluded that while these signs of engagement might provide a means of establishing attentional focus, they may be too subtle and ambiguous for parents to notice or interpret.

Rogers and Puchalski (1984) suggested that with visually impaired children, joint interactions are hindered in a bidirectional manner. Specifically, while the child is deprived of visual input and a lack of effective communicative signals from the parent who cannot interpret the child's signals, the mother is also deprived of the positive and responsive cues from the child that would provide positive feedback about her communicative efforts.

In a study of two profoundly visually impaired children, Urwin (1978) found that the parents were able to establish an adaptive interactive responsiveness once they discovered the particular cues that elicited a response in their child. They used phased touching routines to alert the infants to pay attention. However, despite the effective interactive routines that facilitated dyadic engagement, both of the infants studied exhibited delays in their triadic interactions that required the child infant to incorporate objects into their interactions and establish reversible exchanges of actions on objects.

Vision has powerful effects and children with visual impairment depend developmentally on tactile information and memory, as well as auditory input and verbal guidance by others. These available experiences must at least allow them to learn to co-ordinate the spatial placement of objects and to establish a shared focus on these objects with others.

2.3 Predispositions that provide a foundations for language learning

The *Joint Attentional Socialization Process* posited in this study (see p. 47), is based on the social pragmatic view that humans are biologically social beings that educate their children in routines and activities that structure the young language learner's experience in ways that facilitate the acquisition of the communicative conventions of their local community. The focus of this study is the socialization process by which joint attention is achieved. In this study, the elements of this process are made available to both sighted and blind children because they are based on predispostions that provide supports for language learning in nonvisual ways (with the exception of eye gaze). These predispositions assist the child in 'getting' language as well as in the process of acquiring new language forms and knowledge about the world. The critical element of this process is ATTENTION, and specifically, how the child is socialized to give his attention in situations that afford language learning opportunities.

How is it that by 18-months the children in this study were able to participate in *joint attentional engagements*? Through what early abilities/capacities are they socialized to attend in the ways of their linguistic communities to learn language? From very early on infants show signs that they are predisposed to communicative exchanges through the following ostensive signals: eye contact, *multimodal redundancy*, *contingent responsivity*, and *child-directed speech*. These ostensive signals indicate to the infant a communicative effort on the part of the parent, and in addition, that the parent is specifying the infant as the addressee (Sperber & Wilson, 1995). These predispostions are important because they carry young language learners to and through the processes that are important for learning to communicate in the ways of their community.

Eye Gaze

First, eye contact is preeminent as a major vehicle of interpersonal and communicative development (Robson, 2006). Of all the neonate reflexes visual fixation and gaze following are the only ones that do not drop out overtime, but instead demonstrate increasing facility. In addition, fixation and following are among the first infant actions that are both intentional and subject to his control (Baron-Cohen, 2007).

Eye contact is the quickest and most efficient way to establish a communicative link between people. Mutual looking into each others' eyes confirms that the other is attentive and understands that she is the intended addressee. Newborns prefer to look at a face directly looking at them. Mothers always make sure that their babies head is aligned with their own so that they eyes are coordinated when they initiate interactions with them (Watson, 1972). It is well established that early on eye gaze is an ostensive signal of communicative intent (Baron-Cohen, 2007). In this study, however, because there has been so much prior emphasis on visually mediated *joint attentional engagement*, eye contact is not specifically addressed. In eliminating the visual modality from examination, alternative modes of initiating and sustaining communicative contact are the focus of this descriptive study. The inclusion of children with visual limitations who have met with success in learning language is meant to insure that alternative modes to establishing *joint attentional engagements* have been successful.

Multimodal Redundancy

Second, multimodal presentations occur with regularity for the infant from the beginning of life. Indeed, there is well established reasearch indicating that from birth infants are able to associate different aspects of their experience (Meltzoff and More, 2002; Haith and Benson, 1998). For example, eyes and voices typically occur together and voices consistently occur with physical manipulation. Information that is typically presented redundantly across sensory modalities appears to selectively elicit attention and facilitate learning in infants (Bahrick, Walker & Neisser, 1981). In other words, the infant has available to him ways of attending to events that underpin his developing understanding of communicative exchanges. Events that happen with regularity, together and/or are presented in multiple forms, are imbued with special meaning, and they entrain a sense of anticipation in routine activities. The fact that early parent-child interactions are replete with multiple types of verbal and nonverbal input suggests that the human infant has available various options for entering into communicative relationships. For example, children with no available vision are able to pick up on regularities between voice and various types of physical input such as touch and movement (Freiberg, 1977) that allow them within parent-child activity to develop the anticipatory skills that are prerequisite to recognizing communicative intentions. Hence, by 18-months all of the children in this study had extensive experience making connections across modalities that underpin later connections between verbally presented information and things that can be experienced visually or tactilely.

Contingent Responsivity

Third, infants come into the world able to respond contingently to the pairing of various stimuli (Floccia, Christophe & Bertoncini, 1997), and they can learn from these experiences (Barr, Rovee-Collier & Learmonth, 2011). Early on, a great deal of work is done by parents to engage their infants using their capacity for responding contingently. Parents use both nonverbal and verbal means to secure their infant's attention, and then to engage him in ways that increasingly require his effort in turn taking routines (Bruner, 1977). For example, in *give-and-take routines*, initially the parent is the initiator and she manipulates the interaction so that the infant has a turn, perhaps by putting the object directly into the infant's hand. By 6 months infants begin to take their turn as parents scaffold the interaction by holding an object just out of reach so that infants have to signal their intent to take it by using a reaching gesture. By 11 months infants begin inserting vocalizations into the give-and-take routines at regular intervals. By 12 months children can both show and offer an object in his possession. Bruner's study (1977) suggests that through scaffolding, parents provide the child with a structure for mutual engagement. These contingent interactions are also referred to as early or proto-conversations (Bateson, 1979) as they reflect the kind of turn taking temporal contingency that is characteristic of typical human communication. In addition to the rhythmic flow of turn taking interactions, parents inculcate the notion of speaker and addressee setting the stage for entering and exiting more complex *joint attentional engagements*.

Child-directed-speech

Fourth, the voice is probably the most salient communicative signal in humans. Parents' use of voice indicates for the infant that they are the speaker, and from birth infants prefer the sound of their mother's voice (DeCasper & Fifer, 2005). In addition, voice produces a sound vector from parent to child that establishes a path for communicative efforts, and puts the speaker in a precise location in the here and now. So from birth infants have repeated practice relating to *where* to focus their attention in dyadic communication. However, voice alone is not necessarily an ostensive communicative signal for infants because young infants only direct attention to a certain kind of speech (Dominey & Dodane, 2004). In contrast to adult speech, *child-directed speech* carries a higher and broader pitch, with amplitude variation, and reduced speed that captures infants' attention (Url, Aslin, & Panneton, 1990; Fernald, 1985), thus making it manifest for the infant that he is the addressee. In other words, the special prosody associated with child-directed speech indicates to the infant that he is the one to whom the speech is being addressed, and that he is currently in a communicative situation. So even before words have meaning to an infant, parents make great efforts to communicate affectively with their infants using the distinct prosodically marked *child-directed speech*.

In addition, all four of the above ostensive signals are delivered with a distinctive affective wrap that engenders a like response. In infancy, affective communication is the primary mode of interaction. For example, when infants are attending to *child-directed-speech*, they smile more and appear to be more attracted to adults than when they are listening to adult-directed speech (Werker & McLeod, 1989). With directed eye gaze, newborns look longer at a happy face than a neutral one (Rigato, Menon, Johnson, & Farroni, 2011). In Western cultures parents respond to infants as if they were intentional beings, and they attempt to engage them in affective exchanges that bond them as a reciprocally interactive unit. For example, they learn that certain embodied forms *indicate*, or reflect, different emotions. For example, "The mother takes on facial expressions, motions, and postures *indicative* of emotion, as though the infant were behaving intentionally or as though she and he were communicating" (Brazelton, Koslowski, & Main, 1974, p. 67). These interactions provide a basis for understanding that emotive and physical and verbal actions are connected. In other words, what is felt is indicated and made manifest in particular embodied ways.

In summary, multimodal redundancy, contingent responsivity and child-directed-speech provide a foundation for participating in the *joint attentional engagements* that afford opportunities for language learning regardless of the child's degree of vision. While lack of vision certainly has consequences, the visually impaired children in this study were successful language learners. Their parents had access to services that increased their awareness of the special needs of their children, and they spent large amounts of time with their children from infancy engaging with them in everyday activities that afforded access to multimodal redundancies, contingent responding and child-directed-speech. How visually impaired children might be able to participate in *joint attentional engagements* that foster language learning has received little research investigation primarily because of the exclusive use of visual cues to validate joint attentional states (Biglow, 2003). In addition, how nonvisual cues might afford *joint attentional engagement* has not been studied in the population of sighted children who presumably also have access to the same nonvisual cues. This study takes a naturalistic, observational approach to documenting what some of these nonvisual cues might be.

2.4 *The Joint Attentional Socialization Process* (see Table 1)

In this study *joint attentional engagements* involving toy play provided the framework for observing the elements of parental input that scaffold language learning. "Children understand adult communicative intentions, including those expressed in linguistic utterances, most readily inside the common ground established by joint attentional frames" (Tomasello, 2003, p. 24). The common ground consists of all of the objects and actions within the shared attention of the child and parent. In this study, *joint attentional engagements* were framed in terms of what the parent and child were doing together in their shared toy play activities. Joint attention has received much attention in the research literature particularly for its role in word learning (Bakeman & Adamson, 1994; Tomasello & Farrar, 1986). However, joint attention has consistently been defined, measured and analyzed in terms of visual access. The primary focus has been on how some type of visual access assists the child in making a connection between an intended referent and various forms of co-occurring gestures and words. In addition, the prevalent view maintains that understanding the intentions of others is a prerequisite for the word learning work accomplished by engaging in joint attentional exchanges (Tomasello, 1999).

In order to highlight elements of *joint attentional engagements* that have received less attention, eye gaze is not part of the analyses in this study, although it is important

Table 1. ***The Joint Attention Socialization Process***

I. Attention-Eliciting Cues	II. Attention-Directing Cues	III. Word-Referent Connections	IV. Content Messages	*Retrospective Cues*
Pay **ATTENTION** to the communicative intention	**WHERE** to direct and share attention	The word for **WHAT** we are sharing	**INFORMATION** about how what we are sharing fits in the world	Pay **ATTENTION** to what just occurred
<u>Entrance Markers</u> •*Physical cues* •*Emotive cues* •*Vocative cues* •*Alerting cues* •*Formulaic engagement cues* **<u>Communicative Predispositions</u>** •*(Eye gaze)* •*Multimodal redundancy* •*Contingent responsivity* •*Child-directed speech*	**<u>Nonverbal Cues</u>** Gestures and Actions •*Deictic gesture cues* •*Indicative action cues* •*Physical direction cues* **<u>Verbal Cues</u>** Formulaic Fixed Frames •*Deictic introducers* •*Perceptual imperatives* **<u>Composite Cues</u>** •*Gesture + speech* •*Indicative action + speech* •*Physical direction + speech*	**<u>Verbal labels</u>** **RELEVANCE ACCESS**	**<u>Nonverbal Content</u>** •*Demonstrating gestures* •*Demonstrating actions* **<u>Verbal Content</u>** •*Objects* •*Actions* •*Object parts* •*Object properties* •*Types of objects* •*Contrasive details among objects* **<u>Verbal Forms</u>** *Leading and following-in* •*Prescriptives* •*Descriptives* •*Questions*	**<u>Exit markers</u>** •*Acknowledgement* •*Praise* •*Exclamation*
<u>Pragmatic Purpose</u> Ostensive signals	Deictic marking	Common ground	Informative details	
<u>Manner of Connection</u> Affective connection	Cognitive connection	Language connection	Knowledge connection	
<u>Child Engagement Stance</u> →Anticipatory Stance	→Observant Stance	→Convergent Stance	→Bidirectional Stance	

to note that eye gaze is generally co-present with visually directed gestures such as *pointing* and *holding up an object*, that are included in the analysis. Visually impaired children with varying degrees of visual access are included to bring to the fore nonvisually directed ways of establishing WORD REFERENT CONNECTIONS that have received less attention. This study presents a view of *joint attentional engagements* that includes multimodal sensory input that focuses attention and provides opportunities for learning through the use of gestures, actions, and language.

Prior research on joint attention has generally focused on specific elements that purport to foster connections between individual words and referents in the world. Little attention has been given to the contributions of various socially available elements that comprise options for framing *joint attentional engagements*, moving in and out of them, and hence, making their contents more salient. For example, in addition to the use of ATTENTION-ELICITNG CUES, multimodal redundancies, turntaking contingency, and child-directed speech provide ostensive marking for the adult's communicative intentions. These attentional markers invite responsiveness with the prospect that something worthy of attention is to come. In other words, the intentions of the adult are made manifest for the child through the use of pragmatic ostensive signals.

In addition, little attention has been given to the variety of elements that participation in shared experience affords for general knowledge transfer from parent to child. For example, for the young language learning child, participation in joint activities affords opportunities to connect directly available objects and actions with language more widely, not only to specify relevant referents, but also to transfer relevant new knowledge about referents. For example, the use of culturally established ATTENTION-DIRECTING CUES allows the parent and the child to converge on a common ground, a referent, based on what is relevant to the on-going activity. The common ground then provides a focal point for anchoring the transfer of new knowledge that because of its local relevance may be used as the basis for future generalizations.

In this wider view, *joint attentional engagements* provide opportunities for exchange whereby the adult serves as an educating/socializing agent by making available to the child both culturally inscribed ways of interacting and new or expanded knowledge. Exchange, of course, goes both ways. From early on, the child lets the adult know through his initiations, responses and continuing actions where he is in the engagement process and what he wants to learn (Bloom & Tinker, 2000). Overtime as the child becomes increasingly skilled in the ways of using gestures, actions and language, responsibility for successful engagement becomes more evenly distributed

Viewing *joint attentional engagement* as a pragmatic process that socializes the child in particular ways of communicating and, in addition, offers a conduit to relevant knowledge in a particular cultural milieu, leaves open the possibility that its elements and the manner in which it unfolds may vary in other cultural situations. This particular view of *joint attentional engagement* is based on examination of six Western middle class parent-child dyads engaged in a commonly occurring type of interaction, toy play in the home setting. The fact that this process of *joint attentional engagement* is socially mediated means that different types of input and activities may arise in other cultural situations.

2.5 Research Questions

That input makes a difference in the emergence and the quality of a child's language is no longer in question (Gallaway & Richards, 1994). What specific types of input are facilitative remains an important focus of research. Studying populations that have differential access to input can help to broaden understanding of what can spur language growth. As proposed by social pragmatic theorists, participation in *joint attentional engagements* is critical to the emergence of language. Their research, reviewed above, defines joint engagement primarily in terms of visually available cues. This study examines a wider array of potentially available multimodal cues in order to highlight avenues of crucial access to cognitively intact children born without vision or with limited vision who are successful language learners.

Hence, this study analyzes input from parents to children with varying access to visual input. Six parent-child dyads included two children with no usable vision, two children with partial vision, and two sighted children. These parent-child dyads were videotaped in their homes at four-month intervals from the time the children were eighteen months old until they were forty-two months old. During this time span all six children moved successfully from the one word stage of language development to sentential expression (see Table 2).

Table 2. ***Child's age in months for onset of first words, ten words, and beginning and ending MLU***

Child	Language Measures			
	Age of first word (by mother report)	Age of 10 words (in a video session)	MLU/Level at 18-months	MLU/Level at 42-months
Blind				
Mollie	14	18	1.06/Early I	5.04/Post V
Ethan	13	18	1.24/Early I	5.38/Post V
Partially Sighted				
Amy	15	18	1.33/Early I	4.38/Late V
Sam	14	18	1.50/Early I	4.66/Post V
Sighted				
Ella	14	18	1.19/Early I	4.60/Post V
Tyler	13	18	1.30/Early I	4.46/Late V

This longitudinal descriptive study was designed to address the following overarching question regarding the socialization of attention from the time of the child's first words to sentential expression: What kinds of parent input are made available to the child within the joint attentional engagements that, in Western middle class environments, are purported to enhance word learning opportunities that result in felicitous language outcomes? More specifically the research questions were the following:

Research Questions: ATTENTION-ELICITING CUES

1. What types of ATTENTION-ELICITING CUES *did the parents in this study use to summon their child's attention?*

1.1 Across the 18- to 42-months month age slices how frequently were ATTENTION-ELICITING CUES *employed by the parents of the blind, partially sighted, and sighted children?*

1.1.1 Across the 18- to 42-months month age slices were there changes in the frequency that parents of the blind, partially sighted, and sighted children employed ATTENTION-ELICITING CUES*?*

1.1.2 Across the 18- to 42-months month age slices were there changes in what followed the use of an ATTENTION-ELICITING CUE?

1.2 Across the 18- to 42-months age slices did the parents of the blind, partially sighted, and sighted children employ the same types of ATTENTION-ELICITING CUES?

1.2.1 Across the 18- to 42-months month age slices did the parents of the blind, partially sighted, and sighted children employ some types of ATTENTION-ELICITING CUES more frequently than others?

1.2.2 Across the 18- to 42-months month age slices were there differences in the use of particular ATTENTION-ELICITING CUE types that might be related to vision?

1.2.3 Across the 18- to 42-months month age slices did the frequency of parents' use of particular ATTENTION-ELICTING CUE types change?

1.3 Did the blind, partially sighted, and sighted children respond with similar frequency to their parent's use of ATTENTION-ELICITING CUES?

Research Questions: ATTENTION-DIRECTING CUES

2. What types of ATTENTION-DIRECTING CUES did the parents of the blind, partially sighted, and sighted children in this study use to assist their child in locating a specific referent in the toy play area?

2.1 Across the 18- to 42-months month age slices how frequently were nonverbal ATTENTION-DIRECTING CUES employed by the parents of the blind, partially sighted, and sighted children?

2.1.2 Across the 18- to 42-months month ages slices did the parents of the blind, partially sighted, and sighted children employ the same types of nonverbal ATTENTION-DIRECTING CUES?

2.1.2 Were there differences in the use of particular nonverbal ATTENTION-DIRECTING CUE types that might be related to vision?

2.2 What specific types of nonverbal deictic gesture cues were employed by the parents of the blind, partially sighted and sighted children?

2.2.1 With what frequency did the parents of blind, partially sighted, and sighted children employ specific types of nonverbal deictic gesture cues? Were there any differences related to degree of vision?

2.2.1.1 Pointing gestures

2.2.1.2 Hold up gestures

2.2.1.3 Give/Take reaches

2.2.2 Across the 18- to 42-months month age slices were there changes in the use of nonverbal deictic gesture cues?

2.3 What specific types of nonverbal indicative action ***cues*** *were employed by the parents of blind, partially sighted, and sighted children?*

2.3.1 With what frequency did the parents of blind, partially sighted, and sighted children use specific types of nonverbal indicative action cues? Were there any differences that might be related to degree of vision?

2.3.1.1 Tapping for orientation

2.3.1.2 Tapping the referent/object the child is holding

2.3.1.3 Touching the child with the referent/object

2.3.1.4 Positioning an object for access

2.3.2 Across the 18- to 42-months month age slices were there changes in the use of nonverbal indicative action cues?

2.4 What specific types of nonverbal physical direction ***cues*** *were employed by the parents of blind, partially sighted, and sighted children?*

2.4.1 With what frequency did the parents of blind, partially sighted, and sighted children use specific types of physical direction cues? Were there differences related to degree of vision?

2.4.1.1 Orientation of the body

2.4.1.2 Directing tactile contact with a referent

2.4.2 Across the 18- to 42-months month ages slices were there changes in the use of nonverbal physical direction cues?

2.5 What verbal ATTENTION-DIRECTING CUES were employed by parents of the blind, partially sighted, and sighted children to direct their child's attention toward referents?

2.5.1 With what frequency did the parents of the blind, partially sighted, and sighted children use specific types of fixed formulaic frames? Were there any differences that might be related to degree of vision?

2.5.1.1 Deictic introducers

2.5.1.2 Perceptual imperatives

2.6 With what frequency did nonverbal ATTENTION-DIRECTING CUES *co-occur with speech across the 18- to 42-months month age slices?*

2.7 Did the blind, partially sighed, and sighted children respond with similar frequency to their parent's use of nonverbal and verbal ATTENTION-DIRECTING CUES?

Research Questions: WORD-REFERENT CONNECTIONS

3. Did the parents of the blind and the sighted children in this study provide nonverbal ATTENTION-DIRECTING CUES *concurrently with object labels or* CONTENT MESSAGES *with similar frequency to assist them in accessing referents across the seven age slices from 18- to 42-months?*

3.1 Were there differences in the number of times parents established joint focus on a referent by following in to what the child was already focused on across the seven ages slices from 18- to 42-months?

3.2 Were there differences across the 18- to 42-month age slices in the number of times parents established joint focus on a referent by following-in to what the child was already focused on?

Research Questions: CONTENT MESSAGES

4. What kinds of nonverbal gestures and actions did the parents of the blind, partially sighted and sighted children employ along with their verbal offers of information about the objects and actions in their toy play?

4.1 With what frequency did the parents of the blind, partially sighted and sighted children employ different types of demonstrating gestures and actions?

4.1.1 Demonstrating gestures: Tracing an object or path and *iconic imagery gestures*

4.1.2 Demonstrating actions: Actions with tactile input, actions with both tactile and sound input, actions with sound input and actions with visual access only

4.1.3 Across the 18- to 42-months month age slices were there changes in the use of demonstrating actions?

4.1.4 Did the blind, partially sighted, and sighted children respond with similar frequency to their parent's use of demonstrating actions?

4.2 Were there differences in the types of referents addressed by the parents of the blind, partially sighted, and sighted children?

4.3 Were there differences in the use of content talk related to object types and contrastive statements about objects by the parents of the blind, partially sighted, and sighted children?

4.4 What language forms did parents of the blind, partially sighted, and sighted children employ to assist their child in obtaining indentifying and detailed information about objects and actions in the flow of their toy play activity?

4.5 Were there differences among the parents of the blind, partially sighted, and sighted children in their use of lead and follow-in prescriptives, descriptives and questions?

Research Question: Overall use of attentional cueing

5. Across the 18- to 42-months month age slices how frequently did the parents of the blind, partially sighted and sighed children employ attentional cueing?

CHAPTER THREE

Methods

This study compares the various nonverbal and verbal forms parents use with their children while engaged in a toy play situation in their homes. The toy play situation was used to focus on a type of interaction that is common in middle class Western linguistic communities, and that affords opportunities for language development that are often used as independent variables in experimental studies (a.g., deictic gestures and verbalizaitons). Using a naturalistic setting, this descriptive study aims to detail the specific forms that are actually used in on-going activity. Parent input is examined in order to determine the prevalence of canonical forms as well as to discover other forms and affordances made available by parents in joint play activity.

3.1 Study participants

The blind and partially sighted children selected for this study were part of a larger longitudinal effort by the author to collect data on the course of language development in visually impaired children. A total of sixteen parent-child dyads, where at 18-months the child had some degree of diagnosed visual impairment, were videotaped at four-month intervals until the child reached 42-months of age. Frequently, in visually impaired children, acuity changes over the course of early development, and it is not possible, in most cases, to accurately predict a steady or set degree of vision. However, at 42-months it was possible to retrospectively observe the children's use of sight in the videotapes and discuss acuity levels with parents and professionals who had been involved with the children over the course of the study. The two blind children selected for this study at 42-months were the only two that had minimal light perception only, did not spontaneously bring objects close to their eyes for examination or identification, and by 24 months professionals had determined that they would be Braille readers. For this study partial sight was liberally construed to be 20/200, with spontaneous examination and identification of objects by bringing them close to the eyes, and a determination by professionals that they would need large print books for reading.

In addition, four dyads including children who had normal vision were videotaped as potential comparison dyads. This cohort included two sighted boys and two sighted girls. These dyads met the same initial child language milestones and parental attunement criteria as the visually impaired children. However, at 30-months, one of the sighted children was diagnosed with an articulation disorder and another moved to another state before 38-months of age. Both were discontinued from the study leaving the two sighted children who did meet language and parental attunement criteria.

For all of the 20 children who began the study, the parents indicated that the mother's pregnancy was unremarkable, children were born full term, and the children exhibited no evidence of concurrent cognitive or health issues that would affect their language development.

In on-going retrospective observations and interviews, the parents of the six children selected met three criteria: (1) they spent large amounts of time on a daily basis engaged in play and daily routines with their child, (2) they provided socializing experiences for their child with extended family and friends, (3) they had access to and participated regularly in infant and toddler programs both at home and in centers that included assistance from highly trained professionals. Also, in on-going and retrospective analysis of the videotapes, the parents of the four children selected for this exhibited a high level of attunement to their child's needs and desires in based on the following behaviors: (1) they maintained engagement consistently over the course of the hour-long videotaping session, (2) they were child-directed in their play interactions frequently following-in to the interests of their child, (3) they provided structure for the play activities by using a variety of positive strategies to motivate, engage, and guide their child, (4) they extended their child's play by providing new information at an appropriate developmental level, (5) they did not employ behavior directives (i.e., *Stop that! Don't do that!*), or use negative feedback to reprimand or control their child's behavior, (6) they provided consistent positive feedback to their child, (7) they used appropriate language complexity that was just above the developmental level of their child (see Table 3), (8) they employed child-directed speech to motivate and engage their child.

Adult participants for each of the six dyads were self-selected by the parents after discussion and consensus regarding the following criteria: (1) the largest amount of time spent in interaction with the child, (2) the largest amount of verbal interaction with the child, (3) the largest amount of interactive play with the child, (4) comfort level in being videotaped. The parents of the two blind children and the two sighted children decided on the mother. Both the mother and the father of the two partially sighted children wanted to be included. While there is some reason to suspect that input from fathers is potentially different from input from mothers (Mannle & Tomasello, 1987), using the above criteria insured that the fathers had, at least, equal responsibility for taking care of the child unlike the more traditional fathers in the Mannle & Tomasello study.

3.1.1 Retrospective language measures for all study participants

Since this was a planned retrospective study it was possible to compare longitudinal data on the progression of the children's language development on several standard measures. First, The MacArthur-Bates Communicative Development Inventory Toddler Short From (CDI) (Fenson *et al*., 2000) was completed by all parents at the beginning of the study at 18-months of age, and again at 22-months, 26-months and 30-months. In addition, to vocabulary use, the CDI queries parents regarding involvement in early games and routines. All parents indicated that they spent extensive time engaged with their child in these experiences. Only 8 out of the original 16 visually impaired children were at or above productive language expectations by 30-months.

Second, transcripts from all children at each of the seven age slices were entered into the SALT analysis program (Miller & Chapman, 1992) to obtain data for comparison on common language measures over the time course of the study. The six children selected for this study were the only children who had age expected Leve 5 MLUs at 42-months. Table 3 presents data MLU data for these six children and their parents.

In summary, none of the children in this study had any health or cognitive issues that might adversely affect their language development, and all parents were actively engaged with their children and within the communities in which they lived. All parents were loving and conscientous in their parenting and provided an enriched environment for their child. Ethan's mother was younger than the other parents, and had less experience with children prior to Ethan's birth. In addition, she was still experiencing some typical depression resulting from the discovery of blindness in her child. Although she was very willing to participate in this study, she felt that sometimes during the videotaping her affect was sometimes more subdued than was typical of her daily interactions with Ethan and others.

All six of the children in this study have from birth received consistent and extensive amounts of verbal and nonverbal input from their parents as well as directed and ambient involvement with extended family members and family friends. All parents have had good access to information about child-rearing strategies, enjoy interacting with their children, and provide age appropriate play objects and activities for them. None of the parents involved in this study had concerns about their child's progress in developing language.

It is recognized that this small sample size precludes generalization to the larger population of children in any of their respective categories, blind, partially sighted or sighted. However, as noted above there are many factors that make generalization in visually impaired populations problematic. It is the intent of this study to describe observed elements of engagement among high functioning parent-child dyads; elements that have not previously been described and/or enumerated functioning together within the typical middle class Western environment in which the overwhelming numbers of studies of language development have occurred. Results might best be described as a high end parameter of possibilities for children's successful language development.

3.1.2 Demographics of the two blind children

The two blind children in this study were recruited from the Anchor Center for the Blind Children in Denver, Colorado. Molly was eight months old at her first videotaping session. Ethan was 16 months old. Both were eighteen months at the time of the first videotape used for this study, and both used at least ten words productively in the videotaping session.

Molly and Ethan had minimal light perception only, resulting from Leber's congenital amaurosis (LCA), a rare genetic retinal disorder. LCA is inherited as an autosomal recessive genetic trait, however none of the parents were aware of any familial blindness. LCA is often not correctly diagnosed until months after birth, often when parents note that their child's eyes are not tracking movements. Molly received a diagnosis of LCA at four months, and Ethan at nine months. While light perception has been assistive in orienting for mobility for both children, more so for Molly, neither child spontaneously examined objects by bringing them close to their eyes. According to parental and preschool observations and in play-based evaluation session at 18-months, neither child utilized sight in a manner that would be assistive in the canonical gesture/verbalization scenario frequently used by children to link words and referents. By 24 months professionals determined that both children would be Braille readers.

Both children were from middle class homes in the suburban Denver, Colorado region. Ethan's parents were high school graduates, while Molly's parents both had college degrees. Ethan's father was a performing musician and music teacher. Molly's father owned and operated a small retail shop. Both fathers enjoyed spending time caring for and playing with their children. Neither mother worked outside of the home and both reported that around the time videotaping session for this study took place, they were spending at least four hours per day actively engaged in interacting with their children in addition to regular caretaking activities. Both reported that they were closely involved in monitoring and engaging with their children on a constant basis throughout waking hours. In addition, both children received much attention from their closely-knit extended families, and especially for Ethan, from friends of his parents who are frequently in the home.

At the Anchor Center for Blind Children in Denver, both mothers were actively involved in parent education opportunities, and they regularly attended sessions with their children that included music therapy, fine and gross motor skill development, light room activities, daily living skills , play activities and education regarding daily living skills and behavioral management techniques . Both mothers appreciated the support and camaraderie made available through being with professionals who can give guidance, and other mothers who can empathize. Both felt that their experiences at Anchor Center for Blind Children had helped them deal with the initial realization of blindness, accept and enjoy their children, and take up the challenge of providing an environment that would encourage them to succeed in life to the fullest.

3.1.3 Demographics of the two partially sighted children

Partially sighted children were included in this study in order to compare parental input when some sight is usable. As described above, prior studies have generally concluded that partially sighted children typically function more like sighted children than blind children. However, grouping partially sighted children into one category does not allow for analyzing the potential effects of different types of visual deficit. Hence, I will describe functional differences between the two partially sighted children selected for this study, and discuss how the parents of these children adjusted their input based on their perception of their child's functional vision.

The two partially sighted children, Amy and Sam, were referred by Blind Babies Foundation in San Francisco, California. Amy was eleven months of age at her first videotaping session and eighteen months old at the time of the first videotape used for this study. Ethan was videotaped first at 16 months and was eighteen months old during the first videotaping used in for this study.

Amy's parents and the professionals involved in her prelinguistic and early language development thought that her level of acuity supported light perception at best at eighteen months of age. Her visual impairment was the result of hypoplasia of the optic nerve, a cause of impairment of unknown etiology. At three years, two months her parents noticed orienting behaviors that indicated increased use of vision, and her acuity subsequently was estimated as 20/200. After this time she clearly used her available vision to locate and explore objects. It is not known whether her vision spontaneously improved or, in fact, she had substantial usable vision earlier on. It is now expected that she will be able to read using large print books rather than Braille.

Amy and her parents resided in the Santa Rosa area of northern California. Both parents were high school graduates. Her father was a house painter; her mother stayed home with Amy for her first two years, and then took various service jobs to aid in supporting the family. From age two, Amy attended daycare or Head Start programs for part of the day. In addition, the family had regular weekly home visits from Blind Babies Foundation counselors who provided guidance in caring for Amy's special needs. Both parents were actively engaged with Amy providing much verbal and play stimulation throughout the day.

Sam was diagnosed with anaridia with concurrent nystagmus at four months of age. In addition, he had some centally located cataracts that typically co-occur with anaridia. Although aniridia results from a hereditary chromosomial deletion, neither parent was aware of a familial history of the condition. Sam's acuity did not appeared to worsen overtime of this study and was estimated to be 20/200 overall. He experienced particular difficulty with depth perception and distance vision, but his near vision at 42-months was estimated at 20/80, and it was expected that he would be able to read large print books. The discrepancy in his far and near point vision was very evident in his lack of attention to objects in the distance and his panoptic focus on detail in objects within easy reach.

Sam's family resided in the southern part of San Jose, California. Both parents were college graduates and worked in the high tech industry, his mother in sales and his father as a software engineer. Both parents worked full time until his brother was born when Sam was three-and-a-half years old. Sam was in daycare programs from eight months to three years, at which time he began attending a county funded class for visually impaired children at Chandler-Tripp School. Prior to entering this school his family had weekly home visits from a Blind Babies foundation counselor.

3.1.4 Demographics of the two sighted children

While the small sample size of this study prevents statistical comparative measures, two sighted children were included for rough comparison of general language development and input related to the study's goals. The particular parent-child dyads were chosen to match the general socio-economic status, age, gender and language level of the blind and partially sighted children at the onset of this study. Both families resided near Bouder, Colorado. Both fathers had independent consulting businesses and worked out of the home. Ella's mother was completing a P.h.D at the University of Colorado Boulder. Tyler's mother had completed an undergraduate degree. From age three both Ella and Tyler attended a preschool two days a week. Both families engaged in regular activities with other families.

Table 3. MLU and total word counts for child and parent over the seven age slices from 18- to 42-months

	Months of Age													
	18		22		26		30		34		38		42	
MLU	Child	Parent	Child	Parent	Child	Parent	Child	Parent	Child	Parent	Child	Parent	Child	Parent
Blind														
Mollie	1.06	4.03	1.48	4.16	3.49	4.95	4.71	4.95	4.91	4.96	5.14	5.44	5.04	5.56
Ethan	1.24	4.10	2.05	4.40	2.56	4.10	3.16	4.52	3.68	4.31	3.83	4.96	5.38	5.17
Partially Sighted														
Amy	1.33	3.13	1.79	3.39	2.80	4.04	3.33	4.22	3.20	4.22	3.61	4.48	4.38	4.09
Sam	1.50	4.05	1.49	3.85	1.82	4.09	2.99	4.37	2.69	4.01	3.47	3.89	4.66	4.47
Sighted														
Ella	1.19	3.26	1.28	3.71	2.56	4.52	2.36	4.46	3.38	4.52	3.96	5.32	4.60	5.84
Tyler	1.03	3.44	1.23	3.88	2.60	3.91	3.70	4.83	3.25	4.71	3.31	4.54	4.46	4.74
TOTAL WORDS														
Blind														
Mollie	99	1226	243	1319	754	1543	1261	1561	1513	1590	1707	1716	1292	1790
Ethan	125	1296	350	1398	233	1376	297	1493	476	1442	370	1697	1074	1716
Partially Sighted														
Amy	360	1108	191	1100	388	1359	743	1458	791	1382	831	1489	993	1510
Sam	67	1184	129	1318	111	1390	425	1421	709	1421	689	1492	1502	1775
Sighted														
Ella	123	1054	213	1132	365	1475	565	1406	738	1530	676	1717	911	1748
Tyler	170	1180	228	1320	453	1265	1251	1538	912	1540	1142	1684	1176	1605

3.2 Setting and materials

All six parent-child dyads were videotaped in their homes in order to provide a naturalistic and familiar setting in which to examine their typical modes of interacting during toy play. Several times throughout the hour the investigator gave mothers age-appropriate toys to share with their child. New toys were introduced at the discretion of the investigator at what she considered relatively unobtrusive transition points based on (1) the child's apparent waning interest in the currently available toys and (2) providing an opportunity to engage in several different activities with different types of toys. Parents were asked to *play with their child as they normally would when spending special time together*. All children were exposed to at least four different types of objects and activities during their hour-long session including objects that typically promote different types of activity (e.g., building, pretend play, object exploration). None of the dyads exhibited difficulty in maintaining physical proximity or clearly disengaged from general activity or awareness of the other's presence for any notable length of time. Particular toy sets were selected based on prior observation of each child and discussion with the parents about the types of toys their child enjoyed playing with. Not all children enjoy the same types of toys and visually impaired children in particular often show marked and very individual preferences and aversions toward particular types of toys. Attending to the child's inclination was meant to maximize the fluidity of interaction during the toy play sessions. It was felt that this approach would yield more accurate information about typical behavior than would using a constrained set of toys for all children.

3.3 Recording Procedures

Parent-child dyads were videotaped with a digital video camera with audio. The videotapes were subsequently digitally transferred to a computer, compressed and stored both on an external hard drive and on a CD. All input to the child and the child's initiations and responses during the hour-long sessions were transcribed into a FileMaker Pro database designed by the investigator, and any unclear utterances or actions were subsequently reviewed with the parents for accuracy.

3.4 The data set

The data for analysis in this study came from a larger data set that was being collected to study language development in visually impaired children. Twenty-three dyads have participated in this data collection for varying lengths of time. Out of a potential pool of twenty-three visually impaired children only the two blind children that were selected for this study met the criteria of (1) availability at eighteen months through forty-two months, (2) lack of usable vision, and (3) no concurrent cognitive delay. The two partially sighted children were also the only two meeting criteria one and three and, in addition, having some usable vision. Other children were older than eighteen months at the start of data collection or moved out of the possible data collection areas before forty-two months, or cognitive delays became evident.

In order to examine parent-child engagement in toy play activites overtime, the six parent-child dyads selected for this study were videotaped during the period of time spanning age eighteen months to forty-two months. While some of these dyads were videotaped at least every two months, videotapes at four-month intervals were extracted from the larger available sets. This yielded seven, hour-long sessions for each of the six dyads at ages 18, 22, 26, 30, 34, 38 and 42-months of age.

3.5 Coding of data

Using FileMaker Pro, a coding system was devised to capture the details of specific types of parent-child interactions relevant to this investigation Six levels of coding were completed for the following areas of inspection: Demographics of the parent-child dyad, ATTENTION-ELICITING CUES, ATTENTION-DIRECTING CUES, DEMONSTRATING ACTIONS, parent verbal CONTENT MESSAGES and child response. The hour-long play sessions were divided into play units identified by unique toy sets. Play units containing fewer than ten adult turns were elimiated. Longer play units were divided into two units before randomization in order to avoid over-representation of repetitious interactions.

One FileMaker Pro record contained one parent verbal CONTENT MESSAGE along with all related verbal attention cues, gestures, actions and physical directions, and the child's initiative or response behaviors. All parent and child verbalizations, gestures, and actions were transcribed sequentially, and contingency between different elements was restricted to a three second limitation. This coding parameter allowed for assessing what types of verbal and nonverbal cues were used singly or together in various combinations. Hence the emphasis in this study was on identifying specific elements exhibited in *joint attentional engagements* and their combined effects. The precise synchronicity of the elements was not addressed in this study, but has received prior research attention that will be discussed in relation to the findings of this study.

The initial transcribed database consisted of 22,433 records. The amount of time each dyad spent in focused play with a particular set of toys varied, so in order to make comparisons regarding the parent-child engagements, a random selection of play units was extracted from each play session until 300 records were obtained for each child at each of the seven age slices. This resulted in a dataset reduction to 12,600 records.

3.5.1 Data coding exclusions

Prior to randomization of the play sessions several exclusions were made to the potential set of 300 records per child per age slice. The following exclusions were made for the purpose of limiting the dataset to adult-child interactions that involved toy play activities.

1. Both verbal and nonverbal dyadic social routines, and conventional songs and games were excluded from the dataset. These stereotyped interactions are well documented as having a positive effect on children's later language abilities, and they are important to the socialization of attention. However, the aim of this study is to explore input that is generated spontaneously within typical object play activities between parent and child. To ensure that the children selected for this study had experienced typical parent-child routines, at the beginning of the videotaping sessions all parents were given the MacArthur Communicative Development Inventory Toddler Short Form (CDI), (Fenson et al., 2000) that contains a checklist of these sorts of activities. Based on parent responses all of the children in this study, blind, partially sighted and sighted, had extensive prior and continuing engagement in social routines, conventional songs and games.
2. Book reading sequences were included for analysis only when the parent used gestures or words to establish triadic joint attention in a manner similar to relating to objects. For example, the parent's input was coded when the purpose was to draw the child's visual or tactile attention to elements in a book, but sequences where the mother was just reading the words in the book were excluded from the coded dataset.

3. Unintelligible adult utterances were excluded from the data set. If there were more than three minutes of unintelligible utterances a like amount of material was included from another tape as described above.
4. Utterances that were directed toward people or activities that were not related to the current play situation such as answering the telephone or talking to the observer were excluded.
5. Interactions that related to personal hygiene such as nose blowing or habitual behaviors such as eye poking (common in chldren with LCA) were excluded.
6. Behavioral directives were coded separately and not included in the dataset. Behavioral directives include adult utterances where the intent is to correct or reprimand a child's negative behavior (*Stop that! Don't do that! Put that down!*). All references directed toward eye poking behavior in the blind children were also excluded (e.g., *Handies down, No poking)*. Some studies include these utterances in the analysis of parental use of directives (sometimes because they are simply counting all imperative utterances as directives). For the purposes of this study the analysis of parental use of directives focuses on their functional use as cues in directing the child's attention to objects and actions in the play activities. It is also important to note that these parent-child dyads were selected in part because they had in a previous study exhibited quite fluid interactions generally devoid of negative behaviors. The number of behavioral directives never exceed two for any of the children during any one play session excluding references to eye poking).

3.5.2 Coding of ***ATTENTION-ELICITING CUES***

To address questions related to ATTENTION-ELICITING CUES each FileMakerPro record was examined to identify parent verbal and nonverbal behaviors that served the sole pragmatic function of getting the child's attention. In other words, they did not direct the chilld's attention, but served only as 'pay attention' signals sometimes called *attention-getters* (Clark & Kelly, 2006).

3.5.3 Coding of ***ATTENTION-DIRECTING*** *CUES*

In order to address questions involving ATTENTION-DIRECTING CUES all parent input to the child was examined for verbal and nonverbal behaviors that directed the child's attention toward some object or action apart from the parent-child dyad, thus forming a triaic engagement. ATTENTION-DIRECTING CUES were grouped in terms of their verbal or nonverbal form.

3.5.4 Coding of **CONTENT MESSAGES**

All parent verbalizations were coded for nonverbal gestures, actions and verbalizations that demonstrated or described the objects or actions in which they were engaged. The particular types of words that were the focus of their attention bids (i.e., objects, actions, parts, properties and types) were also coded. In addition, the verbal forms they used to deliver their messages about objects and actions in their toy play were coded as leading or following directives, declaratives or questions.

3.5.5 Coding of child joint attentional engagement

The child's engagement in joint attention has traditionally been measured through the child's ability to alternate his gaze between the speaker and his intended referent. While this measure provides a certain amount of confidence that the child is sharing attention, it is also the case that it is possible to look and not attend, and to attend and not be looking. Recently reseachers have begun to question the stringency of marking joint attentional engagements based solely on visual measures, and indeed, about the necessity for overt manifestation of attention to mark shared engagement as well (Akhtar & Gernsbacher, 2007; Akhtar & Gernsbacher, 2008).

Since the blind children in this study do not have visual access, they provide an avenue to new understandings about how sharing attention can take place without using visually based measures. Hence, in this study the child's on-going joint engagement in toy play engagement with a parent is based upon less stingent interactional observations. The goal was to determine whether children, regardless of their degree of vision, would exhibit observable behaviors in their interactions within activity indicative of their on-going mutual engagement. To address this goal, all observable child behaviors indicating continous and contingent engagment with each adult verbalization were coded along with the adult verbalization on one FileMaker Pro record. Coded behaviors included the following: following the parent's physical direction, emotive behavior, actions, gestures, verbalizations, inattention and child initiations. See Table 4 for subcodings.

Table 4. ***Categories used to code the child's observable contingent engagement behaviors in joint attentional interactions***

Categories	Criteria
Physical Direction	Follows parent physical direction
Emotive Behavior	Positive smile or giggle Negative crying or fussing Avoidance behavior
Actions	Stops activity, verbalization, stills Looks toward parent Turns or moves toward parent Looks at referent Turns or moves toward referent Does action directed Does incorrect action
Gestures	Reaches for, touches or picks up object Index point Palm up offer Symbolic gesture Other gesture
Verbalizations	Nonword verbalization Noncontent word Object or action label Multiword utterance Repetition of own utterance Imitation of parent utterance Unanalyzed chunk
Inattention to Input	No access to input No overt response
Child Initiation Child Response Continued engagement in mutual task	

CHAPTER FOUR

Results, Descriptive Examples and Discussions

This chapter presents descriptive results, proffers examples, and discusses findings from parent-child interaction during toy play sessions in their homes at seven age slices 18, 22, 26, 30, 34, 38, 42-months when the children were between 18- to 42-months of age. It has been suggested that in Western middle class culture a convergence of parent-child focus in *joint attentional engagements* is the primary way in which the child is introduced to the word-referent correspondences that jump-start his entry into his linguistic community. The canonical form of the convergence is established through a GESTURE + label frame, with the most frequently studied gesture being an index *point*. The index *point* provides a vector for the child to visually follow to the parent's intended target object (referent) as the parent concurrently produces a corresponding label (word). There are undoubtedly other ways in which this word-referent highlighting zone can be established, but these have received less research attention. In this study, observing how young language learners who are not able to visually follow a *point* take advantage of other types of *points*, these other ways surface. In addition, how the child comes to fluidly participate in *joint attentional engagements* has received much less attention than the word-referent moment of linguistic spark. Observational data from this study is used to address this gap in the research.

This chapter organizes and describes parental input that might serve to socialize children to the ways of participating in *joint attentional engagements*. The *Joint Attentional Socialization Process* presented on page 46 outlines the four areas of input that are described in this chapter: 1) ATTENTION-ELICITING CUES, 2) ATTENTION-DIRECTING CUES, 3) WORD-REFERENT CONNECTIONS, and 4) CONTENT MESSAGES. Each area of input is addressed first in regard to the results of the research questions posed for this study (p. 52), then explanatory examples are provided, and finally the results and examples are melded in a discussion of findings.

4.1 <u>ATTENTION-ELICITING CUES</u>

Learning to understand the actions involved in giving attention is an essential first step in learning to communicate. 'Understanding' for young language learners means that they know what to *do* in response to the actions that signal a communicative stance. Young language learning children must learn the ways in which people in their linguistic community signal their intention to communicate. In particular, in order to communicate it is necessary to attend to the forms of entering and exiting engagements with others (H. Clark, 1996). In this section the various types of ATTENTION-ELICITING CUES parents employed during their toy play session are described and analyzed in terms of their pragmatic function as *attention getters.* In Western middle class linguistic communities these cues socialize the child in three important ways. First, by using these cues they signal their communicative intention. In other words, by using these cues repeatedly to summon their child's attention they make manifest their intention to engage in mutual action. Second, by delivering these cues in with emotive expression they entrain an anticipatory response, specifically, to expect that something to come is attention worthy. Third, the repeated expression of ATTENTION-ELICITING CUES entrains a participatory response on the part of the child, to engage with the parent. In other words, children learn that upon hearing these cues they have an opportunity for learning something about the world around them.

As documented in their CDI profiles at 18-months (see Methods section), all of the children in this study had engaged in early dyadic routines and games that included turn taking activities infused with structuring ATTENTION-ELICITING CUES of the types analyzed in this study. So these particular types of cues were not new to them. In fact, through engaging in these dyadic activities, they were already socialized to value of paying attention in an anticipatory and participatory manner. Within the context of *triadic joint attentional engagement,* at 18-months and beyond, ATTENTION-ELICITING CUES are described and analyzed in terms of their pragmatic function as *attention-getters* that will draw the child's anticipatory attention outward to objects and actions involved in toy play activities . The overarching question in this section is: *How did the parents in this study socialize their children in the culturally established ways of participating in joint attentional engagements?*

4.1.1 ATTENTION-ELICITING CUES: Results

1. What types of* ATTENTION-ELICITING CUES *did the parents in this study use to summon their child's attention?

All parent verbal and nonverbal behaviors were examined for their pragmatic purpose in summoning their child's attention. Observations indicate that across all ages the parents of blind, partially sighted, and sighted children used specific, short, prosodically modulated words or phrases and very occassionally a physical prompt to summon their child's attention (see Table 5). These ATTENTION-ELICITING CUES were evinced both at the beginning and at the end of their utterances. Words, interjections and most phrases were separated grammatically from the MESSAGE CONTENT of the engagement. This placement highlights their function as *attention-getters* signaling the parent's intention to enter or exit a *joint attentional engagement*.

ATTENTION-ELICITING CUES used at the beginning of a *joint attentional engagement* were classified into five types, four verbal and one physical. Verbal ATTENTION-ELICITING CUES included *emotive cues, (*interjections and gasps), *vocative cues,* (the child's name or an affectionate term), *alerting cues,* (verbal prompts); and *formulaic engagement cues,* (slot filler phrases) (see Table 5). *Physical cues* included tickling, tapping or nudging to prompt the child's attention.

Retrospective prompts (praise, acknowledgements, and exclamations), ATTENTION-ELICITING CUES employed at the end of *a joint attentional engagement*, were not further classified into types. The *retrospective cues* documented in this study are not generally included in the pragmatic class of *attention-getters.* They are sometimes classified as exit markers in conversational turntaking, and that was certainly part of their function in the parent-child exchanges in this study. However, with the focus on how the child's attention is socialized in toy play activity, *retrospective cues* appear to have an additional function. Specifically, *retrospective cues*, delivered with emotive force, alerted the child's attention backward, marking the importance of what had just occurred within a *joint attentinoal engagement* as attention worthy.

Table 5. ***Classifications used to describe ATTENTION-ELICITING CUES***

Emotive Cues	Interjections such as hah, ooh, hey, ooo, and audible gasps.
Vocative Cues	Calling the child's name or using an affectionate term such as sweetie or dude.
Alerting Cues	Word prompts such as okay, ready, or one two three.
Formulaic Engagement Cues	Slot filler phrases such as Let's see xxx, I'm gonna xxx, Come xxx, and Do you wanna xxx?
Physical cues	Actions such as tickling, tapping or nudging the child to prompt attention.
These five types of ATTENTION-ELICITING CUES served to prompt the child (1) to engage with the parent and (2) to anticipate something as yet unspecified to come. They are (3) ostensive signals used to communicate that the parent wants to begin a joint engagement. In other words, they function as entrance markers.	
Retrospective cues	Praise such as in *Good job! That's right*! Acknowledgements such as *Okay! There you go!* delivered with emotive force. Exclamations such as *Wow! Cool! Yay! Way to go!*
These cues served (1) to focus the child's attention backward to what had just occurred and (2) mark its importance. They are ostensive signals used to communicate that the CONTENT MESSAGE of the engagement has been supplied. In other words, they function as exit markers.	

Some ATTENTION-ELICITING CUES such as *okay* were used in either an initial or final position in relation to the main content utterance, and placement as well as rising or falling intonation marked their respective direction. ATTENTION-ELICITING CUES placed at the beginning of a *joint attentional engagement* are described and analyzed according to the five classifications outlined above. However, *retrospective cues* are not further divided into separate classifications, so they are described and analyzed as a single class.

Parents sometimes used more than one ATTENTION-ELICITING CUE in one record (which, to review, consists of one parent verbal CONTENT MESSAGE along with all related verbal attention cues, gestures, actions and physical directions and the child's initiative or response behaviors). In these cases, all uses were counted individually as part of the total usage for each cue type over all records. For example, a parent might have said, "Ready. One, two, three." and this would have been counted as two *alerting cues*. In addition, a parent might have said, "Wow, let's see what's in here?" and two different ATTENTION-ELICTING CUES would have been counted, the *emotive* cue *Wow* an *engagement cue, Let's see*. The following record (1) provides an example where one record contains three ATTENTION-ELICITING CUES, an initially placed *alerting cue* and two *retrospective cues:*

(1) Sam 18-months TC2321 (partially sighted child)
CHI: ACT_bangs the ball on the opening to the ball chute
FAT: **Okay. [*alerting cue*]** Now push that in. **[CONTENT MESSAGE]**
CHI: ACT_pushes the ball through the opening in the ball chute
FAT: **There you go. Ye:::ah! [*two retrospective cues*]**

This example also provides a general illustration of the function of ATTENTION-ELICITNG CUES in a *joint attentional engagement*. In this particular exchange the child is already focused on an activity. The father uses the ATTENTION-ELICITING CUE, *Okay*, to draw the child's attention to his desire to enter into the child's current focus. The child can then anticipate that something will happen if he attends. In this case since he is struggling he can expect to get some assistance. And indeed when he attends and follows through on his father's direction, his success is ratified and the *joint attentional engagement* is completed by the *retrospective cue, There you go,* along with a bit of excited praise, *Yea:::h!* Used together in this way, the initially placed ATTENTION-ELICITING CUE and the *retrospective cue* bookend the content of a *joint attention engagement.* The CONTENT MESSAGE (*Now push that in*) gives the child information about what to do to effect success in an activity that he is already focused on. The ATTENTION-ELICITING CUE, *Okay*, serves to alert the child to pay attention to the CONTENT MESSAGE (*Now push that in*). The *retrospective cues* finalize and validate his success. This type of exchange is part of a socialization process that affords the child an opportunity to learn the ways of getting information about something that he is currently interested in.

Assessment of reliability for identification of* ATTENTION-ELICITING CUE *types

To assess reliability for identifying parental use of ATTENTION-ELICITING CUES in the toy play sessions, an independent coder was trained in the use of a protocol of definitions and the FileMaker Pro database coding system. Reliability between the independent coder and the author was established on the basis of the coding of 20% of each of the 300 records coded per child and per age slice. Agreement was high for identification of all six types of ATTENTION-ELICITING CUES: *emotive cues* 93%, *alerting* cues 90%, *vocative cues* 98%, *engagement cues* 100%, *physical cues* 88%, and *retrospective cues* 87%. In summarizing across all types of ATTENTION-ELICITING CUES agreement for identification was 93%. Hence, the particular types of ATTENTION-ELICITING CUES delineated above are clearly made available to children during toy play activities in service of garnering their attention at the seven age slices across the time period of this study.

1.1 Across the 18- to 42-months month age slices how frequently were* ATTENTION-ELICITING CUES *employed by the parents of the blind, partially sighted and sighted children?

The use of ATTENTION-ELICITING CUES across the timespan of this study was strikingly limited and similarly so for all parents. Results show that across the age slices from 18- to 42-months parents used a combined a total of 1590 initially placed ATTENTION-ELICTING CUES over a total of 12,600 coded adult utterances (NOTE: parents often used more than one initial ATTENTION-ELICITING CUE in one record). The range in use among individual parents was from 236 to 291 (Molly n = 249, Ethan n = 260, Amy n = 291, Sam n = 289, Ella n = 265, Tyler n = 236) (see Table 6). Parents used a combined total of 2164 *retrospective cues*, which is about a third more than their combined total of initially placed ATTENTION-ELICITING CUES (see Table 6). Parent's total use of *retrospective cues* ranged from 349 to 390.

Table 6. ***Total percentages and raw counts for ATTENTION-ELICITING CUE types used by each parent summed across the seven age slices from 18- to 42-months***

	ATTENTION ELICITING CUES						
Child	Emotive Cues	Vocative Cues	Alerting Cues	Engagement Cues	Physical Cues	TOTAL Initial Cues	TOTAL Retrospective Cues
Blind							
Mollie	21 (52)	6 (15)	17 (41)	55 (135)	2 (6)	(249)	(390)
Ethan	10 (27)	9 (24)	25 (66)	54 (140)	1 (3)	(260)	(345)
Partially Sighted							
Amy	22 (65)	6 (18)	22 (63)	49 (142)	1 (3)	(291)	(365)
Sam	20 (58)	20 (59)	19 (55)	40 (117)	<1 (1)	(289)	(359)
Sighted							
Ella	21 (55)	16 (43)	20 (52)	42 (111)	1 (4)	(265)	(356)
Tyler	20 (48)	8 (18)	19 (44)	51 (121)	1 (4)	(236)	(349)
TOTALS	19 (305)	11 (177)	20 (321)	48 (766)	1 (21)	(1590)	(2164)

1.1.1 Across the 18- to 42-months month age slices were there changes in the frequency that parents of the blind, partially sighted, and sighted children employed ATTENTION-ELICITING CUES?

Observations from this study show that in aggregate the use of ATTENTION-ELICITING CUES decreased over the 18- to 42-months age slices. In fact, parents used slightly more than half the number of these cues at 42-months (n = 170) than they did at

18-months (n = 320) with a precipitous drop in use between 30-months and 34-months mostly accounted for by a large drop in *engagement cue* use (see Table 7).

Table 7. ***Total percentage and raw counts for ATTENTION-ELICITING CUE types used by parents at each age slice from 18- to 42-months***

	Months of Age							
ATTENTION-ELICITING CUES	18	22	26	30	34	38	42	TOTAL
Emotive Cues	24 (78)	27 (75)	16 (40)	13 (30)	15 (23)	17 (31)	17 (28)	19 (305)
Alerting Cues	20 (65)	15 (41)	20 (50)	18 (41)	17 (42)	24 (44)	22 (38)	20 (321)
Vocative Cues	12 (39)	10 (27)	14 (35)	9 (21)	14 (22)	10 (18)	9 (15)	11 (177)
Engagement Cues	43 (137)	45 (123)	48 (122)	59 (138)	45 (71)	47 (86)	53 (89)	48 (766)
Physical Cues	<1 (1)	1 (8)	2 (5)	1 (2)	1 (2)	2 (3)	<1 (0)	1 (21)
Total Initial A-E cues per age slice	20 (320)	17 (274)	16 (252)	15 (232)	10 (158)	12 (182)	11 (170)	1590
Retrospective Cues	299	302	310	310	291	330	322	2164

1.1.2 Across the 18- to 42-months month age slices were there changes in what followed the use of an ATTENTION-ELICITING CUE*?*

There was no trend toward change over the time course of the study in what followed the use of an ATTENTION-ELICITING CUE either among individual parents or in aggregate. From the 18-month age slice to the 42-month age slice initially placed ATTENTION-ELICITING CUES were consistently followed by ATTENTION-DIRECTING CUES and/or CONTENT MESSAGES (further information about an object or action) 99% of the time (reliability was 98%). The only exceptions were caused by interruptions to the flow of on-going play engagements (i.e., after a telephone ring or when another person entered the room).

1.2 Across the 18- to 42-months month age slices did the parents of the blind, partially sighted, and sighted children use the same types of ATTENTION-ELICITING CUES?

Across the seven coded play sessions from 18- to 42-months all parents used each of the six ATTENTION-ELICITING CUE types at least once and most considerably more (see Table 6). These findings document that all of these cues were in the repertoires of all parents in this study, and they were used during a time period of expansive language development for these children. This is not surprising because as documented in their CDI profiles, these parents had previously engaged in extensive dyadic play and daily routines that included cueing their child to attend to and engage with them.

1.2.1 Across the 18- to 42-months month age slices did parents of the blind, partially sighted, and sighted children use some types of ATTENTION-ELICITING CUES more frequently than others?

Some types of ATTENTION-ELICITING CUES were used more than others in aggregate over the course of the 18- to 42-months age slices (see Table 6). Interestingly, all parents exhibited the same pattern of cue type preference. This indicates that the children in this study received quite similar input with regard to the manner in which their parents summoned their attention.

Specifically, parents tended to use far more *formulaic engagement cues* than any other type. They amounted to 48% of all initially placed ATTENTION-ELICITING CUE use. In fact, they used almost as many *formulaic engagement cues* as the other cue types combined (n = 776 or 48% for *formulaic engagement cues* vs. n = 824 or 51% for all other initially placed ATTENTION-ELICITING CUES combined). In aggregate parents used close to the same number of *alerting cues* (n = 321 or 20% of all initially placed ATTENTION-ELICITING CUES) as *emotive cues* (n = 305 or 19% of all initially placed ATTENTION-ELICITING CUES). There was more difference among parents in their frequency of use for *vocative* *cues* than any other the other cues (range = 15 to 59). Hence, their use is most likely related to personal preference. Overall, they were used less than other initially placed verbal ATTENTION-ELICITING CUES (n = 177 or 11% of all initially placed ATTENTION-ELICITING CUES. Physical *cues*, however, were very rarely used (n = 21 or 1% of all initially placed ATTENTION-ELICITING CUES*)* (see Table 6).

Parents used far more *retrospective cues* to mark the end of an engagement (*n= 2164/12,600*) than they used initially placed ATTENTION-ELICITING CUES to summon their child's attention to begin an engagement *n = 1588/12,600*). Specifically, they used *retrospective cues* approximately a third again as much as the aggregate of all initially placed ATTENTION-ELICITING CUES (see Table 6).

1.2.2 Were there differences in the use of particular ATTENTION-ELICITING CUE types that might be related to degree of visual access?

While there were some differences among parents of ATTENTION-ELICITING CUES they used (see Table 6), particular cue types did not appear related to their child's degree of vision with the possible exception of *formulaic engagement cues*. For example, the parents of the two partially sighted children used the highest number of two different cue types. Amy's parents used more *emotive cues* (*n* = 65, or 22% of her ATTENTION-ELICITNG CUE use) than other parents (*Range = 27 to 58 or 10% to 20 %*), and Sam's parents used the more *vocative cues (n = 59 or 20%* of all of his ATTENTION-ELICITNG CUE use) than other parents (range = 15 to 43 or 6% to 16%). These differences appear to be style preferences, one parent perhaps being more effusive and the other preferring to use the child's name or an endearing term. In addition, the two mothers of the blind children used the highest (Ethan *n = 66 or 25 %* of her ATTENTION-ELICITING CUE use) and lowest number (Molly *n = 41* or 17% of her ATTENTION-ELICITING CUE use) of *alerting cues* (range of other parents = *44 to 63* or 19% to 22%).

With regard to the use of *formulaic engagement cues*, the parents of the two blind children and Amy (who had much less usable vision early on than Sam, the other partially sighted child), used slightly more of these cues (Molly *n= 135 or 55%* Ethan *n = 140 or 54%*, Amy *n = 142 or 49%*, and Sam n = 117 or 40%, Ella *n = 111 or 42%*, Tyler *n = 121 or 51%* (see Table 6).

It is worth noting one instance of striking difference. Ethan's mother used markedly fewer *emotive cues* than other parents when he was 18-months old (Ethan *n = 7*, MS *n = 14 or* , Amy *n = 16*, Sam *n = 15*, Ella *n = 10*, Tyler *n = 16*) and overall (Ethan *n = 27*, MS *n = 52*, Amy *n = 65*, Sam *n = 58*, Ella *n = 55*, Tyler *n = 48*). In contrast, her use of *alerting cues* at that age slice far exceeded other parents (Ethan *n* = 66, Molly *n = 41*, Amy *n* = 63, Sam *n = 55*, Ella *n = 55*, Tyler *n = 44*; (see Table 6). Although not related specifically to degree of vision in terms of acuity, a related factor may have influenced her use of these cues. It is well known that many parents of children who have disabilities experience extended periods of depression as they begin to cope with life changes far more challenging than those with typically developing children, and that, in general, parents experiencing depression are likely to express less emotion (Kurstjens & Wolke, 2003). Ethan's mother, though conscientious and loving in fostering her relationship with her blind child, did exhibit some depressive affect particularly early on. Her higher use of *alerting cues* at 18-months (*n = 25*, range of others = *44 to 63*) might have been related to a conscientious effort to engage her child through using a less emotionally expressive type of cue. Evidence suggesting that this might be the case is reflected in the fact that her overall cue use (see Table 6) and the pattern of her cue use (both discussed below) is in line with trends exhibited by the other parents.

1.2.3 Did the frequency of parents' use of particular **ATTENTION-ELICITING CUE** *types change over the 18- to 42-months age slices?*

There were changes in the use of some types of ATTENTION-ELICITING CUES over the course of the age slices, but not others. The overall use of *emotive cues* declined sharply by the 26-month age slice (at 22-months n = 75 or 27%, at 26-months n = 40 or 16%, and then leveled off to a minimal use of only a few usages per age slice (see Table 6). This pattern of decline at 26-months held for each individual parent as well. Use of *formulaic engagement* cues dropped off sharply before the 34-month age slice. Specifically, overall parents used 138 (59% of all ATTENTION-ELICITING CUES use) *engagement cues* at the 30 month age slice and only 71 (45% of all ATTENTION-ELICITING CUES use) at the 34-month age slice.

While total use of *emotive* and *alerting* cues was roughly similar across the 18- to 42-months month age slices (as mentioned above) use of *emotive cues* declined sharply before 26-months, but use of *alerting cues* remained fairly constant across the age slices and were consistently used more than emotive cues from 26-months on (the larger number of total *alerting cues* at 18-months is an artifact related to the high use by Ethan's mother discussed earlier).

The overall use of *vocative cues* varied markedly among the parents (range = 15 or 6% to 59 or 20%) and is likely a personal preference. Sam's parents, in particular, used his name a lot to get his attention. Although there were differences in the number of times parents used *vocative cues*, they all followed a pattern of gradual reduced use from the 18-month age slice to the 42-month age slice (see Table 6).

Although all parents used a *physical cue* at some time to gain their child's attention, none used a tap or a touch more than a few times across all of the age slices. In fact, *physical cues* were only used 21 times or 1% of all initially placed ATTENTION-ELICITING CUES across all parents and all age slices (see Table 6).

The use of *retrospective cues* among all parents across the age slices was remarkably constant (see Table 6). Small variations in usage at different age slices did not appear to reflect a trend in increased or decreased use. It is likely that the small differences that do exist relate more to noise factors such as the exigencies of a particular task or the mood of the parent and/or the child on that day.

1.3 Did the blind, partially sighted, and sighted children exhibit observable contingent engagement behaviors to their parent's use of ATTENTION-ELICITING CUES across the 18- to 42-months month age slices?

For each record containing an ATTENTION-ELICITING CUE any child observable engagement was coded on the same record. Child engagement behaviors included following the parents physical direction, emotive behavior related to the mutual activity, gestures and actions initiating or responding to the content of the adult verbalization or related action, and verbalizations initiating or responding to the content of the adult verbalization or related action.

To establish reliability for coding child engagement behaviors related to initially placed ATTENTION-ELICITING CUES an assistant independently coded a random sample of 20% of all author-coded records for each child at each age slice. The assistant received 2 hours of training spread over two days in order gain a fluid understanding of the coding definitions for ATTENTION-ELICITING CUES (see Table 5) and the coding for response type (see Table 4). Training occurred on a separate, but similar data set and was continued until a reliabilty of at least 95% was achieved. Training and coding of

ATTENTION-ELICITING CUES took place independently of training and coding for other reliability measures for this study.

For the current study, reliability was high for all children and all cue types (see Table 8). Reliability for coding of each child's engagement behaviors overall age slices and all ATTENTION-ELICITING CUES was as follows: Molly 99%, Ethan 95%, Amy 94%, Sam 91%, Ella 96%, Tyler 97%. Reliability for *retrospective cues* was determined through a second independent coding of 20% all records at each of the age slices from 18- to 42-months. Reliability for *retrospective cues* was 90%. There were no differences in the ability of the coders in observing child *joint attentional engagement* behaviors that might be attributable to the child's degree of vision.

Table 8. ***Percentages for identification of child joint attentional engagement behaviors for ATTENTION-ELICITING CUES across all age slices from 18- to 42-months***

	ATTENTION-ELICITING CUES					
Child	Emotive	Vocative	Alerting	Engagement	Physical	Mean Percentage Response
Blind						
Mollie	100	100	98	96	100	99
Ethan	96	88	91	94	100	95
Partially Sighted						
Amy	98	100	97	92	100	94
Sam	93	90	89	95	100	91
Sighted						
Ella	98	93	94	97	100	96
Tyler	98	100	91	93	100	97

4.1.2 ATTENTION-ELICITING CUES: Descriptive Examples

In examining *joint attentional engagements* it is important not only to describe their core elements, but it is also important to explore their periphery. ATTENTION-ELICITING CUES make a contribution *to joint attentional engagements* as pragmatic markers independent of deictic marking or the constituents of the CONTENT MESSAGE. Initially placed they serve as turn initiators prompting the child to pay attention. In final position, they mark what has just occurred by closing the exchange and providing an opening for the next. They short utterances separated from other elements of *joint attentional engagements* (except for *formulaic engagement cues* that are connected grammatically to other elements). Their separation highlights their separate and singular function as *attention-getters.* The frequency with which all parents used the ATTENTION-ELICITING CUE types was quite similar, but small differences indicates a degree of personal style and in some cases may reflect the attentional needs of a particular task.

Emotive Cues

Emotive cues are interjections. Interjections as linguistic elements have received little attention. They have been characterized by some as emotive expressions that lack referential content because they are devoid of semantic content and lack conceptual structure (Quirk, Greenbaum, Leech, Svartik, 1985). But characterized under a pragmatic view (Wiezbicka, 1999; Ameka, 1992), they have a very specific purpose in the context of parent-child toy play. They are peripheral elements hailing from the beginning and end of utterances that use emotive power to socialize the child to the importance of paying attention. In the context of toy play they play particularly on the emotions of surprise and pleasure. They are important signals that have received little attention in the literature on joint attention. In triadic play they are continued from their earlier use in dyad play and overlaid upon activities including objects that are inherently engaging for the child.

Before parents use language to communicate with their children, they communicate through emotive exchanges in protoconversations (Bateson, 1979). Indeed, facial and vocal expression are used extensively with infants from their earliest day to encourage interactive behavior. While early uses of *emotive cues* engage the infant in playful dyadic interactions, in this study by 18-months they are used less frequently, and they are followed by cues drawing attention to objects and actions outside the dyad. Thus, at the time the child is beginning to produce words, he is already primed to respond to *emotive cues* as signals to attend to what comes next, and at 18-months it's words and referents in the immediate environment. In example 2 below, as Tyler's mother was reading and *pointing* to pictures in a book, Tyler coughed and was distracted from the book. Before labeling the object in the book, strawberries, she refocused his attention by using the surprise expression, *Hah*.

(2) Tyler 18-months TC27 (sighted child)
MOT: And then what did he eat?
CHI: [coughs]
MOT: Hah! Strawberries.
CHI: EG_looks back at the book
MOT: GES_points to the strawberries in the book
CHI: Mmm.

In example 3 below, Molly's mother used an admonishing tone and vowel elongation as she said, *o:::h*, brfore verbally directing Molly to sit back down on her rocking horse. It may be that without visual access to facial cues, the prosody and tonal quality of *emotive cues* play a particularly important role in socializing the blind child's attention to the importance of anticipating a subsequent verbalization or action.

(3) Molly 18-months TC1237 (blind child)

CHI: ACT_starts to stand up on the rocking horse
MOT: O:::h. You need to sit down please.
MOT: Sit down on your horsie.
CHI: ACT_sits down on her rocking horse

Vocative Cues

The earliest word that infants appear to recognize (Fenson et al., 1994) is an ostensive signal, their own name. Their attention is captured for a longer period of time by the sound of their own name than another name (Mandel, Jusczk, & Pisoni, 1995). This vocative is among the most frequent words that infants hear, and its meaning for the infant is entirely defined by pragmatic rather than semantic factors. The understanding of one's own name is likely acquired within everyday activities supported by *child-directed speech* and eye gaze and/or touch. By extension affectionate terms, delivered in the same manner are used interchangeably as functionally equivalent *attention-getters.* In the following example (4), Molly's mother used a playful vocative to engage her:

(4) Molly 18-months TC2336 (blind child)

MOT: What are you doin' **crazy girl?**
CHI: Umhm:::
MOT: Crazy g>
CHI: <ahn:::
MOT: Crazy girl
CHI: Umhm::: umhm umhm::: umhm:::
CHI: ACT_lies on top of her stuffed elephant then stands up hugging it and walks toward mom

After hearing their name, sighted children typically look toward their parent. The parent's prefacing of a request with the child's name sets up the following expectation: when you hear your name, shift your focus to me, and then I will say or do something important. In example 4, Molly had been rolling around on the floor with her stuffed elephant. There had been no verbal or physical contact between mother and child for more than a minute. To reestablish engagement Molly's mother said in a playful manner, *What are you doin' crazy girl*? Lacking the ability to look at her mother after hearing her name, Molly's response was vocal rather than visual. When her mother said in a playful manner, *What are you doin' crazy girl*? Molly responded contingently, using a nonword vocalization, *Umhm:::*, that she commonly used to maintain contact with her mother. This repartee continued for two more turns providing evidence of engagement. The nonword sounds she used were conversationally modulated , used in conjunction with playing with her stuffed elephant, then she stood up and walked toward her mother carry her stuffed elephant as if showing her what she was doing.

By 18-months it appears that use of *vocative* cues is largely a matter of personal preference. Sam's parents used vocatives more than twice as much as most other parents. In this study the use of the child's name was often combined with other ATTENTION-ELICITING CUES, and indeed early on this coupling may have provided an extension of this function to other cues. In the following example (5), Tyler's mom adds an emotive inducement coupled with her child's name:

(5) Tyler 18-months TC151 (sighted child)
MOT: Hah wow what does elephant do Tyler?
MOT: SD_makes elephant sound
MOT: GES_moves arm like an elephant's trunk

Alerting Cues

The use of *alerting cues* varied minimally from the 18 month to the 42 month age slice. By definition, alerting cues are used before a planned action is carried out. The parent, in effect, notifies the child of impending action and then completes the action. Often *alerting cues* are used in connection with demonstrating how to do something, a teaching situation where learning is dependent upon attending. Example 6 illustrates the use of an *alerting cue* where Ethan's mother is following in to something he is already focused on, letting him know that their attention is focused on the same thing.

(6) Ethan 22-months TC1710 (blind child)

MOT: The wheels go down on the bottom like this.
MOT: ACT_takes the train car off the child's lap and puts its wheels down on the floor in front of the child
MOT: Ready.
MOT: ACT_pushes the animal train car back and forth on the floor brushes it lightly against the child's legs
CHI: ACT_stills then turns his head toward the sound of the train moving on the floor
CHI: ACT_reaches out and takes the train car and moves it back and forth along the floor
MOT: Yea:::h.

Ethan's mother first used a verbal description of the proper orientation for the train car using words within Ethan's receptive vocabulary, for something that was visually unavailable to him. She then used an *alerting cue* to signal her intention to demonstrate what to do with the train. She moved the train back in forth on the floor providing an auditory 'view' of the action. Ethan responded by stilling his body, listening and leaning in toward the sound of the wheels on the floor, much like looking closely. He was then able to reach out for the train car and complete the action himself.

The word, *okay*, is used for many different purposes. For example, it may be an acknowledgement of another's action (*That's okay*) or emotional need (*You're okay*). As an ATTENTION-ELICITING CUE, *Okay*, signals to the child to attend and expect an action, much like the use of the word "ready." Only instances of *Okay* used as an *alerting cue* were counted in the analysis for this study. In example 7, Molly's mother uses the word, *Okay*, to alert her to impending action, specifically, that she is about to begin rocking the rocking hair that she is sitting on.

(7) Molly 18-months TC 1017 (blind child)

MOT: Hold on to the handles.
CHI: ACT_puts her hands on the handles of the rocking horse
MOT: **Okay.**
MOT: ACT_begins moving the rocking horse
MOT: SINGS_Trot trot trot go and never stop

Alerting cues are especially important prior to action that involve touching or moving a blind child in order to avoid a startle response that could cause discomfort and draw attention away for the action of interest. However, this is certainly facilitative for sighted children as well as evinced, for example, in common *alerting cues* given before swinging a child.

Formulaic Engagement Cues

Although *formulaic engagement cues* are not usually considered in the class of *attention-getters*, clearly they serve that pragmatic function in *joint attentional engagements*. In fact, they were by far the most frequently used method of obtaining the child's attention. While scanning the transcripts for the more conventional ATTENTION-ELICITING CUES, the following phrases were used by all parents.

> "Let's xxx."
> "Do you want to (wanna) xxx?"
> "I'm going (gonna) xxx."
> "Come xxx."

The much more frequent use of these particular *formulaic engagement cues* before the 34 month age slice accounted for most of the decline in ATTENTION-ELICITING CUE use at that time. This suggests that they are particularly helpful in garnering the child's attention during the time of rapid vocabulary growth. Indeed, their 'slot filler' form (Tomasello, 2003), augmented by child-directed speech, is particularly suited for highlighting referents. *Formulaic engagement cues* were actually used slightly more with the children in the study who had the least amount of usable vision. It may be that without visual access these children benefitted most from these cues and particularly from their repetitive use. Consider the following (8) use of three of these cues in the attempts of Molly's mother to engage her in play at 18-months of age:

(8) Molly 18-months TC8 (blind child)

MOT: **Do you want** to go play ball?
CHI: ACT_stops then moves away from the wall toward Mom's voice
MOT: **Do you want** to play with your ball?
CHI: Ball.
MOT: Ball. Good job saying it.
CHI: Ball.
MOT: **Let's** go find a ball.
MOT: ACT_brushes past the child walking toward the living room [tactile, audible]
MOT: **Let's** go find one.
CHI: Ball.
MOT: **Come** and find one.
CHI: Ball ball ball.
CHI: ACT_walks toward Mom in the living room

Molly's mother uses the slot filler phrases, *Do you want xxx*, and *Let's xxx* twice and, *Come xxx*, once. The function of all of these phrases is to garner the child's attention in order to engage in mutual activity with an object. The consistency of the intent of the *formulaic engagement cues* affords emphasis to the CONTENT MESSAGE. The child immediately knows he needs to pay attention and the object reference, *Ball,* and the activity reference, *Find*, are highlighted. The child's familiarity with these cues as with all ATTENTION-ELICITING CUES comes from much repetition in early dyadic routines and games. For example, in an early movement game played frequently with blind children, the child is placed on a ball, and parent holds his hands and begins rocking movements saying, *Hah. Do you wanna GO*? The parent will then waits for a response (a giggle or an approximation of *Go*. The repetition of this sequence socializes the child to expect that upon his response a familiar action will occur; the parent will initiate a pleasurable rocking movement. Other common playful dyadic interactions include the familiar, *I'm gonna tickle you*, *get you*, *find you.* By 18-months children are quite familiar with and willing to respond to *formulaic engagement cues.*

Children's familiarity with these *formulaic engagement cues* has been documented by Cameron-Faulkner, Lieven, & Tomasello (2003) in their construction based analysis of child directed speech. They found that not only were these types of slot filler expressions frequent in the speech of parents, but also children quickly learned to use them in their own speech. At least by 18-months, children have a strong desire to capture the attention of their parents to direct them to engage in activities of their desire. All of the children in this study adopted the *formulaic engagement cues* analyzed in this study, and they used them frequently as lead-in chunks to engage their parents by 30-months. While they did this with all ATTENTION-ELICITING CUES, their use of *formulaic engagement cues* was, like their parents, their most frequent attention-getting strategy.

Formulaic engagement cues have not received attention in their function as *attention-getters.* Cameron-Faulkner *et al,* (2003) and Tomasello (2003) examined the use of many 'slot filler' phrases used by parents, including including what I am calling here *formulaic engagement cues*, but their purpose was to discover how they might contribute to usage-based grammatical organization. These formulaic expressions, some times referred to as *frozen phrases* because of their nonproductive nature, have been noted in the early speech of children as they transition from one-word to multiword speech (Pine and Lieven, 1993; Bates, Bretherton, & Snyder, 1988) explored the use of some of these expressions in child's early speech during the transition from one-word to multiword Some *formulaic engagement cues* used in early parent-infant dyads were studied by Snow (1977) in relation to their effect in encouraging turntaking sequences essential for developing conversational skills. The use and pacing of alternations including these types of cues has been studied extensively in the literature on turn taking in adult conversations (Sacks, Schegloff, & Jefferson, 1974). In addition, there are undoubtedly other *formulaic engagement cues* besides the ones documented in this study that are used in service of *attention-getting.* The particular cues in this study were chosen because they were used by all parents in this study, albeit with distinct preferences. They are meant to be illustrative, not definitive. For example, *Can you xxx,* was used a total of 535 times by all parents. It was eliminated from consideration here because many instances were used as word elicitations as in, *Can you say x*. As word elicitations they were used as word practice or if the child didn't respond or supplied an incorrect word, the parent followed with the correct word, thus providing a word learning opportunity. *Can you xxx,* and other slot filler phrases warrant further study in regard to the pragmatic role the play in garnering the child's attention in naturalistic settings.

It is perhaps most surprising that there has been little research attention given to *formulaic engagement cues* in their function as *attention-getters* because they are used commonly in experimental studies involving joint attention (Carpenter, Nagell, & Tomasello, 1998, Baldwin, 1991, Bakeman & Adamson, 1984). Remarkably, their function as *attention-getters* is not mentioned. In fact, more generally, all of the ATTENTION-ELICITING CUES described in this study are used in the prompts given to children in experimental studies of joint attention without attention to this specific function. Presumably, this is because most studies of joint attention focus on common attentional cues that include visual access. Visually available body cues such as eye gaze and head turning and deictic cues such as *pointing* and *holding up* an object are salient and quite fascinating features relating to attention focus in communicative exchanges. But the absence of attention to *formulaic engagement cues* as *attention-getters* is, perhaps, an example of how the salience of visually available cues can mask the important contribution of other elements that might serve a similar function.

Physical Cues

Physical cues in this study are defined as tickling, tapping or touching the child's body in an effort to get his attention. This category does not include touching the child with an object or guiding a child's hands to assist in identification or completing and action on the object. These actions afford the child access to different kinds of information about object and will be discussed in the next sections. Like all ATTENTION-ELICITING CUES the function of *physical cues* is solely to prompt the child to pay attention. Surprisingly, the parents, including the parents of blind children, rarely used *physical cues* to garner their child's attention prior to an action or verbalization or as *retrospective cues*. One might expect that parents of blind children would occasionally use a gentle tap, nudge or tickle on the child to alert them of impending action or information that would also provide kinesthetic support for determining proximity of the parent. In fact, the use of *physical cues* is quite common in early games and routines with both sighted and blind infants. In addition, the 'tap/sign' strategy, tapping on the infant's body before signing in his visual field, used by parents of deaf infants is a well established *attention getter* that signals a parental intention to communicate (Waxman & Spencer, 1997).

The following example (9) illustrates how a *physical retrospective cue* might be helpful for a blind child at 18-months. The mother has tossed a wiggly-giggle ball to the child, and the child is returning it to her.

(9) Molly 18-months TC323 (blind child)
CHI: ACT_the ball falls out of her hands and rolls forward toward Mom
MOT: You threw that ball.
MOT: AE_puts her hands on the child's shoulders

In this engagement the parent's physical contact with the child does not direct her action in any particular way (this type of physical action was coded as an ATTENTION-DIRECTING CUE, and will be discussed later), but rather serves simply to let the child know that the interchange is complete. This could be particularly helpful for a blind child who cannot see that the ball has completed the trajectory toward its intended target. In addition, the physical act of touching the child's shoulders connects the child to the parent and the words she uses to describe the child's completed action. This same sort of *physical cue* could also be used to clearly punctuate the end of an interaction for an active child, blind or sighted, in need of calming before moving on to another exchange.

However, there are several possible reasons for a shift away from using these cues. First, early on in the dyadic setting, prompting touches might enhance emotional attachment, but in the triadic setting the focus is on interacting about something else, an object or action away from the body. In these situations prompting touches may be experienced as distracting or even intrusive. A second possibility is that by 18-months other ATTENTION-ELICITING CUES are used more frequently and physical cues may become redundant. Thirdly, blind children have already been socialized to alternative ways of determining the parent's proximity. They are adept by 18-months at using voice and sounds emanating from actions to place people and objects in their environment (ref). In any case, since *physical cues* were rarely used, it may be that these parents who were well attuned to the feelings and needs of their children understood their potentially intrusive nature.

Retrospective Cues

Retrospective cues function as completion markers at the end of a *joint attentional engagement*. As part of the turntaking sequence, they close a turn, thus leaving an opening for a new exchange (Schegloff, 1973). In closing with an acknowledgement or giving praise, these cues hark back to what was just accomplished marking it as attention worthy, and hence, something to be remembered.

The use of *retrospective cues* remained fairly constant in frequency and were made available to the child more often than initially placed ATTENTION-ELICITING CUES suggesting that over the child's age of 18-months to 42-months it might be more important to mark the importance of a completed verbalization or action than to explicitly call for attention to what is to come over the child's age of 18- to 42-months. It is possible that, as will be discussed later, the need for initially placed ATTENTION-ELICITING CUES is less because a call for attention is included

in the function of ATTENTION-DIRECTING CUES, and within the flow of activity CONTENT MESSAGES themselves can serve to hold attentional focus. Thus other elements in the joint attentional frame may overtime make the use of initially placed ATTENTION-ELICITING CUES redundant on most occasions.

In the following example (10), Molly and her mother were playing with their own dinosaurs and also some dinosaurs from the study's toy bag. Molly was exploring the brachiosaurus from the study's toy bag. She had played with it before, but doesn't appear to remember the two ways that it makes a sound.

(10) Molly 42-months TC753 (blind child)

CHI: How do we get it to talk?
CHI: Open his mouth?
MOT: Well I'm not sure.
CHI: ACT_pushes the button on its side to make the dinosaur sound
MOT: Oh my gosh.
MOT: **Watch!** When you pull his tail he talks.
MOT: ACT_moves the brachiosaur's tail with the child's hand and it makes a sound
MOT: **Oh**! He has two ways to make noise.
CHI: ACT_manipulates the brachiosaurus to make it sound
MOT: **There you go.**
CHI: Is that what a brachiosaurus sounds like?
MOT: I guess so.
MOT: I've never heard one before.
MOT: GES_palms up
CHI: Can you hear them when we are in heaven?
MOT: When we are in heaven I don't really know.
CHI: Why don't you know?
MOT: I don't really know how things work up in heaven.

In this example (10), Molly initiated a question routine for getting and reviewing information about how this particular dinosaur works. When she successfully, on her own, made the dinosaur sound by pressing its sound button, her mother marked her accomplishment with a *retrospective cue, an exclamation* (*Oh my gosh!*). Then she employed an ATTENTION-DIRECTING CUE, a *perceptual imperative* (*Watch!*), to open another turn that will direct her attention toward the other mechanism that activates the dinosaur's sound. She then provided verbal information (a CONTENT MESSAGE, *When you pull his tail he talks*) while simultaneously tactilely demonstrating how to move the dinosaur's tail. Molly's mother then employed an ATTENTION-ELEICTING CUE, an *alerting cue* (*Oh!*) to prompt her to pay attention to her next statement clarifying the important information that Molly apparent didn't remember (*He has two ways to make noise*). When Molly performs the action on her own, her mother responds with a *retrospective cue* (*There you go*) acknowledging that what she just did was successful and worthy of remembering. The remainder of this vignette continues with smooth conversational turn taking, out of the realm of the here-and-now, that doesn't require the use of special attentional markers.

Some ATTENTION-ELICITING CUES can be used in both initial and final positions at the periphery of *joint attentional engagements*; their placement and intonational contour determine their directional focus. The fact that many words can be used in either position reflects their similar singular function outside the main content of a *joint attentional engagement*. In the following examples, *Okay*, is used either to acknowledge a completed action or to encourage a new action.

(11) Molly 42-months TC4017 (blind child)

MOT: Does a horse belong in sea life?
CHI: That horsey needs to stay right on his farm.
CHI: ACT_places the horse away from the sea creature bag near the barn
MOT: Oh **okay**.

(12) Sam 42-months TC4737 (partially sighted child)
FAT: **Okay** now let's put them all back in their places.
CHI: Now.
CHI: ACT_piles all the fish together
CHI: Now let's put them back in there.
CHI: ACT_reaches for the book
FAT: All right.

In the first example (11), Molly is doing pretend play with a set of plastic farm animals, and she places a horse near a bag of sea creatures that she had been playing with previously. Since Molly cannot see the bag of sea creatures her mom uses an indirect question (a CONTENT MESSAGE) to help her consider the effect of her placement. Molly's answer shows that she knows perfectly well that the horse does not go with sea life, and she moves it toward objects that fit into her play scenario. By using the *retrospective cue*, *Oh okay*, mom ratifies her knowledge. In the second example (12), Sam and his dad are putting fish puzzle pieces into a form book, and dad uses the initially placed ATTENTION-ELICITING CUE "okay" preceding his CONTENT MESSAGE to prompt Sam to attend to what needs to be done next.

In the following example (13), at 18-months Amy's mother uses the same *emotive cue* to frame a CONTENT MESSAGE (in this case both a verbalization and an action) that potentially affords a WORD REFERENT CONNECTION.

(13) Amy 18-months TC3104 (partially sighted)
MOT: GES_takes a stuffed bird out of the bag and holds up it in front of the child
MOT: **Hah!** Is this a bird?
CHI: EG_leans in to look at the stuffed bird
MOT: ACT_squeezes the chick to make it chirp
MOT: **Hah!**
CHI: Birdy. (approximation)
MOT: Bird.

Amy's mother is introducing a noise making stuffed bird taken from a toy bag containing a set of stuffed animals. She delivers the *emotive cue, Hah!* with excited expression to entice Amy's focus toward an object for which she then provides a *label* and a *demonstrating action*, thus setting up a prototypical joint attentional word-learning paradigm. The use of, *Ah!* again at the end of the MESSAGE CONTENT signals not only completion of the mother's turn (and response opening for the child), but again marks the message as something exciting. The use of both an initially placed and a final *emotive* cue provides a frame for the MESSAGE CONTENT.

The above examples (11-13) illustrate another important aspect of ATTENTION-ELICITING CUES. While their function is to summon the child's attention, different types of cues also make manifest for the child the parent's attitude toward the MESSAGE CONTENT. In examples 11 and 12, parents of older children (42-months) use an *alerting cue* with a serious, structuring tone that reflects the thoughtful, pedagogical nature of the task in which they are involved. In example 13, the parent of a younger child delivers an *emotive cue,* in a surprised tone that bodes for something exciting within a playful context. So it is possible that children are socialized through the use of ATTENTION-ELICITING CUES, to the notion that people have intentions (to get them to attend) and attitudes about those intentions (*this is serious, this is fun*) through the repeated use of these cues in various types of activities.

4.1.3 ATTENTION-ELICITING CUES: Discussion

ATTENTION-ELICITING CUES are generally short cues delivered with child-directed prosody and situated at the periphery of the main content message of the exchange. They mark the importance of paying attention to something to come or something that has just occurred in order to evoke anticipation or reflection. They do not stand alone because their 'meaning' is set as a marker directed toward something else, something that will be identified subsequently or that has just been part of a joint enterprise. Of the five types of initially placed ATTENTION-ELICITING CUES *physical cues* were rarely used. *Vocatives* were used occasionally and were likely used by personal preference. *Emotive cues* and *alerting cues* were used at similar rates, but while *emotive cues* declined in use, *alerting cue* use remained quite constant over the 18- to 42-months month time period of this study. The most frequently used ATTENTION-ELICITING CUE was *formulaic engagement cues*, longer phrases experienced as a unit. Retrospective cues were used more frequently than initially placed ATTENTION-ELICITING CUES and their rate of use remained constant. The fact that all parents used these cues attests to their robustness as *attention getters* in the repertoires of Western middle class parents.

Like most parent verbalizations in the early input to children ATTENTION-ELICITING CUES are not content words, rather they are utterances that socialize the child in the ways of communicating (Bates, Bretherton & Snyder, 1991). For example, hearing the interjection, *Wow!* is an indication to the child that something of interest is going to be communicated. At 18-months and beyond, in this study, the children responded to these cues with anticipation that what came next was of material importance, specifically something that came with a name and overtime with increasing information about things and actions affording opportunities to learn about the world.

At the beginning of this study when their children were 18-months old parents continued to employ the ATTENTION-ELICITING CUES that they frequently used to engage their children in early dyadic games and routines, but they were no longer ubiquitous in their exchanges. Why might this be? During the parent-child toy play sessions analyzed in this study most parent-child interactions were triadic in nature; they involved objects and actions outside the dyad. So the different goals of dyadic and triadic interactions suggest a possible answer. The primary purpose of dyadic play is mutual focus between parent and child. The parents uses ATTENTION-ELICITING CUES to summon their child's attention directly to them, and in participating in these dyadic interactions the child is educated to the value of responding appropriately through the rewards of playful emotional bonding, and well before 18-months the child recognizes and responds to these cues. However, in triadic engagements, such as the toy play scenario in this study, the primary purpose of using ATTENTION-ELICITING CUES shifts. In triadic engagements, these cues are used to socialize the child to the understanding that when he gives attention, he will be connected with something outside the dyad. In other words, after the child has become educated to the utility of attending to the parent, he more fluidly gives attention to the parent in the flow of communicative verbalizations, gestures and actions within their shared activity. Also, the parent can then expect the child's attention and move mutual focus directly to a specific third element in the triadic play that might provide a common ground for a WORD REFERENT CONNECTION or the transfer of some content knowledge.

The data from this study suggest such a pattern because the use of initially placed ATTENTION-ELICITING CUES appears to decline even further over the time period between 18 and 42-months, a period of increased triadic interactions. In fact, parents used less than half the number of these cues at 42-months than they did at 18-months with sharp decline occurring before 34-months when usage appears to level off (see Table 7). This trend suggests that without receiving explicit cues, children progressively learn that something felicitous will happen if they pay attention during activity with a parent.

While parental use of ATTENTION-ELICITING CUES does decline, it would not be expected that these cues would be completely eliminated from attempts to initiate engagement because adults use these forms occasionally as well. Adult use, however, derives more from real surprise or elation (*Hey Rick. Look at this!*) or in transitions in jointly completing a task (*Are you ready? Okay try this one*).

In further support for this transition in attentional focus, the data show that by 18-months ATTENTION-ELICITING CUES were consistently followed by further efforts by the parent to direct the child's attention to something outside the dyad, whereas in dyadic interactions attention effort is consistently focused within the dyad exploiting the emotive value of acting together taking turns as a unit. Specifically, 99% of the time ATTENTION-ELICITING CUES were followed by *deictic gestures*, *deictic verbalizations* or *indicative actions* (i.e., *tapping on an object*, *touching the child with the object*) and/or CONTENT MESSAGES containing labels and/or information about objects and actions. The only exceptions related to interruptions to the flow of on-going play interaction (i.e., after a telephone call or when another person entered the room).

So it appears that at least by 34-months the children in this study needed far fewer cues specifically summoning their attention; rather parents tended to employ other types of attentional cues directing their attention to objects and actions that could be jointly shared. Engagement was more automatic, and parent's efforts turned toward providing opportunities for coordinating language with the objects and action of interest to their child within their immediate toy play activity.

Consider the following examples (14, 15).

(14) Tyler 18 months TC144 (sighted child)

MOT: ACT_turns zoo train around so child can see the pictures
MOT: Oh it tells you which one.
MOT: Hah! The elephant.
MOT: GES_holds up the plastic elephant
MOT: ACT_puts the plastic elephant on its sound button and presses it to make the elephant sound
CHI: ACT_moves his head and mimicks the elephant sound
MOT: Hah wow! What does elephant do Tyler?
MOT: SD_makes elephant sound
MOT: GES_moves arm like an elephant's trunk
MOT: Can you do that with your trunk?
CHI: GES_moves his arm like an elephant's truck
MOT: Oh good job.

(15) Tyler 38-months TC4454 (sighted child)

MOT: Where's Harvey gonna go?
CHI: ACT_puts Harvey up on top of the tunnel
CHI: He bes up on the tunnel.
MOT: Harvey's gonna be on the tunnel?
CHI: Yeah he's waiting for the train.
CHI: ACT_pulls a train along the track but it keeps coming apart
CHI: It's not connected.
MOT: Maybe he needs a push from Persy (the train).
CHI: Oh.
CHI: ACT_pushes the train from the back
MOT: So sometimes the engines need help from the back.

In example 14, at 18-months, Tyler and his mother are playing with a zoo animal train that has plastic animal figures that make sounds when they are placed on their buttons. There are pictures of the animals on the side of the train engine. Tyler's mother uses several ATTENTION-ELICITING CUES to connect her words with objects and actions within this joint play activity. First, she places the train so the animal pictures are available to the child, then she signals that it is important to pay attention using the emotive interjection, *Oh!* before giving information about the purpose of the pictures. She then holds up the elephant using the *emotive cue*, *Hah!* before labeling the plastic object. She uses two more *emotive cues* and a *vocative cue* calling attention to her subsequent request that Tyler respond by giving evidence that he knows something about what elephants do. When Tyler doesn't immediately respond, she provides two examples of an appropriate response, the elephant's sound and an imagery gesture portraying how his truck moves. She makes another request for a response using a question form. When Tyler responds, she uses a *retrospective cue* to mark the importance of his completed effort. The effort of the mother is primarily focused on getting the child's attention.

In example 15, at 38-months, Tyler and his mother are playing with a model train set. Here Tyler's mother does not need to use ATTENTION-ELICITING CUES to garner the child's attention. The interaction flows through the expression of content (CONTENT MESSAGES). Tyler's mother uses questions (*Where's Harvey gonna go?*) to move the action along and encourage verbal responses. In addition, she makes suggestions for actions (*Maybe he needs a push from Persey*). Importantly, she marks the end of the interchange with specific verbal feedback summarizing the importance of what was accomplished (*So sometimes the engines need help from the back*) rather than using a separate ATTENTION-ELICITING *retrospective cue*. The effort of the mother is primarily focused on content afforded by the objects and actions within their play.

Overall, results from this study suggest that when children are at least 18-months ATTENTION-ELICITING CUES are not used primarily to summon their child's attention toward the parent in a dyadic relationship. Rather they are used primarily to induce an anticipatory response, and then they are directly followed by another cue, an ATTENTION-DIRECTING CUE, employed for the specific purpose of directing the child's attention to some new object or action in a triadic relatioinship. In this altered relationship the parent acts as a conduit to referents in the world, referents that afford naming and/or further description. Results also indicate that the children in this study recognized ATTENTION-ELICITING CUES and provided an obervable response within the flow of the toy play activity. This result is especially important for parents of blind children who often express difficulty knowing if their child has received their input without the expected visual feedback provided by eye gaze (Perez-Pereira & Conti-Ramsden, 1999). Since all ATTENTION-ELICITING CUES (not just specifically the *emotive* cues) are generally presented with highly emotive affect, child responses are often evident in their own emotive behaviors. For blind children observable responses are often produced through bodily activity such as kicking movements or waving the hands or verbally produced emotive sounds. In any case, the independent coder for this study was, in viewing the videootapes without knowledge of the child or parent, able to determine a child's response to parental utterances containing an ATTENTION-ELICITING CUE with overall reliability above 90%.

For young language learning children ATTENTION-ELECITING CUES are important communicative markers that POINT (suggest) to new learning opportunities through *joint attentional engagement*. They make manifest for the child the adult's desire to communicate something attention worthy, and, at 18-months, the children in this study responded with anticipation and participatory action.

4.2 ATTENTION-DIRECTING CUES

In this study, ATTENTION-DIRECTING CUES are described and analyzed in terms of their pragmatic function as deictics that serve to anchor a potential common ground, specifically the objects and actions in the current context of *triadic joint attentional engagement* in toy play. While the ultimate goal of *joint attentional engagement* is to effect some new learning instantiated in a common ground, a referent label and/or informative details about a referent, the child must first learn the joint attentional processes that afford this learning. The primary function of ATTENTION-ELICTING CUES is to alert the child to the parent's communicative intention. The primary function of ATTENTION-DIRECTING CUES is to guide the child's attention toward a common ground. The pragmatic function of summoning the child's attention is nested within ATTENTION-DIRECTING CUES because directing someone's attention implies a communicative intention. Since ATTENTION-DIRECTING CUES have this nested, dual function, they are treated separately from ATTENTION-ELICITING CUES in this study. In addition, while ATTENTION-ELICITING CUES, at least from the time the child is 18-months of age, are primarily verbal, ATTENTION-DIRECTING CUES are almost always delivered in a composite, multimodal manner with simultaneous nonverbal and verbal presentations.

Understanding the types of cues that communicate *where* attention is to be directed is critical to understanding the communicative message. In addition, ATTENTION-DIRECTING CUES entrain in the child the notion that the parent is a conduit to knoweldge in the world, a kind of tool for learning about things in the world that are of interest to him (Vygotsky, 1986). Through the use of ATTENTION-DIRECTING CUES parents socialize their children in the ways of managing their attention, in effect, teaching them how to access and hence, connect objects and actions in the world with simultaeously presented verbal content. The overarching question in this section is: *How did the parents in this study socialize their children in the culturally established ways of directing their attention to objects and actions in order to jointly converge on a referent/common ground?*

4.2.1 ATTENTION-DIRECTING CUES: Results

2. What types of ATTENTION-DIRECTING CUES did the parents of the blind, partially sighted, and sighted children use to assist their child in locating a specific referent in the toy play area?

All parent verbal and nonverbal behaviors were examined for their use in directing their child's attention toward a common ground within the toy play setting. Observations indicate that parents employed four types of ATTENTION-DIRECTING CUES in both nonverbal and verbal forms: (1) *deictic gestures*, (2) *indicative actions*, (3*) physical direction of the child* and (4) verbal expressions in the form of *introductory fixed frames*. *Deictic gestures* included *pointing, holding up/toggling an object in the child's line of sight* and *give/take reaches*. *Indicative action cues* included *taps for orientation, tapping an object the child is holding, touching the child with an object,* and *placing/positioning an object for maximal access. Physical direction cues* included *orienting the child's body to better perceive a referent,* and *directing tactile contact with an object. Formulaic fixed frames* included *deictic introducers* and *perceptual imperatives* (see Table 9).

Table 9. ***Classifications used to describe nonverbal and verbal ATTENTION-DIRECTING CUES***

Nonverbal Cues	
Deictic gesture cues	Pointing Holding up/toggling an object in the line of sight of the child Give/take reaches (defined in terms of an actual reaching exchange)
Indicative action cues	Taps for orientation Tapping an object the child is holding Touching the child with an object Placing/positioning an object for maximal access
Physical direction cues	Orienting the child's body to better perceive a referent Directing tactile contact with an object.
Verbal Cues (formulaic fixed frames)	
Deictic introducers	Deictic place adverbs (*here, there*) Demonstrative adjectives (*this, that, these* and *those*)
Perceptual imperatives	*See the horsie, Touch his nose*, and *Smell the flower*
Composite Cues	Gesture + speech Indicative action + speech Physical direction + speech

Because the purpose of using ATTENTION-DIRECTING CUES is to direct the child's attention toward a common ground, these cues were coded on the same record along with the parent's labeling of a REFERENT and/or delivering a CONTENT MESSAGE (giving further information about the referent). The specific synchronicity of the input recorded on one record was not addressed in this study, but contingency among different cues and the message content was restricted to three seconds as is typical in studies of joint attention (Bakeman & Adamson, 1984; Carpenter, Nagell, Tomasello, Butterworth & Moore, 1998; Tomasello & Farrar, 1986). Hence, a three second limit between parent and child utterances, gestures and actions determined what input was included on one record. This coding parameter allowed for assessing what types of cues where used singly or together along with accompanying language, and also to compare cue use among study participants and their use overtime.

Assessment of reliability for identification of* ATTENTION-DIRECTING CUE *types.

To assess reliability for identifying parental use of ATTENTION-DIRECTING CUES, an independent coder was trained in the use of a protocol of definitions and the FileMaker Pro database coding system. Reliability between the independent coder and the author was established on the basis of coding of 20% of each of the 300 records coded per child and per age slice. Agreement was high for identification of all four types of ATTENTION-DIRECTING CUES: *deictic gesture cues* 93%, *indicative action cues* 90%, *physical direction* 87% and *formulaic fixed frames* 94%. Summarizing across all types of ATTENTION-DIRECTING CUES agreement for identification was 91%. Hence, the ATTENTION-DIRECTING CUES documented in this study were reliabilty discernable in the input to children as they engaged with their parents in toy play during the 18- to 42-months month age slices in this study.

2.1 Across the 18- to 42-months month age slices how frequently were nonverbal ATTENTION-DIRECTING CUES *employed by the parents of the blind, partially sighted and sighted children?*

Across the 18- to 42-months age slices parents used a combined total of 2885 ATTENTION-DIRECTING CUES with a range in use among individual parents of 453 to 515 (Molly n = 460, Ethan n = 467, Amy n = 489, Sam n = 453, Ella n = 501, Tyler, n = 515) (see Table 10).

Table 10. ***Total percentages and raw counts for nonverbal ATTENTION-DIRECTING CUE types used by the parents of the blind, partially sighted, and sighted children summed across the seven age slices from 18- to 42-months***

	Nonverbal ATTENTION-DIRECTING CUES			
Child	Deictic Gesture Cues	Indicative Action Cues	Physical Direction Cues	TOTAL Nonverbal Cues
Blind				
Mollie	12 (56)	68 (313)	20 (91)	460
Ethan	11 (51)	72 (337)	17 (79)	467
Partially Sighted				
Amy	49 (238)	43 (209)	9 (42)	489
Sam	71 (320)	29 (132)	<1 (1)	453
Sighted				
Ella	61 (305)	39 (196)	<1 (0)	501
Tyler	71 (365)	29 (149)	<1 (1)	515
TOTALS	46 (1335)	46 (1336)	(7) (214)	2885

2.1.2 Across the 18- to 42-months month age slices did the parents of the blind, partially sighted, and sighted children employ the same types of nonverbal ATTENTION-DIRECTING CUES*?*

Across the seven coded play sessions all parents used *deictic gesture cues*. The range of *deictic gesture cue* use among all parents was from 51 to 365 instances. All parents also used *indicative action cues.* The range of use among all parents for *indicative action cue* use was from 132 to 337 instances. All parents except one parent of a sighted child used *physical direction cues* at least once. The range of *physical direction cue* use among all other parents was from 1 to 91 instances. These findings document that during the time their child's language use was expanding rapidly, all parents employed a variety of identifiable cue types to engage their child in shared attention. In particular, these cues afforded the child access to the general location of objects and actions in their current play area (see Table 10).

2.1.2 Were there differences in the use of particular nonverbal ATTENTION-DIRECTING CUE **types** *that might be related to degree of vision?*

Over the seven age slices there were wide differences in the particular types of ATTENTION-DIRECTING CUES used that were clearly related to the degree of vision of the child. For two types of nonverbal ATTENTION-DIRECTING CUES (*deictic gestures* and *physical direction cues*), use was similar for parents of children with the same degree of vision, but widely discrepant across different degrees of vision. In fact, there was an inverse relationship between degree of vision and the use of *deictic gesture cues* and the use of *physical direction cues* (see Table 10). Specifically, the parents of the blind children used far fewer *deictic gesture cues (*Molly n = 56 or 12 % of her total nonverbal ATTENTION-DIRECTING CUE use, Ethan n = 51 or 11% of her total nonverbal ATTENTION-DIRECTING CUE use) than parents of children with any available vision, and the parents of partially sighted children used more *deictic gestures cues* (Amy n = 238 or 49% of their total nonverbal ATTENTION-DIRECTING CUE use, Sam n = 320 or 71% of their total nonverbal ATTENTION-DIRECTING CUE use) than the parents of the blind children, but fewer than the parents of sighted children (Ella n = 305 or 61% of her total nonverbal ATTENTION-DIRECTING CUE use, Tyler n = 365 or 71% of her total nonverbal ATTENTION-DIRECTING CUE use).

Similarly, but inversely, for *physical direction cues* the parents of the blind children used far more *physical direction cues* (Molly n = 91 or 20% of her total nonverbal ATTENTION-DIRECTING CUE use, Ethan n = 79 or 17% of her total nonverbal ATTENTION-

DIRECTING CUE use) than parents of children with any available vision, and the parents of the partially sighted child with less vision used fewer *physical direction cues* (Amy n = 42 or 9% of their total nonverbal ATTENTION-DIRECTING CUE use) than the parents of the blind children, but more than the parents of sighted children and the parents of the partially sighted child with more vision (Ella n = 0 or 0% of her total nonverbal ATTENTION-DIRECTING CUE use, Tyler n = 1 or <1% of her total nonverbal ATTENTION-DIRECTING CUE use, Sam n = 1 or <1% of her total nonverbal ATTENTION-DIRECTING CUE use).

With regard to *indicative action cues*, the use of these cues by parents of partially sighted children was much closer to use for sighted children than it was for blind children. Hence, an inverse relationship applied to *indicative cue use* by parents of blind children and parents of children with any available vision. Specifically, *indicative action cues* were the preferred ATTENTION-DIRECTING CUE used by parents of blind children (Molly n = 313 or 68% of her nonverbal ATTENTION-DIRECTING CUE use, Ethan n = 337 or 72% of her nonverbal ATTENTION-DIRECTING CUE use). While parents of partially sighted and sighted children did use these cues, on average they used them about half as much as the sighted children (Amy n = 209 or 43% of her nonverbal ATTENTION-DIRECTING CUE use, Sam n = 132 or 29% of her nonverbal ATTENTION-DIRECTING CUE use, Ella n = 196 or 39% of her nonverbal ATTENTION-DIRECTING CUE use, Tyler n = 149 or 29% of her nonverbal ATTENTION-DIRECTING CUE use) (see Table 10).

Overall, for parents of children with any available vision *deictic gestures cues* were the preferred strategy for directing attention to a common ground. Overall, for parents of the blind children *indicative actions cues* were the preferred strategy. All parents employed *physical direction cues* sparingly.

2.2 What specific types of nonverbal deictic gesture cues were employed by the parents of the blind, partially sighted, and sighted children use?

Parents who used *deictic gestures* used the following three types*: pointing, holding up* and *give/take reaches*. For the purpose of this study *give/take reaching gestures* were coded as such only when exchanges were successful. All deictic gestures required visual access to their form and trajectory, except *give/take reaches* that were successfully employed by the parents of the blind children when accompanied by a verbal cue establishing intent to transfer an object (see Table 11).

Table 11. ***Total percentages and raw counts for deictic gesture use for the parents of the blind, partially sighted, and sighted children across the seven age slices from 18- to 42-months of age***

	Deictic Gesture Cues				
Child	Pointing	Holding Up/Toggling	Total Canonical Gestures	Give/Take Reaches	TOTAL Gestures
Blind					
Mollie	<1 (0)	11 (5)	11 (5)	89 (42)	47
Ethan	20 (10)	<1 (0)	20 (10)	80 (40)	50
Partially Sighted					
Amy	12 (28)	63 (149)	75 (177)	25 (60)	237
Sam	25 (79)	56 (178)	80 (255)	20 (63)	318
Sighted					
Ella	41 (122)	44 (131)	86 (253)	14 (42)	295
Tyler	43 (149)	45 (157)	88 (306)	12 (41)	347
TOTAL	30 (396)	46 (610)	78 (1006)	22 (288)	1294

2.2.1 With what frequency did the parents of blind, partially sighted, and sighted children employ specific types of nonverbal deictic gesture cues? Were there any differences related to degree of vision?

2.2.1.1 *Pointing gestures:* Not surprisingly, *pointing gestures* were also rarely used by the parents of blind children. Interestingly, though there did appear to be differences in the use of *pointing gestures* that were related to degree of vision. Both parents of partially sighted children (Amy n = 28 or 12%, Sam n = 79 or 25%) used far fewer *pointing cues* than parents of sighted children (Ella n = 122 40%, Tyler n= 157 or 43%) (see Table 11). Further supporting degree of vision as a factor in the use of *pointing gestures*, is the fact that the parent of the partially sighted child with the least amount of usable vision used the fewest number of *pointing gestures*.

2.2.1.2 *Hold up gestures***:** *Hold up deictic gestures* in this study were contrained to visually presented instances where an object was held up in the child's line of sight without any additional identifying input such as sound or touch that would also draw the child's attention. Instances where an object was *held up and toggled* were considered as *deictic gestures.* However, instances where, for example, a sound making object was held up and made to produce a sound were coded as 'actions on an object with sound input' and will be discussed in the CONTENT MESSAGES section. This coding distinction was made in order to highlight the comparison between visually presented *deictic gestures* and tactilely presented *indicative actions*. As will be discussed in the CONTENT MESSAGES section, actions on objects give more than deictic informaton, and here the concern is with specifically those ATTENTION-DIRECTING CUES that function solely to draw attention to a common ground.

Hold up gestures were rarely used by the parent of the one of blind children and never by the other (Molly n = 5 or 5% of her *deictic gesture* use, Ethan n = 0), but were the most frequent nonverbal deictic ATTENTION-DIRECTING CUE used by both the parents of the partially sighted (Amy n = 149 or 63% her *deictic gesture* use, Sam n = 178 or 56% her *deictic gesture* use) and sighted children (Ella n = 131 or 44% of her *deictic gesture* use, Tyler n = 157 or 45% her *deictic gesture* use) (see Table 11). Differences in frequency of use between the parents of partially sighted and sighted children did not appear to be related to degree of vision because one parent of a partially sighted child (Amy n = 149) used close to the same number of *hold up gestures* as one of the parents of a sighted child (Tyler n = 157), and one of the parents of a partially sighted child (Sam n = 178) used the most number of *hold up gestures* and one parent of a sighted child (Ella n = 131) used the least. Across age slices 18- to 42-months, parental use of *hold up gesture* ranged from 131 to 178 instances.

2.2.1.3 *Give/Take reaches (holding out gestures):* The parents of the blind children (Molly n = 42 or 75% of her *deictic gesture* use, Ethan n= 40 or 78% of her *deictic gesture* use) and the parents of the sighted children (Ella n = 42, Tyler n = 41) used *give/take reaches* to exchange objects with approximately the same frequency (see Table 11). Parents of partially sighted children both used *give/take reaches* at about the same frequency (Amy n = 60 or 25% of their *deictic gesture* use, Sam = 63 or 20% of their *deictic gesture* use) and both more than parents of the blind and parents of the sighted children. The parents of blind children used more *give/take reaches* than any other *deictic gesture,* where as parents of sighted children used them less than *pointing* and *hold up gestures*. Both parents of partially sighted children (Amy, Sam) used *give/take reaches* substantially less than *hold up gestures*, but the parents of Amy used them less frequently than *pointing gestures* and, in contrast, the parents of Sam used them at about the same frequency (see Table 11).

2.2.2 ***Across the 18- to 42-months month age slices were there changes in the use of nonverbal deictic gesture cues?***

Very few *pointing* and *hold up gestures* were used by the parents of the blind children, so there were no relevant changes in use overtime for them, and they are not included in the tables summaries for *deictic cue* use. Also, as noted above, Amy's parents used very few *pointing gestures*, and the few gestures they used overtime did not follow the pattern of the parents of the other child, Sam (who had a higher degree of usable vision), and the parents of the sighted children. Hence, the frequency of *pointing gesture* use by Amy's parent is listed, but is not included in the totals for *pointing gesture* use across the 18- to 42-months month age slices. The parents of the other partially sighted child and the parents of the sighted children showed a marked decrease in the use of *pointing gestures* between the 26-month and the 30-month age slices (see Table 12).

Table 12. ***Total raw counts for deictic point gestures used by the parents of the partially sighted children and the two sighted children at each age slice from 18- to 42-months***

	Deictic Point Gestures per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Partially Sighted								
Amy	0	2	4	4	9	6	3	28
Sam	16	18	17	9	9	6	4	79
Sighted								
Ella	29	28	20	8	11	12	14	122
Tyler	34	30	22	12	14	21	16	149
TOTALS	79	76	59	29	34	39	34	350

NOTE: Amy not included in totals

Over all age slices, 18- to 42-months, the frequency of use for *hold up gesture cues* was roughly similar for all of the parents of the partially sighted children and sighted children (range = 131 to 178). In addition, for all of these parents there was a marked decline in use of *hold up gestures* between the 26-month and the 30-month age slices (see Table 13).

Table 13. ***Total raw counts for deictic hold up gestures used by the parents of the partially sighted and sighted children at each age slice from 18- to 42-months***

	Deictic Hold Up Gesture Cues per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Partially Sighted								
Amy	31	29	25	17	25	14	8	149
Sam	51	31	37	13	8	16	22	178
Sighted								
Ella	41	25	22	3	16	11	13	131
Tyler	29	32	40	13	9	19	15	157
TOTALS	152	117	124	46	58	60	58	615

A comparison of Tables 12 and 13 shows that over each age slice from 18- to 42-months, the parents of the partially sighted and the sighted children all consistently used more *hold up gestures* than *pointing gestures*. Overall they used about a third more *hold up gestures* than *pointing gestures.*

Differences in the use of *give/take* gestures did not appear to be related the child's degree of vision, but all parents greatly reduced the use of these gestures before 30-months (see Table 14).

Table 14. ***Total raw counts for Give/Take reaches used by the parents of the blind, partially sighted and sighted children at each age slice from 18- to 42-months of age***

	Give/Take Reaches per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Blind								
Mollie	5	13	9	7	4	2	2	42
Ethan	6	10	10	6	6	2	0	40
Partially Sighted								
Amy	6	8	22	8	2	7	7	60
Sam	18	13	10	7	5	7	3	63
Sighted								
Ella	23	4	8	1	0	3	3	42
Tyler	11	3	19	2	2	2	2	41
TOTALS	69	51	78	31	19	23	17	288

2.3 What What specific types of nonverbal indicative action cues were employed by the parents of blind, partially sighted, and sighted children?

Parents used four types of nonverbal *indicative action cues* to direct the child's attention to referents and actions in the play setting. They used a *tap for orientation* that involved tapping on a surface near the intended referent. They also used a *tap on an object that the child was holding*, thus providing localized tactile information about the where to focus attention. They also provided tactile support for where to focus attention by *touching the child with the object/referent*. In addition, parents *placed or positioned objects* to provide maximal access for focusing attention on a referent (see Table 15 .

Table 15. ***Total percentages and raw counts for nonverbal indicative action cue use for the parents of the blind, partially sighted, and sighted children summed across the seven age slices from 18- to 42-months of age***

Child	Indicative Action Cues				TOTAL
	Tap for orientation	Tap object child is holding	Touch child with object	Position or place object	
Blind					
Molly	20 (64)	20 (63)	24 (75)	35 (111)	(313)
Ethan	13 (45)	15 (51)	26 (89)	45 (152)	(337)
Partially Sighted					
Amy	11 (23)	5 (11)	6 (13)	78 (162)	(209)
Sam	2 (3)	5 (6)	<1 (1)	92 (122)	(132)
Sighted					
Ella	13 (25)	4 (8)	<1 (1)	83 (163)	(197)
Tyler	21 (31)	2 (3)	<1 (1)	77 (114)	(149)
TOTALS	(191)	(142)	(180)	(824)	(1337)

2.3.1 With what frequency did the parents of blind, partially sighted, and sighted children use specific types of nonverbal indicative action cues? Were there any differences that might be related to degree of vision?

Tapping and touching cues providing tactile access were used by the parents of the blind children considerably more than the parents of partially sighted and sighted children, however *positioning an object for access* was the most used *indicative action cue* for all parents (see Table 15).

2.3.1.1 *Tapping for orientation:* All parents used taps on or next to an object to direct the attention of their child to an intended referent. Parents of the blind children used this type of cueing considerably more than the other parents (Molly n = 64 or 20% of her nonverbal *indicative action cues*, Ethan n = 45 or 13% of her nonverbal *indicative action cues*). Other parents used *tapping for orientation* at a lower frequency, but their child's degree of sight did not appear to affect how much they used this strategy. Specifically, the parents of one of the partially sighted children rarely used *tapping for orientation*

(Sam n = 3 or 2% of their nonverbal *indicative action cues*). The parents of the other partially sighted child used *tapping for orientation* at about the same frequency (Amy n = 23 or 11% of her nonverbal *indicative action cues*) as the parents of the sighted children (Ella n = 25 or 13% of her nonverbal *indicative action cues*, Tyler n = 31 or 21% of her nonverbal *indicative action cues*) (see Table 15).

2.3.1.2 *Tapping the referent/object the child is holding*: While all parents used a cueing strategy of tapping on an object their child was holding, the parents of the blind children used this tactile strategy much more frequently (Molly n = 63 20% of her nonverbal *indicative action cues*, Ethan n = 51 or 15% of her nonverbal *indicative action cues*). The parents of the partially sighted child (Amy n = 11 or 5% of their nonverbal *indicative action cues*, Sam n = 6 or 5% of their nonverbal *indicative action cues*) and the parents of the sighted children (Ella n = 8 or 4% of of her nonverbal *indicative action cues*, Tyler n = 3 or 2% of her nonverbal *indicative action cues*) rarely tapped on an object the child was holding to draw the child's attention to it as the intended referent (see Table 15).

2.3.1.3 *Touching the child with the referent/object:* Similarly, touching the child with an object to draw attention to it as the referent was rarely used by either the parents of the partially sighted children (1) or the parents of the sighted children (1). However, this was the preferred tactile *indicative action cue* for both of the parents of the blind children (Molly n = 75 or 24% of her nonverbal *indicative action cues*, Ethan n = 89 or 26% of her nonverbal *indicative action cues*) (see Table 15).

2.3.1.4 *Positioning an object for access:* All parents used *positioning or placing an object* for better access as a strategy for directing their child's attention to a referent, and it was, in fact, the most prevalent *indicative action cue* for all. However, there was a range of use (111 or 35% to 163 or 83%) that did not appear to be related to degree of vision because one parent in each pair (blind, partially sighted and sighted) used it with less frequency (Molly n = 111 or 35% of her nonverbal *indicative action cues*, Sam n = 122 or 92 % of her nonverbal *indicative action cues*, Tyler n = 114 or 77% of her nonverbal *indicative action cues*) than the other member of the pair (Ethan n = 152 or 45% of her nonverbal *indicative action cues*, Amy n = 162 or 78% of her nonverbal *indicative action cues*, Ella n = 163 or 83%) (see Table 15).

2.3.2 Across the 18- to 42-months month age slices were there changes in the use of nonverbal indicative action cues?

For the parents of the blind children, who were the primary users of *indicative action cues* involving tapping or touching, changes in use were strikingly similar to the changes observed in the use of *deictic cues* by the parents of children who had vision. Specifically, the same pattern in decreased use of *deictic* ATTENTION DIRECTING CUES between the 26- and 30-month age slices was also observed in a decreased use of *indicative action* ATTENTION DIRECTING CUES involving taps or touches by the parents of the blind children. All other parents rarely employed *indicative action cues*, but they also used them primarily at the younger ages (See Table 16).

Table 16. ***Total raw counts for nonverbal indicative action cue use for (1) tapping an object the child is holding, (2) touching the child with an object, and (3) tapping for orientation for the parents of the blind, partially sighted and sighted children at each age slice from 18- to 42-months***

	Indicative Action Cues per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Blind								
Molly	43	48	51	14	11	20	15	202
Ethan	29	48	44	24	15	15	10	185
Partially Sighted								
Amy	10	11	8	4	4	4	6	47
Sam	2	3	1	1	0	1	2	10
Sighted								
Ella	6	7	6	2	5	5	3	34
Tyler	9	10	2	3	3	5	3	35
TOTALS	99	127	112	48	38	50	39	513

The use of *positioning or placing an object* was the most frequently used *indicative action cue* for all parents. There was a range in use (111 to 163) (see Table 18), but this did not appear to be related to visual access because one of the parents of a blind child, Molly, and one of the parents of a sighted child, Tyler, were the two that used this cue the least (Molly n = 111, Tyler n = 114). In fact, one parent in each degree of vision category was a more frequent user and one parent was a less frequent user (Molly n = 11, Ethan n = 152; Amy n = 162, Sam n = 122; Ella n = 163; Tyler n = 114). In addition, all parents, more frequent users and less frequent users, followed a general pattern of gradual decreased use over the 18- to 42-months month age slices beginning with a combined use of 148 instances at the 18 month slice and declining to 86 instances at the 42 month age slice (see Table 18). In other words, there was a marked decline over the 18- to 42-months month age slices, but no dramatic drop in use at any particular age (See Table 17).

Table 17. ***Total raw counts for nonverbal indicative action positioning/placing cues used by the parents of the blind, partially sighted, and sighted children at each age slice from 18- to 42-months***

	Indicative Action Positioning/Placing Cues per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Blind								
Molly	18	13	18	18	15	17	12	111
Ethan	23	28	25	21	29	19	7	152
Partially Sighted								
Amy	37	30	14	19	29	16	17	162
Sam	28	19	20	20	13	10	12	122
Sighted								
Ella	25	23	26	16	23	28	22	163
Tyler	17	26	15	10	13	17	16	114
TOTALS	148	139	118	104	122	107	86	824

2.4 What specific types of nonverbal physical direction cues were employed by the parents of blind, partially sighted, and sighted children?

Parents used two types of *physical direction cues* to assist their child in locating intended referents. First, they *oriented the child's body* to best perceive or interact with a referent. Second, they *directed tactile contact with an object* primarily by moving the child's hand either toward the object or directly on it in order to mark it as the intended referent (see Table 18).

Table 18. ***Total percentages and raw counts for physical direction cues (orientation of the body and directing tactile contact) used by the parents of the blind, partially sighted, and sighted children summed across the seven age slices from 18- to 42-months***

	Physical Direction Cues		
Child	Orientation of the body to perceive a referent	Directing tactile contact with a referent	TOTAL
Blind			
Mollie	45 (41)	55 (50)	(91)
Ethan	35 (28)	65 (51)	(79)
Partially Sighted			
Amy	43 (18)	57 (24)	(42)
Sam	(0)	(1)	(1)
Sighted			
Ella	(0)	(0)	(0)
Tyler	(0)	(1)	(1)
TOTAL	41 (87)	59 (127)	(214)

2.4.1 With what frequency did the parents of blind, partially sighted, and sighted children use specific types of physical direction cues? Were there differences related to degree of vision?

Both types of *physical direction cues* were used almost exclusively by the parents of the children who had the least amount of usable vision. One of the parents of a sighted child *physically directed* her child only once (Tyler n = 1) and the other never used *physical direction* (Ella n = 0). The parents of one of the partially sighted children used *physical direction* only once (Sam n = 1). The parents of the other partially sighted child used *physical direction* with close to half the frequency (Amy n = 42) of the parents of the blind children (Molly n = 91, Ethan n = 79) (see Table 18).

2.4.1.1 *Orientation of the body*: Neither the parents of the sighted children (Ella n = 0, Tyler n = 0), nor the parents of the partially sighted child with the most vision (Sam never used *orienting the child's body* as a strategy for directing the child's attention toward an intended referent. The parents of the two blind children used this type of cueing occasionally, one (Molly n = 41) more than the other (Ethan n = 28) (see Table 18).

2.4.1.2 *Directing tactile contact with a referent*: Similarly, the parents of the sighted children (Ella n = 0, Tyler n = 1 or <1% of her nonverbal *indicative action cues*) and the parents of the same partially sighted child (Sam n = 1 or <1% of her nonverbal *indicative action cues*) almost never guided their hand to direct attention to a referent. The parents of the other partially sighted child used *directing tactile contact* about half as much (Amy n = 24) as the parents of the blind children (Molly n = 50 or 55% of her *physical direction cues*, Ethan n = 51 or 65% of her nonverbal *indicative action cues*) (See Table 18).

2.4.2 Across the 18- to 42-months month age slices were there changes in the use of nonverbal physical direction cues?

The parents of the blind children who used *physical orientation of the body* to direct their child's attention toward a mutual focus used this type of cueing primarily before the 26 month age slice with only occasional use thereafter. However, they used the strategy of *directing tactile contact* at a more constant rate throughout the 18- to 42-months month age slices with no evident pattern in frequency of use (see Table 19).

Table 19. ***Total percentages and raw counts for two physical direction cue types used by the parents of the two blind children and the parents of the partially sighted child with the most limited vision at each age slice from 18- to 42-months***

	Physical Direction Cues per Age Slice							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Orientation of child's body								
Blind								
Molly	37 (15)	37 (15)	2 (1)	<1 (0)	5 (2)	7 (3)	20 (8)	41
Ethan	68 (19)	<1 (0)	7 (2)	3 (1)	11 (3)	11 (3)	<1 (0)	28
Partially Sighted								
Amy	28 (5)	28 (5)	11 (2)	22 (4)	<1 (0)	11 (2)	<1 (0)	18
Directing tactile contact								
Blind								
Molly	10 (5)	2 (1)	18 (9)	18 (9)	12 (6)	16 (8)	24 (12)	50
Ethan	14 (7)	18 (9)	20 (10)	20 (10)	16 (8)	4 (2)	10 (5)	51
Partially Sighted								
Amy	<1 (0)	33 (8)	25 (6)	<1 (0)	7	4 (1)	8 (2)	24

2.5 What verbal ATTENTION-DIRECTING CUES *were employed by parents of the blind, partially sighted, and sighted children to direct their child's attention toward referents?*

Parents used two forms of deictic verbal expressions to direct their children's attention to intended referents, *deictic introducers* and *perceptual imperatives* (see Table 20).

Table 20. ***Total percentages and raw counts of deictic formulaic fixed frames used the parents of the blind, partially sighted, and sighted children summed across the seven ages slices from 18- to 42-months***

Child	Deictic Formulaic Fixed Frames: Deictic Introducers	Deictic Formulaic Fixed Frames: Perceptual Imperatives	TOTAL Verbal Deictic Expression
Blind			
Mollie	81 (168)	19 (40)	208
Ethan	86 (222)	14 (35)	257
Partially Sighted			
Amy	76 (233)	24 (75)	308
Sam	69 (148)	31 (65)	213
Sighted			
Ella	72 (161)	28 (62)	223
Tyler	67 (147)	33 (73)	220
TOTAL	76 (1079)	24 (350)	1429

2.5.1 With what frequency did the parents of the blind, partially sighted, and sighted children use specific types of deictic formulaic fixed frames? Were there any differences that might be related to degree of vision?

All parents used far more *deictic words* (range = 148 to 233) than *perceptual imperatives* (range = 35 to 75) (see Table 20).

2.5.1.1 *Deictic introducers*: Parents varied in the frequency with which they used *deictic introducers*, but degree of vision did not appear to be related to frequency of use. One parent of a sighted child (Tyler n = 147 or 67% of her verbal *deictic introducers*) and one parent of a partially sighted child (Sam n = 148 or 69% of her verbal *deictic introducers*) used the fewest *deictic introducers*. The parents of the other partially sighted child (Amy n = 233 or 76% of her verbal *deictic introducers*) and the parent of one of the blind children (Ethan n = 222 or 86% of her verbal *deictic introducers*) used the most *deictic introducers*. The other parent of a sighted child (Ella n = 161 or 72% of her verbal *deictic introducers*) and the other parent of a blind child (Molly n = 168 or 81% of her verbal *deictic introducers*) used a mid-range of *deictic words* (see Table 20).

2.5.1.2 *Perceptual Imperatives:* Parents of blind children used *perceptual imperatives* less frequently (Molly n = 40 or 19% of her verbal *deictic introducers*, Ethan n = 35 or 14% of her verbal *deictic introducers*) than parents of partially sighted or sighted children who used them with about the same frequency (Amy n = 75 or 24% of their verbal *deictic introducers*, Sam n = 65or 31% of their verbal *deictic introducers*, Ella n = 62 or 28% of her verbal *deictic introducers*, Tyler n = 73 or 33% of her verbal *deictic introducers*) (see Table 20).

2.6 With what frequency did nonverbal* ATTENTION-DIRECTING CUES *co-occur with speech across the seven age slices from 18- to 42-months of age?

In this study all parent *gestures, actions*, and *physical directions* related through communicative actions to one parent verbalization were coded on one record. Parent *gestures, indicative actions* and *physical directions* were consistently accompanied by verbalizations. Many studies of gesture employ a rigorous timing of synchronicity among gesture, speech and eye gaze (Kendon, 2004; Clark & Estigarribia, 2011). However, in this study, exact temporal overlap was not calculated. This omission is consistent with work by Rader & Zukow (2012) that suggests that dynamic close synchrony of gestures with accompanying speech is important for initial word learning, but not so crucial after 18-months. It is also consistent with work by Clark & Estigarriba (2011) that indicated that the timing of gestures with speech and gaze was more differentiated for one-year-olds than for 3 year-olds. In this study, while parents frequently used speech without co-occurring gestures, actions or physical directions, they very consistently used speech along with their nonverbal ATTENTION-DIRECTING CUES.

All parents consistently used language along with producing *deictic gestures* and *indicative actions* in their toy play interactions. In other words, when parents directed their child's attention toward a referent using a *deictic gesture* to indicate its location, they also used a verbal ATTENTION-DIRECTING CUES, a label or a pronoun, or they commented on it in some way. When using an *indicative action cue* or a *physical direction cue* to indicate the location of a referent all parents consistently used co-occurring language, a verbal ATTENTION-DIRECTING CUE, a label or a pronoun, or they commented of the referent indicated by the *indicative action* or *physical direction.*

Reliability for the co-occurrence of all nonverbal ATTENTION-DIRECTING CUES and speech was established by an independent coder on 20% of records for each child at each age slice. Reliabilty for *deictic gesture cues* and co-occurring speech was 100%. Reliability for *indicative action cues* and co-occurring speech was 98%, and reliability for *physical direction cues* and co-occurring speech was 100%.

2.7 Did the blind, partially sighted, and sighted children exhibit reliably observable contingent engagement behaviors to their parent's use of nonverbal and verbal ATTENTION-DIRECTING CUES across the 18- to 42-months month age slices?

For each record containing a nonverbal ATTENTION-DIRECTING CUE any child observable engagement was coded on the same record. Child engagement behaviors included following the parents physical direction, emotive behavior related to the mutual activity, gestures and actions initiating or responding to the content of the adult verbalization or related action, and verbalizations initiating or responding to the content of the adult verbalization or related action (see Table 4).

To establish reliability for coding child engagement behaviors related to ATTENTION-DIRECTING CUES an assistant independently coded a random sample of 20% of all author-coded records containing a ATTENTION-DIRECTING CUE for each child at each age slice. *Physical direction cues* were elminated from the reliabilbity corpus because a physical direction requires a child response, so their 100% response rate would skew the mean total response. In addition, in calculating mean total response, the visually oriented *deictic gestures* of *pointing* and *holding up an object* were eliminated from the total for the two blind children because for the most part these cues were not accessible to the child and a response would not have been expected.

The coding assistant received 3 hours of training spread over two days in order gain a fluid understanding of the coding definitions for ATTENTION-DIRECTING CUES (see Table 9) and the coding for response type (see Table 4). Training occurred on a separate, but similar data set and was continued until a reliabilty of at least 95% was achieved. Training and coding of ATTENTION-DIRECTING CUES took place independently of training and coding for other reliability measures for this study.

Overall mean percentages for the coding of engagement behaviors related to ATTENTION-DIRECTING CUES ranged from 91% to 96%. Means for *deictic cues* ranged from 92% to 96%. Means for *indicative action cues* ranged from 93% to 98%. Means for verbal ATTENTION-DIRECTING CUES ranged from 93% to 97% (see Table 21). These percentages are all above 90% and as such indicate high agreement between the author and an independent coder for identifying when a child responded to an ATTENTION-DIRECTING CUE. *Looking at a parent* or *the indicated referent* was only one of many possible coded responses (see Table 4), so reliable nonvisual indications of the child's response toward a parent's directional cue were possible within the on-going activity in this study. There were no differences in response rates that were attributable to degree of vision.

Table 21. ***Percentages for identification of child joint attentional engagement behaviors to ATTENTION-DIRECTING CUES across all age slices from 18- to 42-months.***

Child	Deictic Gestures			Indicative Action Cues				Verbal Cues	
	Pointing	Hold Up	Give/Take	Tap for Orientation	Tap object child is holding	Touching child with object	Placing/ Positioning	Deictic Introducers	Perceptual Imperatives
Blind									
Mollie	n/a	n/a	93	94	100	100	96	97	96
Ethan	n/a	n/a	92	90	100	100	92	91	94
Partially Sighted									
Amy	93	98	97	94	99	100	92	97	92
Sam	91	92	94	91	98	97	91	92	93
Sighted									
Ella	94	99	91	92	98	98	91	94	93
Tyler	94	98	90	91	97	96	90	94	91

4.2.2 ATTENTION-DIRECTING CUES: Descriptive Examples

ATTENTION-DIRECTING CUES documented during parent-child toy play activites in this study included nonverbal *deictic gesture cues, indicative action cues,* and *physcial direction cues*; verbal *fixed formulaic frames*; and composite speech including *gesture + speech, action + speech,* and *physical direction+ speech.* These cues reflect effort of the part of parents to direct their child's attention for the purpose of establishing shared attention on a common ground.

ATTENTION-DIRECTING CUES-Nonverbal

The following examples include the nonverbal ATTENTION-DIRECTING CUES indentified in this study as: *deictic gestures, indicative actions* and *physical directions*.

Deictic Gesture Cues

The deictic gesture cues identified in this study were: the *pointing gesture*, the *hold up gesture* and *give/take reaches*.

Pointing gestures

Index points were coded in the canonical manner. Specifically, a *point* gesture was coded if the parent's index finger was extended toward an intended target providing a line of regard from the tip of the finger to the general area of the target while focusing a simultaneous gaze on the object or the child (Goldin-Meadow, Kendon, McNeil). However, eye gaze (to object or child) that occurred along with *pointing* was not coded as a separate occurrence.

In addition to the canonical index *point*, there were other *pointing gestures* that varied by degree that were included in the count for *pointing gestures* in this study. These variations included the following forms:

• Instances where the index finger actually touches and/or moves over an object, thus providing even clearer (but still ultimately indeterminate as to the specific referent) direction to the target as in the following example (16) where Tyler's mother is indicating the color of the stuffed monkey:

(16) Tyler 18-months TC747 (sighted child)
MOT: The monkey's brown.
MOT: GES_strokes the monkey with her index finger
CHI: Monkey.

• Instances where the *index point* directs attention to a particular space on or in an object as in the following example (17) where Amy's father is directly putting his index finger into a hole to indicate proper placement for a key used to open a shape box:

(17) Amy 34-months TC801 (partially sighted child)
FAT: See the hole.
FAT: GES_puts his index finger in the keyhole

• Instances where another digit of the hand is extended toward a referent as in the following example (18) where Amy's father uses his thumb rather than his index finger to indicate, unsuccessfully, the direction of an in-air balloon:

(18) Amy 38-months TC2221 (partially sighted child)
CHI: Where is it?
FAT: It flew that way.
FAT: GES_points with his thumb over his shoulder
CHI: ACT_doesn't look at Dad's point but walks forward in the opposite direction he is pointing

• Instances where the whole hand or more than one finger is placed on or toward a referent as in the following example (19) where Tyler's mother is indicating a stuffed lamb using all of her finger tips:

(19) Tyler 22-months TC2402 (sighted child)
MOT: This is a lamb huh?
MOT: GES_touches the stuffed lamb's head with the tips of her fingers

The above variants of the canonical *pointing gesture* display the same indexical intent, but are offered in forms that vary from some studies of *index pointing*. Including them along with canonical *index points* serves to maximize the count for gestures of the hand that do not include performing an action on the object, but rather serve the main purpose indicating the location of a referent that is situated away from the parent who is performing the *pointing gesture*. In addition, the children in this study did not responded differentially to these modifications to the canonical index *pointing gesture* form. Specifically, all sighted and partially sighted children responded to all of the *pointing gestures* described above aimed *near* the target[3] or *on* the target with a high degree of frequency.

Pointing gestures were used at every age slice and by all parents of sighted and partially sighted children. In addition, the parent of one of the children without vision used a canonical gesture in four out of the seven age slices with a total of ten *pointing gestures* across the time period of the study. The parent of one of the partially sighted children used more that twice as many *pointing gestures* as the other. It is possible that the reduced use by Amy's parents was due to the fact that her use of partial vision was unclear until approximately 32 months. After that time they might not have increased their use of *pointing gestures* out of habitually not using them to direct her attention. The parents of the two sighted children used *pointing gestures* with a much higher degree of frequency than the parent of the other partially sighted child. In terms of frequency of use, the degree of vision available to the child distinguished the frequency of *pointing gesture* use among the parents.

[3] Most of the toy play involved targets that were close by, hence there was little opportunity in this study to make judgements about children's responses to *pointing gestures* that involved distal targets.

Why, we might ask, did one of the parents of a child without usable sight use even some *pointing gestures* when they were clearly unavailable to her child? The probable answer likely stems from the deeply rooted nature of *pointing gestures* (Kita, 2003). While Molly's mother consciously suppressed her use of *pointing gestures* in response to its lack of utility[4], Ethan's mother was consciously trying to find ways to direct Ethan's attention, but was not specifically inhibiting her typical use of gesture. Indeed, research has shown that the *pointing gesture* is so ingrained in the ATTENTION-DIRECTING repertoire of adults that it is hard to restrain its use (Kita, 2003; Kendon, 1981), and would likely take some conscious effort on the part of a parent to not use it. In fact, some requests are typically paired with a *pointing gesture* as in the following example (20) where mother and child have been playing with a fire truck, and Ethan who is blind cannot find it. Ethan's mother suggests that he scan floor to find it and automatically provides a hint by *pointing* to its location; a cue that, of course, he can't take advantage of. Realizing this she provides further verbal information that allows him to succeed in locating the fire truck.

(20) Ethan 22-months TC1333 (blind child)
CHI: Truck.
MOT: Umhm.
CHI: Fire truck.
MOT: Oh you gotta find them.
MOT: GES_points toward the fire truck
MOT: Over there.
MOT: It's over by the carpet.
CHI: Carpet.
MOT: Umhm.
CHI: ACT_walks toward the carpet

In example (20), the carpet itself is an affordance that can serve as an aid in his search. The word *carpet* for Ethan serves as a *point* or vector specifying the trajectory he must follow. At 22-months, Ethan is able to navigate through familiar space anchoring his

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[4] Private conversation-Molly's mother also initially supressed the use of visual words, but by the time Molly was 26-months she was using them regularly.

movement using familiar landmarks (Landau, Spelke & Gleitman, 1984). In this case, he knows where he is in the kitchen and where the carpet marks the beginning of the living room, and he is able to successfully locate the fire truck.

Also notable in the use of *pointing gestures* is their decline in use along with the child's increasing age, and particularly their precipitous drop between 26- and 30-months of age. Continued use of *pointing* is expected, of course, as adults commonly use *pointing* to add clarity to their referents in grounding their communications. But why is there a decline in use for young language learning children? *Pointing* is used for different purposes in different situations, so the reason for reduced use may be related to changes in its local function. With children in the toy play setting in this study, parents tended to use *pointing gestures* early on in two primary ways (1) drawing attention to an object to elicit an action as in the following example (21):

(21) Sam 22-months TC1334 (partially sighted)
FAT: What's in there?
FAT: GES_points to the bag.
CHI: EG_follows dad's point to the bag.
FAT: You wanna open that up?
FAT: GES_points to the bag.
CHI: EG_ looks toward bag.
FAT: Wanna see what's in the bag?
FAT: GES_pointing to the bag.
FAT: Wanna see what's in the bag?
FAT: GES_pointing to the bag.

Or (2) to establish word-referent relations either by introducing a new word as in the following example (22) or to prompt the child to give a verbal response exhibiting his expressive knowledge of a particular word as in the following example (23):

(22) Tyler 22-months TC4127 (sighted child)
MOT: Hah.
MOT: ACT_lifts up the ladder on the other fire truck
MOT: GES_points to the hose
MOT: SD_water flow sound
MOT: The hose.

(23) Tyler 22-months TC811 (sighted child)

MOT: It's...what is the monkey eating?
MOT: ACT_turns the monkey toward the child
MOT: GES_points with her index finger touching the banana
CHI: Nanana.
MOT: What is he eating?
CHI: Nana.
MOT: What is he eating?
CHI: Nana

Later at 38-months *pointing gestures* were more typically used instrumentally in the flow of joint activity as in the following example (24) where parent and child were working together to complete a multistep task, building a bird house. In the following example (24), the parent used the word "bottom" not to help the child learn the word, but rather to give guidance in how to proceed by using a word Ella knew and *pointing* to two different exemplars, the actual birdhouse piece and a picture of the piece in a diagram of the birdhoue.

(24) Ella 38-months TC1817 (sighted child)

MOT: Let's look at the picture.
MOT: ACT_places the birdhouse diagram down on the floor in front of the child
MOT: See the bottom.
MOT: GES_points to the bottom piece in the picture
CHI: EG_looks at the picture
CHI: Umhm.
MOT: GES_points to different parts in the picture
MOT: That shows all the different parts and how we put them together
MOT: ACT_picks up a birdhouse piece and taps on it
MOT: And this.
MOT: Looks like that one.
MOT: GES_points to the corresponding piece in the picture
MOT: So I think that's on the bottom.

Example 24 above shows that, at 38-months, the *pointing gesture* was used along with known words to scaffold the child's success in performing an activity. Rather than connecting individual words with their referents in a name game activity, parents were making connections between known words and how their referents might be used as affordances in completing an activity.

In addition, at older ages WORD REFERENT CONNECTIONS were used in a more conversational manner adult-like manner to repair misunderstandings as in the following example (25), where Tyler and his mother are negotiating their different perceptions about the path of a train car:

(25) Tyler 38-months TC3545 (sighted child)
MOT: She didn't go over two bridges?
CHI: No.
MOT: She went over this one?
MOT: GES_points to one of the bridges
CHI: Yeah.
MOT: And then that little bridge.
MOT: GES_points to the overpass
CHI: No that's under.
CHI: GES_scoops his hand palm up
MOT: Under a tunnel.
CHI: And not up.

In summary, the decline in use of *pointing gestures* sometime between 26- and 30-months may relate to the types of activities the parents and children are engaged in. Before 30-months parents may emphasize drawing their child's attention to specific objects and actions in order to teach their labels during their play activities. After 30-months when children have developed a substantial store of labels, the use of *pointing gestures* may become a smaller part of on-going play exchanges that have moved toward more adult-like conversational exchanges without the need for explicit nonverbal directional cueing.

Hold up/toggle gestures

Hold up/toggle gestures included holding up an object in the child's line of sight and in some cases toggling it to attract attention as in the following example (26):

(26) Ella 22-months TC1754 (sighted child)
MOT: Do you wanna put the hat on?
MOT: GES_picks up the hat and swings it on her finger in front of the child
CHI: Yeah.

Vision appears to be required for parents to use the *holdup/toggle gesture.* It is possible that it is not as engrained in the repertoire of strategies for directing attention as is *pointing.* Ethan's mother never used the *hold up/toggle gesture*, and Molly's mother used it only when she held an object up close to Molly's eyes to ask her what color an object was. Molly was able to distinguish and learn color names by bringing objects close to her eyes. She was also able to put her eyes close to a TV monitor and identify Elmo as red. She did not spontaneously bring objects to her eyes, but was taught to do this by her mother specifically for the purpose of identifying colors.

The frequency of use for the *hold up/toggle gesture* for the parents of the sighted and partially sighted children varied from 131 to 176 instances across the 18- to 42-months age slices, however frequency of use did not appear to be related to the degree of vision of the child. The parent of one of the sighted children used *hold up/toggle gestures* least, and the parents of one of the partially sighted children used it the most. It is possible that these differences were related to parental style and/or the particular tasks that dyads were engaged in at different times.

Although frequency of use for the *hold up gesture* did not differentiate partially sighted children from sighted children, there was a striking difference in use by the parents of the partially sighted children between their use of the *hold up gesture* and their use of the *pointing gesture.* Parents of the partially sighted children used the *hold up gesture* from two to five times as much as the *pointing gesture.* This is likely related to restricted far point vision affecting the ability to follow a *point* to a distal common ground.

For parents of partially sighted and sighted children use of the *hold up/toggle gesture* followed the same pattern of decline in use between the 26- and 30-month age slices as did *pointing gesture* use, and for similar reasons. Early on the *hold up gesture* was the primary way of directing attention to a whole object for the purpose of labeling or identifying it as part of the name game routine as in the following example (27):

(27) Tyler 22-months TC2358 (sighted child)

CHI: Moo moo.
CHI: GES_puts his hand on the cow on the floor
MOT: This is a moo?
MOT: GES_picks up the cow and looks at it
MOT: It's a cow.
MOT: GES_holding up the cow
MOT: You're right.

Later parents tended to *hold up* objects within on-going play activities with a more cognitively oriented function. In the following example (28), Sam and his father were playing with some balls and his father offered a comparison:

(28) Sam 38-months TC1838 (partially sighted child)

FAT: Which one's bigger?
FAT: GES_holds the spidery ball next to the suction ball
CHI: EG_looks at the suction ball
CHI: This one.

In addition, parents' later use of *hold up/toggle gestures* are paired with suggestions proffered in a more conversational manner as in the following example (29) where Ella and her mother are playing with a gear set:

(29) Ella 38-months TC520 (sighted child)

CHI: ACT_puts one gear piece on top of another
CHI: Put it there.
MOT: On top of each other?
CHI: Um actually you put this better on.
CHI: ACT_puts another gear piece on top of another one and spins it
MOT: Maybe with these?
MOT: GES_picks up a gear piece and holds it up to the child
CHI: Umhm. Yeah like you could put it here.
CHI: GES_puts her index finger on an available gear
`

Give/take reaches (or holding out gestures)

Give/take reaches are defined in this study as holding the hand out for the purpose of giving or receiving an object. In other words, they always involved a potential object exchange. *Give/take reaches* are one of the first gestures used by children. Indeed some research indicates that gesture use is part of the early language learning process (Clark & Kelly, 2006, Goldin-Meadow, 2003). On this view, before first words are uttered children use, for example, a *gimme* gesture to express a desire for an out-of-reach object. If early gesturing is important in the language learning process we might expect that it is, to some degree, socialized in its form and function very early on. Gray (1978) suggests that the "mother's creating and scaffolding of intentions" in give/take routines provides a basis for learning how to respond to attentional signals. Interestingly, in this study, while the mothers of the blind children did not use the *hold up gesture* to direct their child's attention to an object, they did frequently establish a common ground by holding *out* an object toward their child inviting him to take it. Since their children lacked visual access to the form of the *giving gesture*, why did they do this? The socialization process involved in assisting the child to respond to a *giving gesture* by taking the object is exemplified in the following examples (30, 31):

(30) Ethan 18-months TC3916 (blind child)

MOT:	Do you want a cracker?
MOT:	Cheeto
CHI:	Cheeto
MOT:	ACT_takes a Cheeto out of the box. This is audible to the child.
MOT:	GES_holds out Cheeto to the child
CHI	Cheeto .
CHI:	GES_reaches out and takes the Cheeto
MOT:	Cheeto.
CHI:	Cheeto.
MOT:	Cheeto for you.

In the example above (30), Ethan had learned that if he reaches out on hearing his mother say the name of a favorite food, he will find what he desires in front of him. This example also illustrates the supportive effect of audible actions performed without the conscious intention of directing the child's attention. Words are frequently embedded within the context of familiar events, and they can be associated with desired items routinely present in those events (K. Nelson, 1986). In this example, Ethan recognized the familiar sound of his mother taking a Cheeto from a bag. His mother uttered the word *Cheeto* three times, and he repeated it each time. For Ethan, the sound of his mother extracting a Cheeto from its box, and concurrently labeling it, may form an auditory WORD REFERENT CONNECTION quite comparable to a sighted child's visual representation of the Cheeto that is embedded in the entire action of obtaining the desired item.

(31) Ethan 18-months TC2541 (blind chid)
MOT: Horsie.
MOT: GES_holds the big plastic horse out toward the child
MOT: Horse.
MOT: ACT_taps the child's wrist with the big plastic horse
CHI: GES_reaches out and touches the neck of the big plastic horse

The example above (31), suggests that Ethan has not yet learned to reach out on hearing just any word in any context. Instead a more direct, embodied gesture is necessary when words are not yet familiar and/or embedded in a familiar context. In this example, Ethan did not reach out to explore the horse when his mother employed a *give/take gesture* and said *horse.* However, when his mother used an *indicative action cue*, tapping the horse on his hand, he did reach out when he felt the touch of something new to explore. A sighted child is also unlikely to respond by focusing his attention toward an object only at the sound of an unfamiliar word; he also needs an ATTENTION-DIRECTING CUE to guide his eyes just as the blind child needs a tap to guide his hands. The *point* and the *tap* can both function to establish a common ground. The *tap*, however, is embodied, and therefore provides a quicker, and more direct route to the referent than either *pointing* or *holding up gestures* that may require a shift in gaze direction from parent to object.

The parents in this study used *give/take reaches* for four different purposes. First, the parents of the blind children, but not the parents of children with sight continued practicing the "game" of giving and taking with various familiar objects. In the following example (32), Molly initiated the 'give/take game':

(32) Molly 18-months TC357 (blind child)

CHI: ACT_walks toward Mom with her stuffed elephant Elie
MOT: GES_holds Elie out to Mom
MOT: Are you gonna give it to Mommy?
MOT: GES_reaches out to take Elie
CHI: ACT_grabs Elie back
MOT: Oh you took him back.
CHI: GES_reaches Elie out to Mom
MOT: GES_reaches out to take Elie
MOT: Give him to Mommy.
CHI: ACT_takes Elie back
MOT: Take him from Mommy.
CHI: GES_reaches Elie out to Mom
MOT: Give.
CHI: ACT_takes Elie back
MOT: And take
CHI: ACT_gives Elie to Mom
MOT: Give.
CHI: ACT_pulls Elie away
MOT: And take.
CHI: GES_reaches the football in her right hand out to Mom
MOT: Give me the ball.
MOT: ACT_wraps her hand around the football
CHI: ACT_takes the football out of Mom's hand
MOT: Take.
CHI: ACT_puts the football back into Mom's hand
MOT: Give.
CHI: ACT_takes the football out of Mom's hand
CHI: Ball.
MOT: Can you kick your football?

Second, during the 18- to 30-month period of rapid vocabulary growth exchanges of objects involving *giving/taking reaches* provided opportunities for making WORD-REFERENT CONNECTIONS by labeling a referent within the well-established *give/take* exchange routine as in the following example (33):

(33) Sam 26-months TC1432 (partially sighted child)
MOT: Here's bracelets.
MOT: GES_picks up the bracelets and holds them out to the child
CHI: GES_takes the bracelets and explores them with his hands
MOT: You know what bracelets are.
MOT: Where do they go?
CHI: ACT_keeps the bracelets in his right hand

Third, parents also used *giving/taking reaches* to "test" their child's understandings of words within play activity as in the following example (34).

(34) Sam 22-months TC5921 (partially sighted child)
MOT: Can I have a fork?
MOT: GES_holds her hand out for the fork
CHI: GES_gives Mom a fork
MOT: Thank you.

Fourth, as the child's fluency with language increased *give/take reaches* became part of instrumental transactions with all children, with vision or not, fluidly executing these exchanges within toy play activity as exemplified in the following example (35).

(35) Molly 34-months TC4144 (blind child)
CHI: It's time to lick the beaters.
MOT: I don't know if those beaters come off of that.
MOT: Here let me see.
MOT: GES_reaches over to take the mix master from the child
CHI: GES_gives the mix master to the child

Indicative Action Cues

Indicative action cues identified in this study included tapping for orientation, tapping on an object the child is holding, touching the child with an object and positioning/placing an object for maximal access.

Tapping for orientation

Tapping for orientation utilizes a sound produced near a target referent to project an auditory trajectory to the child. *Tapping for* orientation affords the child without vision a "pay attention over here" signal that is roughly analogous to a visual line of sight provided by a *pointing gesture*. All parents used *tapping for orientation* sometimes in the name game routine much like *pointing* as in the following examples (36, 37):

(36) Tyler 22-months TC2200 (sighted child)
MOT: What color's this?
MOT: ACT_taps her finger on the orange smoke stack
CHI: Orange.

(37) Molly 22-months TC2431 (blind child)
MOT: What is this?
MOT: ACT_taps on the child's crib
CHI: Bed.

Parents of blind children frequently used *tapping for orientation* just like a *pointing gesture* to designate an object for mutual focus either tapping near an object the child was looking for or near an object to which they would like the child to direct attention. In addition, however, they used *tapping for orientation* for a purpose rarely used by parents of sighted children. They frequently used *tapping for orientation* to assist their children in orienting to stable features in their familiar environments in order to ground landmarks for building independent mobility skills. It is helpful to pair these grounding environmental features to their verbal labels in order to build a vocabulary that allows guidance by verbally produced ATTENTION-DIRECTING CUES alone. In the following example (38), Molly's mother grounds "milk" with where it is found, the *frig.* She used the word "milk" four times before pronominalizing it to emphasize its location.

(38) Molly 22-months TC355 (blind child)
CHI: ACT_takes Mom's hand
MOT: What do you want?
CHI: Milk.
MOT: Do you want milk?
CHI: ACT_turns Mom's hand toward kitchen
MOT: Okay let's go get some milk.
MOT: PHYD_orients child toward the kitchen holding her hand
CHI: ACT_takes the lead into the kitchen
MOT: Where do we find milk?
MOT: ACT_taps on the refrigerator
CHI: ACT_puts her hand on the refrigerator
CHI: Milk.
MOT: Milk's in the frig huh.
MOT: ACT_opens the refrigerator
MOT: Oh burrr.
MOT: Here it's right here.
MOT: ACT_taps on the refrigerator shelf where the child's bottle is
CHI: ACT_picks up the bottle and starts drinking her milk
MOT: How's that milk taste?
CHI: ACT_puts the bottle up to her cheek
CHI: Burr.
MOT: Burr is it cold on your cheeks?

There was not a clear pattern of a decline in use of *tapping for orientation*, but this cue was used early on by all parents to connect words with referents in the name game, while later use was primarily to anchor an object in a particular location during an activity. In the later case, *tapping for orientation* was used more to direct attention to how objects might be used to complete an action. In fact, frequently object names were replaced by demonstrative adjectives emphasizing location over object names in completing an activity. In the following example Tyler and his mother are engaged in putting a train track together. Not only is Tyler is familiar with the noun "track," he can see it; the WORD REFERENT CONNECTION is secured by the *pointing gesture*, so it is replaced by demonstrative markers. The use of the *indicative action cue, tapping for orientation* is about location not the object. Concurrent verbal CONTENT MESSAGES serve to further specify the object he needs to use to successfully complete the action of connecting the train track pieces. In the following example (39), verbalization and action work in tandem, much like verbalization/gestures pairings, each carrying a different load in the communicative effort to specify the appropriate common ground that will lead to the successful completion of common goal.

(39) Tyler 34-months TC127 (sighted child)

MOT: Okay the long **one** goes here.
MOT: ACT_taps on a space in the tracks
MOT: ACT_places a piece of train in front of the child
MOT: Wanna click **that** in?
MOT: GES_points to the piece of track
CHI: ACT_starts to put the piece of track in place
MOT: Oops **that**'s the wrong **one**.
MOT: ACT_moves the piece of track away
MOT: Let's click **this one** in.
MOT: ACT_places a new piece of track in front of the child
MOT: ACT_taps her hand on the space where the piece of track would fit
CHI: ACT_picks up the piece of track and pushes it into place
CHI: It went in right there.
MOT: I know we just put **it** in.
MOT: Perfect wasn't it.

Using referent names paired with a *tapping for orientation cue* within on-going activities may be crucially important for the blind child who does not have continuous access to the referent during an on-going activity. While the array of available objects is constantly present for the sighted child, the blind child's "view" of the array of objects in a toy play setting is limited to current physical contact and memory built up overtime regarding what is typically available within a particular set of toys. In the following example (40), Molly and her mother were playing with a set of kitchen devices. Molly's mother used *tapping for orientation* (taps the plastic toast on the toaster) like a *point* to ground the referent most basic to the play activity (the toast). However, plastic objects are not very informative in terms of tactile access. In other words, touching this piece of toast is not likely to afford Molly a "view" of toast equal to that of a sighted child. In order to provide a "view" Molly's mother did two specific things. First, she augmented her "view" through verbalizations that provided labels ("Push down on the lever") and connections ("If you have a toaster you need some toast") among the array of "toast" toys. And along with her verbalizations she engaged her simultaneously in tactile activities providing a whole "picture" of the available objects, their labels and how they fit together in the play setting and more generally in her "daily toast making" world.

(40) Molly 34-months TC3922 (blind child)

CHI: ACT_puts her hand into the box and feels the play toaster
CHI: What is that?
CHI: This.
CHI: GES_holds up the play toaster
CHI: A toaster.
MOT: A toaster?
MOT: Well you need some toast if you have a toaster.
MOT: Here you go.
MOT: ACT_taps the plastic toast on the toy box
MOT: GES_holds out the plastic toast toward the child
CHI: GES_reaches out and takes the plastic toast
CHI: You want some toast?
CHI: You eat the toast.
MOT: Yum. Is it pretend toast with jam?
MOT: See if it tastes good.
CHI: ACT_puts the play toast to her mouth
CHI: ACT_puts the plastic piece of toast on top of the toaster
MOT: Here put your toast in.
MOT: ACT_guides the child's hands toward the toaster slots
MOT: Push down on the lever.
MOT: ACT_pushes child's hand down on the lever
[The toast clicks into place in the toaster]
MOT: And feel it.
MOT: PHYD_puts child's hand on top of the toast slots

CHI: ACT_takes the toast out of the toaster
CHI: How low is that timer?
CHI: ACT_puts down the toast
CHI: ACT_picks up the toaster and feels it
CHI: The timer isn't hot.
MOT: Nope the timer's not hot.
MOT: You're right.
CHI: That thing wasn't hot.
MOT: Nope.

Another use of the *tapping for orientation cue,* often employed by parents of blind children, but not by parents of children with vision, is tapping on the child to clarify first person pronoun use. Some blind children use a strategy of repeating their parent's full utterance as a chunk (either subsequent to a current utterance or from memory) when they are talking about what they are doing. When they do this, the repetition does not follow the relational requirements of pronoun use. In the following example (41), *tapping for orientation*, Molly's mother provided an embodied cue to the appropriate pronoun stance:

Tapping on the child to indicate first person reference

(41) Molly 34-months TC1557 (blind child)
CHI: ACT_picks up the cow
CHI: Can you play with the cow a little but longer?
MOT: I want to play with the cow a little bit longer.
MOT: ACT_taps the child on the tummy
CHI: I want to play with the cow for a little bit longer.
MOT: Okay.

It is important to notice here that Molly was developing flexibility within her repetitions. In her response she did not repeat verbatim what her mother said, but added the word *for.* The following example (42) shows how Molly played with language forms as her mother continueed to guide her understanding of first person usage using an embodied *indicative action cue*.

(42) Molly 26-months TC1 (blind child)

CHI: ACT_sitting on the couch exploring with her hands the cow piece that fits on the animal sound box in her lap.
CHI: She is playing with her cow.
CHI: Playing with her cow.
CHI: Playing with the cow.
MOT: You're playing with your cow?
MOT: Do you wanna show Carolyn your new cow?
CHI: You show Carolyn cow.
MOT: I will show Carolyn the cow.
MOT: ACT_tap the child on the tummy
CHI: ACT_starts to get off the couch
OBS: Do you have more cows?
CHI: ACT_gets off the couch and starts walking toward Carolyn carrying the cow
CHI: Carrying the cow.
CHI: I bringing the cow.
MOT: Are you bringing the cow to Carolyn?
CHI: Bringing the cow.
OBS: Do you want to show me the cow?
CHI: GES_lifts her hands over her head extending the cow out toward

Tapping the referent/object the child is holding

When a parent *taps an object the child is holding* this provides the child with a near point tactile cue to attend to it. This type of attentional cueing is frequently employed early on in name game activities like the one Molly and her mother were playing in the following example (43):

(43) Molly 18-months   TC12232   (blind child)

MOT: Is this a ball or a ba:::by?
MOT: ACT_taps on the baby doll that is in the child's lap
MOT: Tap a little ball.
MOT: ACT_taps on the ball next to the child that the child has her right hand on
CHI: ACT_taps her hand on the ball
CHI: ACT_holds up the baby doll in her left hand
MOT: Baby.
MOT: ACT_taps the baby doll the child is holding
CHI: ACT_touches the baby doll with her right hand
CHI: ACT_moves her right hand back to the ball
MOT: Ball.
MOT: ACT_taps on the ball
CHI: ACT_taps the ball
MOT: Ball.
MOT: ACT_taps the ball
CHI: ACT_taps on the ball twice then waits
MOT: That's the ball.
MOT: ACT_taps the ball
MOT: Where's the baby?
MOT: ACT_taps on the baby doll in the child's left hand
MOT: And the baby.
CHI: ACT_taps the ball
MOT: This is your ball.
MOT: ACT_taps the ball along with the child

However, at 38-months in example below (44), *touching objects the child is holding* was used to make connections that afforded access to more detailed information about objects. The added information was supplied in a conversational manner in the context of on-going play with a variety of objects. In the following example where Molly and her mother were playing with a plastic wind-up crab that is part of a set of ocean toys, Molly's mother's tap afforded her access to a similarity that she can further explore tactilely as a sighted child might visually. The mother of a sighted child might well provide the same tactile cueing, but since this was rarely observed among the parents of sighted children in this study, it is possible that at 38-months the verbal explanation alone is sufficient in directing the child's attention to the similarity.

(44) Molly 38-months TC2534 (blind child)

CHI: ACT_exploring a plastic wind up crab with her hands
CHI: What would you do if I took his claws off?
MOT: Oh he would be broken.
CHI: What if he wouldn't have claws?
CHI: Does it have claws?
MOT: He wouldn't be able to walk or grab his food.
MOT: The lobster's claws are like your hands.
MOT: ACT_taps on the lobster's claw and then touches child's hands
MOT: He can grab things with them.
MOT: ACT_squeezes child's hand
MOT: He uses them as pinchers.
MOT: ACT_pinches child's hand

Even at 42-months, although with less frequency, *touching an object the child is holding* was used as an ATTENTION-DIRECTING CUE in order to anchor a specific referent in an activity with many available options. Vision affords viewing a whole array of objects at one time. Tactile access affords only sequential access, so for blind children anchoring a referent with touch aids in keeping track of possible options. In the following example (45), Ethan and his mother were working together putting shape pieces in a form board. She tapped the object he had just touched to direct his attention to a contrast between it and the object to which he was just attending.

(45) Ethan 42-months TC 853 (blind child)

CHI: ACT_picks up the circle piece and shakes it
CHI: This is a circle.
CHI: ACT_puts his hand on the square piece on its peg
MOT: ACT_taps the square in the child's hand
MOT: This is a square.

Positioning or placing an object

Positioning or placing an object directs the child's attention to a particular place in order to establish mutual regard on an object. All parents used *placing or positioning an object* for a variety of reasons over the 18- to 42-months month age slices, and for all parents it was the most frequently used *indicative action cue*. Early on parents used *positioning or placing an object* to highlight its whole object features in name game routines. In the following example (46), Sam's father demonstrated the common standing up position of a stuffed horse.

(46) Sam 18-months TC40 (partially sighted child)
FAT: What is this?
FAT: ACT_picks up a stuffed horse and stands it up in front of child.
CHI: EG_looks toward the horse

Parents more frequently used *placing or positioning an object(s)* to increase instrumental access for the child while labeling a category or set of objects. For example, they placed objects in sets as in the following example (47), where Amy's father set an array of stuffed animals in front of her:

(47) Amy 22-months TC2915 (partially sighted child)
FAT: EG_looks in a toy bag
FAT: There's barnyard animals in there.
FAT: ACT_dumps the stuffed animals out in front of the child
FAT: Whoa:: look at all the animals
FAT: ACT_places the stuffed animals in a line in front of the child
FAT: Look at all the animals.
FAT: They escaped.

In addition, parents *placed objects* strategically to direct their child's attention to possibilities for action as in the following example (48), where Tyler and his mother negotiated the placement of a piece of track:

(48) Tyler 30-months TC919 (sighted child)

MOT: Do you want it over here?
MOT: ACT_holds the track piece over one end of the track
MOT: Or over here?
MOT: ACT_holds the track piece over the other end of the track
CHI: Over there.
CHI: GES_points to the end of the track that is open
MOT: You do want it here where it's open?
MOT: ACT_snaps the piece into the track
CHI: Yeah.

Parents also *positioned objects* to make parts of objects more accessible. In the following example (49), Molly's mother positioned the stuffed cow so that when Molly reached out, the first thing point of contact was the cow's udders. In this example, Molly's mother is not just holding out the cow for Molly to take, she is holding it out to provide the most efficient access for her intended referent:

(49) Molly 26-months TC1339 (blind child)

MOT: Feel his tummy.
MOT: ACT_holds the udders toward the child
CHI: ACT_reaches out to the cow in Mom's hands and explores its udders with her right hand
MOT: What's on his tummy?
CHI: Udders.
MOT: Oh what comes out of those udders?
CHI: ACT_begins shaking the frog toy that has been in her left hand and then presses its sound mechanism
MOT: What do cows give us?
MOT: ACT_taps the child's right hand with the cow
CHI: Milk.
MOT: Oh you're so smart.

Physical direction cues

Physical direction of the body

Without vision it is difficult to know one's position in space. Hence, blind children have a compromised ability to perceive the world around them and their position in it (Biglow, 1995). Physically orienting a blind child's body is helpful in establishing mobility routes in familiar environments, and also typical body positioning for various activities. This can be helpful for sighted children as well, but parents of sighted children did not use *physical direction of the body* in any of their activities in this study. Even parents of blind children rarely used *physical direction of the child's body* to direct their child's attention after the 22-month age slice. In addition, the low use of this type of cueing is likely related to the types of close proximity toy activities in which the dyads were engaged. The following example (50) involving ball play, however, presents a scenario that is typically used by parents of sighted children as well as blind children.

(50) Molly 18-months TC57 (blind child)

MOT: Here turn around here so we can play cah.
CHI: GES_reaches for Mom's hand
MOT: PHYD_takes the child's feet and swings her around facing her, then positions her legs in a V
MOT: Can you throw it to Mommy?
CHI: ACT_lets go of the ball and it rolls toward Mom
MOT: Good job throwing it to Mommy.
MOT: Do you want more? Do you want to pl...
MOT: PHYD_repositions the child's legs in a Vfor cahing the ball
CHI: More.
MOT: More.
MOT: Here it comes.
MOT: ACT_bounces wiggly giggly ball
MOT: Here it comes hah.
MOT: ACT_rolls the ball and it squeaks as it rolls toward the V in Molly's legs
CHI: ACT_reaches toward the ball

Parents typically physically assist their child in many ways such as placing them in their laps for reading. Blind children as well as sighted children learn this positioning and quickly learn to position themselves for this activity. The following example (51), might pertain to a parent of a sighted child, but in this case the father of one of the partially sighted children added *orienting the child's body* to an unsuccessful *pointing cue* that did not produce a clear enough trajectory toward the referent object.

(51) Amy 38-months TC2227 (partially sighted child)

FAT: Behind Daddy somewhere.
FAT: GES_points over his should with his thumb
CHI: ACT_turns to her right to look for the spidery ball
FAT: No over here.
FAT: PHYD_turns the child around
FAT: Where did it go?
CHI: That way.
CHI: ACT_runs toward the spidery ball and picks it up

Directing tactile contact with a referent

Directing tactile contact with an object using the child's hands requires a great deal of sensitivity. The fact that a blind child's hands in some sense serve as his eyes means that their manipulation is potentially very intrusive and anxiety provoking. In fact, manipulating a sighted child's hands toward an object also produces discomfort and often rejection. Perhaps an even stronger analogy would be gripping a child's head to direct the focus of the eyes on a referent.[5] Professionals who work with parents of blind children suggest a gentler approach to directing attention to a referent when employing the hands. Rather than grasping the child's hands, the parent suggests that the child 'hop on my hands', thus giving the child a more invitatory approach to an object. It is also possible to be sensitive to the child's initiation of requests for access as in the following example (52) where Molly and her mother are exploring some sea creature toys:

(52) Molly 38-months TC1602 (blind child)

CHI: I wanna see why that's a fish.
CHI: ACT_exploring the rubber puzzle piece cut-out of fish with her hands
CHI: ACT_turns toward Mom
MOT: Well he has fins and a tail and a silly mouth.
CHI: Mommy where is its mouth?
CHI: Oh is this...
MOT: Here here's its tail.
MOT: PHYD_puts child's fingers on the tail
MOT: If his tail's on this end where's his mouth?
CHI: Right there.
MOT: His mouth must be on...
MOT: PHYD_moves child's fingers to the other end of the fish
CHI: ...that side.
MOT: Right there it is.
MOT: PHYD_touching child's fingers to the fish's mouth
MOT: He has funny fish lips.

In the above example (52), Molly's mother followed her daughter's lead in allowing her to ask for the information she wanted. Molly's attention was already

[5] Incredibly, at one point in time this strategy was recommended by behaviorists for training attention in blind children. Indeed, Foxx (1977) claimed that 'the facial orientation of a blind person toward the speaker provides at least some indication of listening behavior' (p.489).

directed toward an object of interest to her, so her mother's use of *physical direction* was requested not imposed. While sighted children generally have full, immediate and temporally continuous access to whole objects, blind children's access to the gestalt of an object is sequential and temporally limited. Unlike sighted children who typically learn to recognize whole objects as gestalts first, and then procede to learn about an objects parts, blind children learn about the spatial and physical features of objects by building an understanding of their gestalt through first recognizing their parts. The above example, illustrates how Molly has been socialized through the use of various routines to gain access to the kind of information she needs to develop knowledge about things in the world that she cannot access through vision.

First, Molly's request for information was part of an established verbal routine. Her mother was a very frequent user of the verbal ATTENTION-ELICTING CUE, *Do you wanna* followed by a proposal. At 38-months, Molly was also familiar with the Why-question format and she was fluidly transforming wh-questions into requests. In addition, her growth in understanding how to make requests was evident in her accurate use of first person; at 30-months she would likely have produced an exact repetition of her mother's request form saying, *Do you wanna see why that's a fish?*

Second, early on mother's requests in this format were typically followed by a *physical direction* to the object of interest, in effect, showing her the referent. However, at 38-months, Molly did not always need physical contact with referents to get the information she wanted, so her mother first attempted to fill her request with a verbal only response (*Well he has fins and a tail and a silly mouth*). At 38-months, Molly had previously 'observed' various fins and tails and mouths. Here, she was not seeking information about word-referent relations, rather she was seeking information about this particular fish and where its mouth is located and that requires *physical direction*.

In addition, through initiating this exchange, Molly was not only asking for specific information, she was also asking for the repetition and practice she needed to learn how to learn. In her response, Molly's mother offered a verbally mediated *physical direction cue* that is part of another routine about how to locate parts on a whole object (*Here here's its tail. PHYD_puts the child's fingers on the tail. If his tail's on this end*. *Where's his mouth?).* This kind of exploration is critical for children who need to construct the whole object from its parts. Indeed, almost all of the *physical direction* cues used by the mothers of the blind children in this study were employed in the service of grounding parts within the context of their larger form (Molly n = 91, Ethan n = 79, Amy n = 42. In contrast, parents of children with at least enough available vision to visually locate parts almost never used *physical direction* (Sam n = 1, Ella n = 0, Tyler n = 1). Instead, they were able to successfully ground words referring to parts with a *pointing gesture* as in the example below (53).

(53) Ella 42-months TC1534 (sighted child)
MOT: Look at their teeth.
MOT: GES_points to the dinosaur's teeth

It is important to note that neither the *physical direction cue* coupled with the verbalization *Here here's its tail*, nor the *pointing gesture cue* coupled with the verbalization *Look at their teeth* were about making a WORD REFERENT CONNECTION. In other words, the children here were not learning words for parts of thing, parents were using their shared background knowledge of *tails* and *teeth,* respectively, to learn new and relevant *information* about these parts of fish and dinosaurs.

In addition, the mothers of the blind children talked far more about parts than parents of children with available vision (discussed further in section four) using vocabulary to assist them in building an understanding of what constitutes a particular object. In other words, for a blind child an object *IS its parts.* So the use of *physical direction cues* is crucial for blind children in order to afford them access to the specific kind of information about parts that they need to build knowledge about objects in the world. They learn about parts and wholes through physical contact at first, then with sufficient vocabulary relating to promenant parts, they are able to quickly identify an object by collecting haptically its parts. As they build understandings about what parts typically belong to particular whole objects, they can use their expectations to identity whole objects more quickly (i.e., *fish have fins*).

ATTENTION-DIRECTING CUES-Verbal

Verbal ATTENTION-DIRECTING CUES identified in this study were two types of formulaic 'slot filler' frames that function as verbal points toward the parent's intended referent/common ground. They included *deictic introducers* and *perceptual imperatives* that occurred in an initial position in an utterance and included a stated referring object, quality or action. These familiar, often repeated, frames provide a 'slot' for referents that can be interchanged with newly available objects and actions. For example, ***That is*** *a dog* provides a frame and a slot, ***That is*** *[referent].* Frames that did not include a referring noun, adjective or verb, but filled the "slot" with a pronoun such as ***That's*** *the one,* were not counted because the emphasis in this study was on determining when the parent provided an explicit reference to an particular object or action. The substitution of pronouns for referents typically occurs when either the child already knows the 'name' of the referent or when some aspect of the object or action is the intended common ground. *Perceptual imperatives* included utterances with initially placed perceptual words such as *Look at the frog, feel its nose, Smell that juice, Listen to the bell.*

Deictic Introducers

Within their play sessions parents often used a small set of fixed grammatical frames that serve to highlight particular referents. Tomasello (2003) posits that children's first active use of words occurs "within the common ground of joint attentional engagements, and include both gestural and linguistic means" (p. 31). He provides examples where many of children's first words include a small number of high-frequency words such as certain function words that have highly recurrent discourse functions; for example, demonstratives (*this, that, those,* these) that serve to specify potential available referents. Many of these words are instantiated in fixed frames that parents employed rather repetitively in naming particular referents in establishing a common ground within the *joint attentional* play activity in this study. In addition, when used for the purpose of establishing a common ground along with nonverbal deictic cues, they serve to further clarify the available options for selecting the intended referent, thus mediating the Quinean conundrum.

Since the words used in *deictic introducers* are typically in the early vocabularies of children, they likely understand their intent when they are used in the service of establishing word-referent relations at 18-months. In addition, children use gestures communicatively before they use words (Goldin-Meadow, 2003), and they use gesture-word combinations before their grasp of language is sufficient to express their desires (i.e., *point+* milk) (Clark & Kelly, 2006).

Deictic introducers took the form of assertions and questions (Clark & Wong, 2002) that parents used either to present a new word or test the child's current knowledge of a, perhaps, insecure word. Assertions identified in this study were expressed through a variety of deictic pronouns: demonstrative place adverbs *here's* and *there's*, demonstrative adjectives *this is, that is, these are* and *those are* and the personal pronoun *it's.* These "item-based constructions" (Tomasello, 2003) could also be transformed into question form as in the following: *"Is this [X}?, Are these [X}? or Is it {X}?.* Other very frequent 'name game' type questions including the Wh-question frames *What, Who, or Where* as in the following examples: *What's that?, Who's this? Where's the ball?* Typically, in using a question form, parents either supplied the answer within the slot (*Is this kitty*?) providing a model for the referent or they waited briefly before supplying the referent themselves (*What's that? That's a tower.*)

All parents in this study used a variety of *deictic introducers* to *point* to referents in order to establish a common ground for the purpose of labeling an object; thus, providing a word-referent mahing opportunity. While there was a range in the frequency with which parents used *deictic introducers*, differences did not appear to relate to degree of vision. Prior research related to the use of *deictic introducers* has found similar variation in the amount of usage among parents of young language learners (Clark & Wong 2002).

There was no overall pattern of increased or decrease use over the 18- to 42-months month age slices or for any individual parent. However, the purpose for which these forms were used did change in a manner similar to other ATTENTION-DIRECTING CUES. Early on *deictic introducers* were produced in short *joint attentional engagements* and they functioned as word-referent training opportunities in a 'name game' activity. Later they were used more within the flow of current activity involving a larger array of possible referents and more fluid on-going conversational engagements such as pretend play, building or putting together parts, or playing with a set of objects. Hence, the word-referent opportunities afforded by these *deictic introducers* expanded from learning individual words for things to learning more about object properties and kinds and relationships among in a wider realm of options. The following examples represent a sampling of *deictic introducers* and Wh-question frames from each of the parents and across early and later age slices:

Deictic introducers

Demonstrative adjectives:
That is [X], That's [X], That's not [X], Is that [X], That has [X]
This is [X], Is this [X], This has [X]
These are [X], Are these [X]?
Those [X], Are those [X]?
Demonstrative place adverbs:
Here's [X], Here is [X], Here are [X],
There's [X], There are [X], Is there?, Are there?
Demonstrative pronouns (also includes persona pronouns but only objects and actions are considered here):
It's [X], Is it [X]
Wh-question frames containing deictic introducers:
What's this, What's that, What are those, What are these?

Deictic Introducers: Within early joint attentional engagements (18- to 26-months)

The following example presents a typical 'name game' frame. Amy was partially sighted and at 18-months needed to bring small objects right up to her eyes to examine them. A *pointing gesture* would not have been sufficient to mark the word-referent relationship, so in this multisensory presentation of a new word, the word and the referent were in very close proximity. Since the mother knews the answer to the question she was posing, this Wh-question + *deictic demonstrative* form must serve a special purpose when used with young language learning children. That purpose is likely to elicit an anticipatory response such that the child will "look" for an unfamiliar word. The anticipatory response was instilled, as in example (54), by the mother's quick response to her own question melded with close examination of the referent.

(54) Amy 18-months TC3750 (partially sighted child)

MOT: **What's** this?
MOT: GES_holds a mouse up to the child's eyes
MOT: ACT_toggles it to make it squeak
MOT: ACT_toggles the mouse in front of the child's eyes until it squeaks
MOT: Mouse mouse.
CHI: ACT_takes the mouse and brings it close to her eyes
MOT: Mouse.
CHI: Mouse.

The next example (55), reflects a more "direct teaching" frame for making WORD REFERENT CONNECTIONS. Sam's father presented the referent, the monkey, in just the right position for his degree of vision, then delivered an ostensive marking by presenting the monkey's sound. As soon as Sam's attention was secured, in this case by eye gaze, his father presented its label. The stress marking on *is* further highlights the multisensory connection between the referent (monkey), its label, and its distinctive (in this case rather loud) sound.

(55) Sam 18-months TC127 (partially sighted child)

FAT: GES_holds monkey in front of child. (deictic gesture)
FAT: ACT_squeezes the monkey to make its sound.
CHI: EG_looks at the monkey
FAT: **That IS** a monkey. (d*eictic introducer*)

Parents introduced new words not only as single instances as in the above example (58), but they also introduced words in the context of on-going play while children were acting on objects. In the following example (56), there was not a clear reference to what *the cops* typically referred to, but rather the child likely learns that in this play context *the cops* refers to the car with the siren. That word-referent connection was sufficient for engaging in this particular activity.

(56) Amy 22-months TC16 (partially sighted child)

FAT: ACT_presses the activation button on the police car and the siren sounds and he pushes the car toward the child
MOT: **There are** the cops. (*deictic introducer)*
CHI: ACT_moves the police car back and forth and activates the siren

Children pick up on the utility of *deictic introducers* and apply them frequently to get information they want or to practice what they are learning. In the following example (57), Tyler, drawn to the enormity of a toucan's beak, initiated a learning sequence that included several uses of *deictic introducers* to aid word-referent accuracy by making comparisons (with a *nose*), to extend the use of a word to other instances, and to make corrections to inaccurate extensions of meaning. Verbal input, including label repetition, was accompanied by embodied tactile exploration that further serves to clarify what constitutes a *beak*.

(57) Tyler 26-months TC3513 (sighted child)

CHI:	What's that?	
CHI:	ACT_feeling the toucan's beak	(*tactile exploration*)
MOT:	**That's** the beak.	(*deictic introducer*)
CHI:	GES_holds the toucan out to Mom	(*give/take exchg)*
MOT:	GES_takes the toucan	(*deictic introducer*)
MOT:	**It'**s a toucan.	
MOT:	A tropical bird.	
MOT:	His beak.	(*label repetition*)
MOT:	GES_points the beak toward the child	(*deictic gesture*)
MOT:	**It's** kind of like his nose.	(*deictic introducer*)
MOT:	GES_rubs her nose with her index finger	(*deictic gesture*)
MOT:	He's got a beak.	(*label repetition*)
MOT:	GES_rubs the toucan's beak with her index finger	(*deictic gesture*)
CHI:	ACT_reaches out and feels the toucan's beak	
CHI:	Beak.	
MOT:	A beak.	(*label repetition*)
CHI:	It's a beak.	
MOT:	**It's** a beak.	(*deictic introducer*)
MOT:	GES_holds up the cardinal	(*deictic gesture*)
MOT:	Does he have a beak?	(*a new instance*)
MOT:	GES_holds up the cardinal closer to the child	(*deictic gesture*)
CHI:	Yeah.	
CHI:	EG_looks at the cardinal and then back to the toucan's beak in his hands	
MOT:	A little one.	(*contrasting info)*
MOT:	GES_holding the cardinal up to the child	(*deictic gesture*)
CHI:	Little one.	
MOT:	That's a great big one.	(*contrasting information*)
MOT:	GES_points to the toucan's beak	(*deictic gesture*)
MOT:	Hah **is this** a beak? (*Attn-Eliciting Cue signals change*)	(*deictic introduce*
MOT:	GES_holds up a duck	(*deictic gesture*)
CHI:	Noooo.	(*formulaic response)*
MOT:	That's not a beak?	(*deictic introducer*)
MOT:	GES_holding up the duck	(*deictic gesture)*
CHI:	It's duck.	
MOT:	It's a duck.	(*deictic introducer*)
MOT:	And the duck has a...	(*formulaic prompt*)
MOT:	GES_puts her thumb and index finger around the duck's beak	(*deictic* gesture)
CHI:	Nose.	

MOT:	A nose?
MOT:	It's kinda like a nose.	(*comparative info)*
CHI:	That's a nose.
CHI:	GES_points to observers nose
MOT:	Carolyn has a nose.	(*new comparative instance*)
OBS:	I have a nose.
CHI:	ACT_touches his nose
CHI:	I have a nose.
MOT:	You have a nose?
MOT:	Hah I think...	(*Attn-Eliciting Cue signals change*)
MOT:	ACT_picks up a stuffed dog
MOT:	**Who has** a nose?	(*Wh-question frame)*
MOT:	GES_holds up a stuffed dog in front of the child	(*deictic gesture*)
CHI:	Doggy.

The sets of toys offered to the parent-child dyads in this study were designed to afford opportunities to talk about relationships among objects. *Deictic introducers* present opportunities for making comparisons and contrasts as in the example (58) below that fosters clearer understanding of word-referent mahes and connections with other words.

(58) Sam 18-months	TC354	(partially sighted child)
FAT:	GES_picks up a cow (thinking it is a horse) and looks at it
FAT:	**That's** not a horsie.	(*deictic introducer*)
FAT:	**This is** a HORSIE.	(*deictic introducer*)
FAT:	GES_holds up the horse in front of the child	(*deictic gesture*)

Deictic Introducers: Within later joint attentional engagements (30- to 42-months)

While the use of common introducers early on is often in service of the 'name game' they may serve other purpose later on. The use of a definite article in a *deictic introducer* + NP indicates that the noun is given. In other words, the mother can assume that the child knows that the noun she uses is salient in the current environment and that its referent is understood by the child. If this assumption proves false, a teachable moment arises.

(59) Ethan 30-months	TC2821	(blind child)
CHI:	Wanna touch it.
MOT:	GES_holds the airplane out to the child	(*deictic gesture*)
CHI:	GES_takes the airplane from Mom
MOT:	**That's** the airplane.	(*deictic introducer)*

In example (59), Ethan's mother assumed that Ethan knew the term *airplane* and her use of the term here indicates that the referent of airplane has already been made salient in the current context and is, therefore, physically available for both mother and child. This kind of ubiquitous linguistic marking provides the blind child with cues about what is present but he cannot see in his environment. In the above context, the mother's use of the definite article in *That's the airplane* is not about naming referents, it is about making them available. All is well here but, consider what occurred prior to this exchange in the following example (60):

(60) Ethan 30-months TC2749 (blind child)

MOT:	Wanna play with **the** flying toy?	
CHI:	No.	
MOT:	Oh.	
MOT:	Not with **the** airplane?	
CHI:	Want the airplane?	[NOTE: Ethan's question inflection is part of the blind child's language strategy of repeating the parent's uttterance. He means 'I' want the airplane.]
MOT:	Okay **it's the** little airplane.	

In example (60) above, Ethan's mother's use of the definite article after an ATTENTION-ELICITING CUE (*Wanna X*) elicited a negative response that suggested that Ethan did not know what *the flying thing* is. She then used a definite article with the noun that she knew was familiar to him, *airplane*. His knowledge of the term was ratified by his response, and she further acknowledged his understanding with a pronoun introducer followed by the definite article *the* and the known noun, plus specifying additional information about what particular airplane, *the little one* is available. Then with a clear grasp of the child's understanding of both the word and the currently available referent, Ethan's mother returned to connect what he didn't know with what he surely does now know.

(61) Ethan 30-months TC2822 (blind child)
MOT: You gotta go fly::: in the air.
MOT: ACT_moves the airplane in the child's hands
MOT: SD_flying sound whoooo.
MOT: **It's** a flying toy.

In the above example (61), Ethan's mother used an *introducer pronoun* (*it's*) followed by the indefinite article, *a,* to connect new information to the currently available referent. In addition, she provided an embodied description of two of its canonical features, airplanes are objects that fly, and they make a distinctive sound.

In the following example (62), Ethan's mother used a *deictic introducer* to connect an object part with its name. Ethan was fingering a part, the fin of a plastic shark, not scanning the whole object. His mother followsed in to his current tactile focus and provided a label using a *deictic introducer.* Using a *demonstrative pronoun* to replace the noun, *shark*, highlighted that what she was labeling was not the whole object, but rather the part of the shark that was currently of interest to Ethan.

(62) Ethan 38-months TC1314 (blind child)
CHI: ACT_has his fingers on a plastic shark's fin
MOT: **That has** fins.
CHI: That's a fin Mama.
MOT: Correct.

The next example (63), illustrates how parents use *deictic introducers* to offer labels for objects with which children may already have considerable experience. In other words, children may be very familiar with some objects for which they don't yet have specific labels. In the following example (63), Ella had very likely played with lots of pots and pans before, but her mother evidently didn't think she knew their specific labels and distinguishing features. While the *deictic introducers* she used are frequently employed with younger children in offering single WORD REFERENT CONNECTIONS, she did two things that work for older children, but not for younger ages. First, she began with a statement that indicated that she was going to do some 'direct teaching' about some objects in their play activity and that this would interrupt their current play focus. Second, she indicated that this would be new information, something they had not talked about before. Her offers presented, not only distinct WORD REFERENT CONNECTIONS, but also clear contrasts between the two common objects. At 38-months in the following example (66), the Ella's uptake was not a repeat of the labels, but was a request for further information about the objects. At 38-months Ella took verbal initiative in negotiating the meaning she wanted (Bloom & Tinker, 2001).

(63) Ella 38-months TC4312 (sighted child)

MOT: Lemme show you something.
MOT: We don't really talk about this but this...how these are little…
MOT: GES_holds up a pan
MOT: **These are** called pans.
MOT: ACT_puts the pan on a burner
MOT: And **this is** a POT.
MOT: GES_holds a pot in front of the child
CHI: GES_takes the pot
CHI: What's it for?
MOT: Pots are for making sou::p and it's usually bigger.
MOT: And pans are for frying things like grilled cheese and French toast and eggs pancakes and they're flat.
MOT: ACT_picks up the pan and puts it down on a burner

Perceptual Imperatives

Perceptual imperatives direct attention to particular sensory aspects of objects that can facilitate WORD REFERENT CONNECTIONS by inviting a specific kind of contact. For parents of young language learning children *perceptual imperatives* specify a particular way to make contact with an object. Objects have affordances that make their essential properties directly perceiveable; for example, the rose affords smelling. What particular *perceptual imperatives* parents use when they talk about objects in on-going play interactions make their referents available in specific ways that serve not only to constrain the possibilities for mutual focus, but also amplify important characteristics of the object.

So *perceptual imperatives* are about providing access opportunities both in the sense of making a referent option more transparent, and in the sense of making available its affordances. In effect, employing a *perceptual imperative* sends a coded vector toward the referent, a form of multisensory deixis.

In the following example (64), Ethan's mother employed tactile deixis to connect word and referent. Santa's beard afforded touching. (What child who has sat on Santa's lap has not reached for his beard?) Ethan's mother used *physical direction* as an *indicative action cue* along with the *perceptual imperative feel* to give him tactile direct access to the referent (a toy Santa) along with an identifying characteristic that he will likely remember when he meets the actual Santa. While a sighted child would not receive a *physical direction cue*, along with the *perceptual imperative "Look at his beard"* it is likely that the parent of a sighted child would provide a *demonstrating action cue* by stroking his beard to indicate this affordance.

(64) Ethan 30-months TC827 (blind child)
MOT: **Feel** his beard.
MOT: PHYD_puts the child's hand to Santa's beard

The following two examples (65 and 66), illustrate aural deixsis in producing a sound vector to their referents. Lions roar and mice squeak. Their sounds make them directly perceivable in this way to the sighted children in these examples and also to blind children. The gestures and actions that accompany the *perceptual imperatives* also provide deictic cues that not only provide access, but demonstrate how these particular toys produce their affordances.

(65) Ella 22-months TC2906 (sighted child)
MOT: ACT_picks up a mouse and it squeaks
MOT: GES_holds the mouse close to the child
MOT: Hah! **Listen** Em a mouse.

(66) Tyler 22-months TC1004 (sighted child)
MOT: **Hear** that tiger roar.
MOT: ACT_puts the tiger on its sound button and it roars

In the following examples (67, 68) both parents employ visual *perceptual imperatives*, but Sam's father (67) uses an *indicative action cue of placing* the referent, a horsie, in the child's line of sight. However, Ethan's mother (68) provides a *physical direction cue* providing him with tactile rather than visual access. For a blind child, the pairing of visual words with direct tactile access suggests that, contrary to Landau and Gleitman's (1985) *syntactic bootstrapping* proposal, it is more parsimoniously possible that blind children are socialized to the understanding that for them 'visual' words provide access to referents in a tactile manner. More generally, *perceptual imperatives* are about access, and Ethan's primary modality for accessing information about objects is through exploring them with his hands.

(67) Sam 18-months TC353 (partially sighted child)
FAT: **See** the horsie.
FAT: ACT_positions the stuffed animal in front of child.

(68) Ethan 30-months TC1949 (blind child)
MOT: **See** this ladder.
MOT: PHYD_puts the child's hand on the ladder

ATTENTION-DIRECTING CUES-Composite Cues (AD Cue + Speech)

From the beginning of life adults talk when they are interacting with their infants. They not only talk to them, but when they talk, they physically interact with them through touch and movement, they gesture by holding up or giving them objects, and they talk about what actions the child is performing. For the infant, speech is embodied, it emanates from parents and occurs in conjunction with familiar routines in familiar places. Hence, the multimodal nature of deixis is not new to the young language learning child. On seeing a *deictic gesture* or hearing or feeling an *indicative action* there is an expectation of connected speech that is directed to them for the purpose of sharing something. ATTENTION-DIRECTING composite frames (AD + speech) consist of two elements each presenting information regarding a referent in a different modality, a *deictic gesture* or *indicative action* or *physical direction* that locates the referent and the speech that relates to the referent.

In Western middle class communities parents tend to engage their children in joint attentional exchanges that involve direct instruction in making WORD REFERENT CONNECTIONS using composite speech and nonverbal ATTENTION-DIRECTING CUES. When these ostensive 'word game' activities have been established, occasionally, but very rarely, a parent will use the routinized format of these exchanges in a familiar and on-going context without using speech. In the following example (69), Tyler and his mother were playing with an animal train set where putting a plastic animal on its corresponding sound button produced the animal's sound. This was a very familiar play routine for this dyad, so in this case the mother did not need to cue her child verbally; he was able to complete the expected action with a visually directed gesture augmented by emotive facial expression.

(69) Tyler 18-months TC126 (sighted child)
CHI: ACT_presses the monkey sound button on the animal train car
CHI: EG_looks at Mom
MOT: FE_looks at child [shared gaze] with mouth open eyes wide open
MOT: GES_picks up the plastic monkey and holds it in front of child
MOT: GES_points to the monkey sound button
CHI: GES_takes the plastic monkey and puts it on the monkey sound button
CHI: ACT_ presses down to make the monkey sound then takes the monkey off the train car and puts it on the sofa

The above case (69) is rare. Far more frequently gesture and speech are combined and "cooperate …to present a single complex meaning" (McNeill, 1985, p.

353). In this study, deictic gestures were almost always accompanied by speech. In the following canonical example (70), Ella's mother used an ATTENTION-ELICITING CUE to secure Ella's attention first (*Oh*). Ella's gaze toward her mother ratified her anticipatory stance. In other words, on hearing an ATTENTION-ELICITING CUE, Ella expected that her mother intended to share something. Then she employed an ATTENTION-DIRECTING CUE, a *pointing gesture,* to direct the her attention toward the object, a duck. When Ella's eye gaze indicated that she had access to the duck, her mother provided a *deictic introducer* (*There's*) to present the label (*the duck*). This example is consistent with work by Estigarribia & Clark (2007) that suggests that adults rely on the child's eye gaze after presentation of an ATTENTION-DIRECTING CUE (in this case a *pointing gesture*) to confirm that the child is attending to the intended object before introducing a label.

(70) Ella 22-months TC5515 (sighted child)

MOT:	Oh.
CHI:	**EG_looks at Mom**
MOT:	**GES_points to the duck beside the child**
CHI:	**EG_looks at the duck**
MOT:	**There's the duck.**
CHI:	ACT_looks down at her side and picks up the duck

In this study, the *hold up* + label composite was more common than the above *point* + label composite during the period of extensive word learning from 18- to 26-months of age. The *hold up gesture* was employed frequently with co-occurring Wh-questions + demonstrative adjective where the parent immediately followed with an answer (*What's that? A dog*.), thus modeling the question-answer sequence of a word-elicitation frame. In the following example (71), another question-answer sequence employing a demonstrative adjective (an inverted assertion turned into a question), Amy's mother provided the answer (the label, *rooster*) within the question format.

(71) Amy 18-months TC3720 (partially sighted child)
MOT: GES_picks the rooster up and holds it in front of the child
MOT: ACT_squeezes it to make it crow
CHI: ACT_explores the rooster with her hand
MOT: Is **that** a rooster?
CHI: Rooster.

In the following example (72), Tyler and his mother were playing with a Lionel train set. The mother's *hold up* gesture disambiguates the Lionel train from other possible available options for WORD REFERENT CONNECTIONS. Tyler had an extensive vocabulary of the names for types and parts of trains that were learned through explicit *hold up gesture* + label practice.

(72) Tyler 30-months TC3506 (sighted child)
MOT: GES_takes a caboose out of the box of trains and holds it up
MOT: This is a Lionel train caboose.

Parents in the above examples (70, 71, 72) employed ostensive composite marking of WORD-REFERENT CONNECTIONS in joint attentional engagements presented in 'word game' frames that are common during parent-child play in Western middle class communities. In these examples the gesture and the accompanying speech referred to the same entity, thus the speech foregrounded the label for the indicated referent. However, this is not always the case. Parents also employed a deici gesture with co-occurring speech that was in a complementary relationship to the accompanying gesture, thus foregrounding particular aspects of the referent rather than the referent itself. Consider the following example (73), where the gesture indicates the sound button on the fire truck, but the co-occurring speech refers to an action on the object to be performed by the child. This format introduces for the child, an affordance of the object whereby the child can produced a particular response. The substitution of a pronoun for the object name (the sound button) foregrounds the action (*push*) of immediate interest regarding the object. In the following case, the parent wants the child to perform an action related to the sound button.

(73) Ella 30-months TC3439 (sighted child)
MOT: Push that one.
MOT: GES_points to the activation button on the fire truck

A complementary relationship between the gesture and the speech components of (AD cue + speech) composite parent input may also foreground an attribute of the pronominalized indicated referent as in the following example (74).

(74) Tyler 18-months TC1434 (sighted child)
MOT: Where's the red one?
MOT: GES_points to the red block
CHI: EG_looks toward the red block

Give/Take exchanges afforded opportunities for learning object labels within on-going activity in a less directive manner. The learning of labels in this scenario is supported by the use of a *deictic introducer* and a *give/take* nonverbal ATTENTION-DIRECTING CUE. In the following example (73), Ethan and his mother are playing with a set of ocean toys. Ethan's verbal reply is typical of many blind children who, for a period of time, use memorized chucks of adult language rather than generative language. This particular scenario is one in which Ethan's mother frequently says, *Do you wanna [fish],* and offers the fish at the same time she utters the word *fish*. In his nonverbal response here, Ethan's nonverbal action confirms that he means that *he* wants the fish, but in his verbal response he used part of a *formulaic engagement cue* that he has learned along with the *give/take gesture* at a unit.

(73) Ethan 22-months TC4308 (blind child)
MOT: Oh here's a fish.
MOT: GES_holds out a fish toward the child
CHI: GES_reaches out and takes the fish
CHI: Wanna fish?

Since blind children do not have access to the visually directed cues described above, was expected that parents of the blind children would apply a more embodied approach in directing their child's attention by using nonverbal *indicative action cues* along with speech. Indeed, they did. Particularly during the period of rapid word learning from 18- to 26-months, they employed *indicative action cues* in a canonical labeling fashion in much the same manner as the parents of the sighted children employed *deictic gestures*. In the following example (74), at the 18-month age slice, Molly's mother employed a composite nonverbal *tap on the object* Molly was holding while emphasizing the word *TAP* in a co-occurring verbal ATTENTION-ELICITING CUE along with the action to be performed together (*formulaic engagement cue* + CONTENT MESSAGE) in order to direct attention to the joint action of tapping on the ball.

(74) Molly 18-months TC12253 (blind child)
MOT: **Let's** TAP a little ball.
MOT: ACT_**taps on** the ball in Molly's lap as she says "tap"
CHI: ACT_taps her hand on the pink ball

In the above example (74) the *indicative action cue* and the co-occurring speech (AD cue + speech) both refer to the action of tapping. But like the *deictic gesture* examples above (73) an *indicative action cue* and its co-ccurring speech can be in a complementary relationship where the speech is employed to describe an aspect of an unnamed referent. In the following example (75) the indicative action cue refers to the helicopter blade and the co-occurring speech refers to the action of the helicopter blade.

(75) Ethan 26-months TC4917 (blind child)
CHI: ACT_pushes the helicopter blade sound button again
MOT: This goes round and round.
MOT: ACT_jiggles the helicopter blade touching the child's hand

In the following (AD cue + speech) composite example (76) the *indicative action cue* refers to the DV tape box, and the speech refers to a requested action.

(76) Molly 18-months TC3449 (blind child)
MOT: ACT_touches the DV tape box in the child's hand
MOT: Clap this on the table.

Parents of sighted children also used *indicative action* cues concurrently with speech, but much less frequently. They were typically used to clarify or disambiguate a referent. In the following example (77), Ella did not provide an appropriate response to her initial attempt to locate and label the referent of her question. Surmising that the label was still unfamiliar to Ella, she clarified the object, a whale, using an embodied gesture, *tapping on the object the child was holding,* along with a direct offer of the label using a *deictic demonstrative (It's).*

(77) Ella 26-months TC1410 (sighted child)

CHI:	ACT_picks up a small plastic whale
MOT:	Do you know what this is?
MOT:	GES_points to the whale in the child's hand
CHI:	Uhhuh.
MOT:	Do you know what it's called?
CHI:	Uhhuh.
MOT:	This one.
MOT:	ACT_taps on the whale in the child's hands
MOT:	It's a wha::le.
CHI:	Whale.

Parents consistently used speech along with *physical guidance cues.* However, rather than the typical synchronization of speech + ATTENTION-DIRECTING CUE in composite presentations, speech usually preceded the use of a *physical guidance* ATTENTION-DIRECTING CUE to prepare the child for receiving a potentially intrusive cue. In the following example (78), Amy's father directed her attention using a *deictic introducer* ("*here)* to alert her to impending directive physical contact, and a *perceptual imperative* along with *physically directing* her hands to the location of the sound buttons on a fire truck.

(78) Amy 22-months TC607 (partially sighted child)

FAT:	You wanna see where the button's at?
CHI:	Yeah.
FAT:	Here.
FAT:	PHYD_takes the child's hand
FAT:	Let's see your fingers.
FAT:	PHYD_moves her fingers to the activation button
FAT:	Watch this.
FAT:	PHYD_puts the child's fingers on the button
FAT:	Push.
FAT:	ACT_pushes the child's fingers down on the activation button

One striking difference in the use of composite ATTENTION-DIRECTING CUES among the parents in this study related to the amount of speech used in combination with the nonverbal component of the expression. Specifically, the mothers of the blind children provided many more verbal directional cues along with their nonverbal ATTENTION-DIRECTING CUES to help their child locate objects in the environment. In the following example (79), Molly was looking for the monkey that goes with the animal train. To locate the animal train that is on the coffee table, Molly's mother structured her search by first using an ATTENTION-ELICITING CUE (*formulaic engagement cue-"Do you wanna…"*) to signal that she wanted to share in Molly's focus to assist her. She specifies the search action they are going to perform together, ("…FIND him?) and backgrounds the object by using a pronoun replacement for *monkey*. Then she guided Molly's search using a *composite*, the verbal component, a non specific *deictic place adverb* ("He's right *there*) and the nonverbal component, an *indicative action cue* (*taps on the coffee table*) providing a sound vector to the general target of their search. The next segment of the search grounded Molly in familiar territory providing a frame transferable to other searches. Specifically, she used language relating to the body (*by your left hand*), a constant for Molly, and names for objects in the immediate environment (also constants) that afford anchors for this and future searches (*on the table*) along with another *indicative action cue* bringing the sound vector closer to the target object.

(79) Molly 26-months TC544 (blind child)

CHI: Monkey.
MOT: Do you wanna **FIND** him?
CHI: Wanna find him.
MOT: He's right here.
MOT: ACT_taps on the coffee table
MOT: By your **left hand**.
CHI: ACT_reaching in the direction of the toy bag not the items on the coffee table
MOT: Reach over this way.
MOT: ACT_taps next to the toys
MOT: He's right here on the table.
MOT: ACT_taps her fingers on the coffee table near the toys
CHI: ACT_moves her fingers to the monkey sound button
CHI: Monkey monkey monkey
MOT: You found the monkey.

The blind child's input regarding locating objects in the environment requires considerably more language input to socialize the child in routines that can lead to independence in locating unseen objects. This increased language input maybe another way that blind children 'learn language through language.' What is a glance for the sighted child is a verbally mediated point-by-point linear search for the blind child. This entails use of alternative nonverbal embodied ATTENTION-DIRECTING CUES and more extensive use of verbal ATTENTION-DIRECTING CUES with joint attentional engagements that socialize the blind child into the ways of navigating through and finding objects in the environment.

4.2.3 ATTENTION-DIRECTING: Discussion

The purpose of using an ATTENTION-DIRECTING CUE is not only to draw the child's attention to an object or action, to provide an avenue of access; but also to let the child know that the parent is attending to the same object or action. To be in joint attention means that both parent and child are aware of the other's focus of attention. A situation where parent and child are simply playing with the same objects does not meet the requirements of *joint attentional engagement* until there is a successful attempt on the part of either parent or child to direct the attention of the other to the same object or action

Tomasello & Todd, 1983). The use of ATTENTION-DIRECTING CUES is most basically about establishing mutual access to a common ground.

While ATTENTION-ELICITING CUES are always followed by ATTENTION-DIRECTING CUES, ATTENTION-DIRECTING CUES need not be preceded by an ATTENTION-ELICITING CUE. This is because implicit in directing attention is directing attention for someone. ATTENTION-ELICITING CUES have only one purpose and that is to notify the child of a desire to share attention. ATTENTION-DIRECTING CUES, on the other hand serve the inclusive purposes of (1) notifying the child of a desire to share attention (2) to the location of a common ground. Studies often lump ATTENTION-ELICITING CUES and ATTENTION-DIRECTING CUES together under the general rubric of *attention-getters.* This study separates them in order to highlight a developmental *Joint Attentional Socialization Process* that begins with socializing the child to the importance of paying attention in a dyadic manner, then, using different cues socializes the child to locate to something outside of the dyad. Through the actions performed within this socialization process, as children learn the culturally established ways of managing their attention, others' intentions are made manifest.

ATTENTION-DIRECTING CUES provide access, a *point*, so to speak, to the intended common ground. Because visually impaired children do not have the same access to nonverbal visually oriented *deictic gesture cues*, but they do have access to nonverbal *indicative action cues* and nonverbal *physical direction cues*, it was expected that parents' use of various ATTENTION-DIRECTING CUES would differ according to degree of sight. For example, the canonical *point*+label scenario used in most research on the connection between joint attention and language development is not available to blind children. Since the blind children in this study learned language at about the same pace as their sighted peers, presumably they were able to make WORD REFERENT CONNECTIONS in other ways.

With regard to visually oriented nonverbal *deictic gestures cues,* use of the canonical gesture types *pointing* and *holding up an object to the child's line of sight*, was inversely related to the degree of the child's sight. As expected, parents of the blind children did not use these cues (except one parent who used them in a habitual, but nonfunctional manner). The parents of the partially sighted child with more usable sight used fewer of these cues than the parents of the sighted children, but more than the parents of the partially sighted child with less vision. Parents of sighted children used *deictic gesture cues* far more than any other cue type.

With regard to the two tactilely oriented nonverbal *indicative action cues,* all parents used these cues indicating that they were options even for parents of children with sight; however, they were used very rarely if sight was available. The tactile cues, *touching the child with the referent* and *tapping a referent the child is holding,* were used in situations where *holding up* the referent would normally afford visual access. Particularly with less familiar referents and referents that are not part of regular routines, *touching the child with the referent* facilitates a WORD-REFERENT CONNECTION. In the following example (80), Molly had been exploring the hole in a lid that belonged to a pot that was part of some familiar cooking toys she was currently playing with. She was exploring the surface of the lid, not using it in its usual capacity. She was familiar with the object and its typical placement on a pot, but not word *lid*. Her mother's *indicative action cue* was used to help her locate the lid to continue her exploration of the its form while she uttered its label. Using the word *lid* made it clear that what she was playing with was the lid in its familiar form with even though she was not currently using it as a lid.

(80) Molly 18-months TC3728 (blind child)

MOT: ACT_picks up the lid and taps it on the child's chest
MOT: Lid.
CHI: ACT_takes the lid from Mom and puts it to her mouth and sticks her tongue through the hole and leans toward Mom

So although parents of sighted children occasionally used tactile *indicative actions cues*, deictic cues provide the most fluid access, and the preference appeared to be to use cues that provide the most efficient access for the child rather than a wider variety of cues. ATTENTION-DIRECTING CUE use by the parents of the two partially sighted children also provides support for cue use based on the modality providing the most direct access. The parents of the partially sighted child who had usable, but limited, sight used ATTENTION-DIRECTING CUES in a manner similar to parents of the sighted children. They used few tactile *indicative action cues* and they used *deictic gestures cues* with about the same frequency as the parents of sighted children. The parents of the other partially sighted child used more tactile *indicative action cues*, but still far less than the parents of the blind children, and they used fewer *deictic gesture cues*, but far more than the parents of the blind children.

Using a sound vector as a *point* in the direction of a referent, *tapping for orientation,* was used by all parents, but much more by the parents of the blind children. This is primarily because the parents of blind children used *tapping for orientation* for some purposes that were specific to establishing common ground in the absence of sight. For example, they tapped on objects to create stable landmarks for locomotion in familiar environments (i.e., tapping on the coffee table, or the edge of a doorway) often with concurrent labeling of the objects. They also used tapping to create an embodied grounding for first person pronoun use.

There were two ATTENTION-DIRECTING CUE TYPES where use did not appear related to degree of vision. Both *give/take reaches* and *positioning/placing an object* are visually directed cues, but parents of blind children were able to support the use of the cues through other modalities.

Despite their visually directed oriented orientation, *give/take reaches* were used by the parents of blind children as frequently as the parents of the sighted children. The parents of the partially sighted children used them even more frequently. All parents reduced their use of *give/take reaches* before their children were 30-months of age. The act of giving and taking is well-practiced in infancy (Bruner, 1977; Gray 1978), and its routine is the foundation for turn taking. In this study from 18- to 30-months months exchanges of objects involving *giving/taking reaches* provided opportunities for making WORD REFERENT CONNECTIONS by labeling a referent within a well-established exchange routine as in the following example (81):

(81) Sam 26-months TC1432 (partially sighted child)
MOT: Here's bracelets.
MOT: GES_picks up the bracelets and holds them out to the child
CHI: GES_takes the bracelets and explores them with his hands
MOT: You know what bracelets are.
MOT: Where do they go?
CHI: ACT_keeps the bracelets in his right hand

Parents also used *giving/taking reaches* to "test" their child's understandings of words within play activity as in the following example (82).

(82) Sam 22-months TC5921 (partially sighted child)
MOT: Can I have a fork?
MOT: GES_holds her hand out for the fork
CHI: GES_gives Mom a fork
MOT: Thank you.

Since visually based *give/take reaches* afford rich opportunities for learning words and contrastive concepts, it is important that blind children are able to engage in these exchanges through other means. In this study, they frequenlty completed give/take exchanges without tactile prompts fluidly particularly in routine play with familiar objects. Early give-and-take games couple physical actions with simple language and do not require sight, so blind children's participation is not disadvantaged. Through their participation, blind children are socialized in the language of turn taking as in example (82) above. For them language, rather than vision, is the most salient element of these routines, and this is one of the ways that blind children learn language through language. In familiar settings, with familiar objects they reach out when they hear specific words (rather than see an outstretched hand) such as, *Here's the X*, *Do you want the X*, or requests as in the following example (83):

(83) Molly 22months TC957 (blind child)
MOT: Can you hand Mommy your LITTLE football?
MOT: GES_holds out her hand
CHI: GES_gives the little football to Mom
MOT: Oh thank you.

Using deictic cues is about providing access to referents. *Positioning or placing an object* strategically so that a referent can be accessed most efficiently is clearly a way of indicating a referent, but it is rarely considered in this role (but see H. Clark, 2003). However, this study provides support for the use of this cue in establishing a common ground with the context of parent-child toy play, and indeed, it was the most frequently used *indicative action cue* for all parents.

Although there were differences in the frequency with which parents used *positioning or placing an object*, they did not appear to be related to the degree of sight of their child, but more likely to the personal preference or the demands of a particular kind of play. Of the four *indicative action cues* identified in the toy sessions in this study, *positioning or placing an object* appears to be less an adaptive cueing strategy than one that is natural to all parents.

The use of *physical direction cues* was inversely related to the degree vision of the children in this study. Specifically, the parents of the blind children used the most *physical direction cues* and the parents of the sighted children virtually never did. This contrast is exemplified further in the use of *physical direction* cues by the parents of the two partially sighted children. The parents of the partially sighted child with usable but limited near and far point vision used about half as many physical direction cues as the parents of the blind children. The partially sighted child who had good near point vision but poor far point vision frequently brought objects close to his eyes to explore them. His parents, like the parents of the sighted children, used virtually no *physical direction cues.* The use of *physical direction cues* appears to be crucial for blind children in order to 'see' how the parts of an object make up its whole configuration. Sam, who spent a lot of time visually exploring objects by bringing them close to his eyes, did not need direct contact with object parts to 'observe' the whole object. The use of *physical direction cues* appears to be critical for blind children in order to 'see' how the parts of an object make up its whole configuration. While sighted children can quickly grasp a snapshot of a whole object, blind children must learn what whole objects are by tactilely connecting their parts.

So while all parents occasionally used *physical direction cues*, limited or lack of vision appears to demand their use in order to assist the child in accessing some essential information. Hence, *directing tactile contact with an object* appears to be primarily an adaption for visually oriented deictic cues when they are not available. In the following examples (84, 85), Molly who is blind is receives direct tactile, contact with the toucan's beak, while Tyler who is sighted follows a visually directed *point.*

(84) Molly 26-months TC2228 (blind child)
MOT: He has a beak.
MOT: PHYD_rubs the child's fingers along the duck's beak

(85) Tyler 26-months TC3522 (blind child)
MOT: He's got a beak.
MOT: GES_rubs the toucan's beak with her index finger

Physical direction cues were used rarely by parents of children who had sight, and sparingly and less and less overtime by parents of blind children. In the context of parent-child toy play they appear to be adaptive cues that are used primarily to afford access to the potential common ground in the most efficiently available modality.

In addition, *physical direction cues* that involve tapping or touching the child provide an embodied *point* to the referent that through direct contact ratifies the parent's desire to share the referent with the child. For the blind child this physical contact can provide a tactile vector in place of a line of gaze. The tap or touch, thus, specifies the referent and the parent's desire to share attention as does a *pointing gesture.*

It is likely that the intrusive nature of physical contact causes a discomfort and a distraction that is unnecessary when other modalities afford sufficient cueing. So what do *physical direction cues* provide for the blind child that lead to overriding this prohibition? Children with sight have immediate and continual access to whole objects, and upon a full configuration they can attach an anchoring label, and then proceed to explore and label its parts and gather all sorts of other pertinent information about the object. For the blind child *physical direction cues* enable access to various canonical object parts from which they can put together a whole configuration, not in a visual sense, but the sense that 'if it has the obligatory parts then it is what it is.' While the identification of parts through tactile exploration alone is possible with practice (Molly was able to identify many kinds of plastic dinosaurs by tactile means alone), most objects do not afford an access to canonical parts that is comparable to visual access. Physical direction enables a part/whole access for the blind child that provides a platform upon which to use co-occurring speech to provide essential information about objects. For example in (52) above, it is evident through Molly's initiation of a routinized request form that at 38-months she knows how to get the information she needs about an object. In this case, she invites physical participation in a learned joint attentional process in order to practice *how to* get information.

Most importantly, in establishing a joint attentional engagement, speech coupled with *deictic gesture cues* or *indicative action cues* or *physical direction* cues act as one synchronous unit, reinforcing, disambiguating and adding information related to the currently shared focus. In this study, parents consistently used verbal and nonverbal cues in concert to provide access to their intended referent. This is consistent with reports of adult composite use with one exception relating to *positioning or placing an object*. H. Clark (2003) suggests that in adult usage, 'directing-to' gestures such as *pointing* are rarely used without accompanying speech, but 'directing-for' actions such as *placing and positioning* are quite frequently used alone. For the child recipients of *placing and positioning indicative actions*, at least between the ages of 18 and 42-months, the parents in this study always offered *placing and positioning* and speech as a unit. The primary purpose of *pointing and placing indicative actions* is to provide maximal access to the referent for subsequent action with the object. H. Clark's "Preparatory Principle" states that "the participants in a joint activity are to interpret acts of placement by considering them as direct preparation for the next steps in that activity." (H. Clark, 2003, p. 260).

It is likely that young children are socialized to attend to and act on *placing and positioning cues* by the repeated pairing of the same verbal ATTENTION-ELICITING CUES and ATTENTION-DIRECTING CUES that are paired with other nonverbal ATTENTION-DIRECTING

CUES. In the following example (86), Molly's mother used composite speech and nonverbal cues to provide easy access to a toy bag. She initiated the joint attentional engagement with a verbal ATTENTION-ELICITING *vocative cue.* Then she used a verbal ATTENTION-DIRECTING *perceptual imperative cue,* concurrently employing a nonverbal *indicative action cue*, *positioning the object for access,* by holding the toy bag in front of the child and opening it wide for easy access. At 30-months, her mother's offer of toys from the toy bags available in the video taping sessions in her living room was very familiar. Familiar context and familiar people lend support for her attention to this cue.

(86) Molly 30-months TC3254 (blind child)
MOT: Molly girl see what's in the bag.
MOT: ACT_pulls the sides of the toy bag back and sets it in front of the child
CHI: ACT_reaches in the bag and pulls out the stuffed dog

Overtime the child learns that when something is placed in front of her in a distinctive manner within a familiar routine, his parent is requesting an action. *Positioning and placing actions* are generally embedded in familiar routines such as placing an item in front of a cashier at a store, so the need for further verbal direction is not necessary (H. Clark, 2003). For adults the referent of a *pointing gesture* is usually disambiguated through accompanying speech, but the intent of *positioning and placing objects* is heavily dependent on mutually construed context that is part of long-term accumulated background knowledge about what typically transpires in a particular situation. Young children await this contextual knowledge, and therefore, need additional supportive verbal cues.

In summary, ATTENTION-DIRECTING CUES used by parents in this study, *point* for the child, toward the referent intended by the parent in order to establish a common ground. They used ATTENTION-DIRECTING CUES to assist in making their intended referent salient for the child. So parents very clearly use ATTENTION-DIRECTING CUES that provide the most efficient access to their intended referents, rather than, for example, using a variety of different kinds of cues. Hence, parents use visually oriented cues to the extent that their children have available vision. Tactile cues are adaptive cues used primarily as substitutes for visual access. *Give/take reaches* may appear to be visually based exchanges, but, in fact, they are socialized in infancy within routines that are verbally and physically established, so their communicative purpose is entrained in a way that does not necessitate visual access. The blind children in this study learned early on to respond to verbal cues for giving and taking, so they were able to take part in these very essential communicative exchanges, for the most part, without adaptive tactile cues. *Positioning and placing objects* appears to be another ATTENTION-DIRECTING CUE that is available to all and used frequently to establish a common ground. It is likely that blind children extend their understanding that there is something being positioned for them through the language they have learn through participating in *give/take reaches*.

While blind and sighted children have similar access to ATTENTION-ELICITING CUES because they are largely vocally presented, blind chidren are provided access to ATTENTION-DIRECTING CUES primarily through adaptive tactile means. Tactilely based ATTENTION-DIRECTING CUES, are in the repertiore of sighted parents, but rarely employed. Results from this section indicate that by 18-months when vision was available and objects were within a visually accessbile range, parents overwhelmingly employed the canonically based visually oriented means of directing their child's attention (i.e., *diectic gestures*). To afford access to shared locations, the parents of blind children employed adaptive tactilely based means of directing their child's attention (i.e., *indicative actions*). Physically based means (*physical direction)* were employed more by the parents of the blind children, but overall use of the kinds of embodied cues that link vocalization and touch from birth, were rarely utilized by the time the children were 18-months of age. However, the types of formulaic language (*deictic introducers* and *perceptual imperatives*) that are used to garner the infants attention during close dyadic physical play interactions continue to be used along with all of the ATTENTION-DIRECTING CUES identified in this study after 18-months are employed to draw the child's attention outward in mutual focus to objects and actions into triadic engagement.

4.3 WORD-REFERENT CONNECTIONS

ATTENTION-DIRECTING CUES always 'point' to something. They are employed by parents to seek convergence with the child on a common ground that can afford, for the young language learner, a special opportunity for learning word-referent correspondences. Within this convergence parents can supply conventional labels to children in a manner that takes into account the child's own current activity as well as his interests as expressed in his everyday exploration of objects in his world. Multiple factors determine the probability that the parent and child will converge on a particular WORD-REFERENT CONNECTION. *Access* and *relevance* encompass what are most important in achieving successful convergence. The children in this study had different types of *access* to opportunities for word learning based on their degree of vision. Determining what is currently *relevant* for a young language learner is crucial in garnering his attention toward a potential word learning opportunity.

This section explores three questions regarding the establishment of joint attentional engagements that afford opportunities for word learning with particular attention to issues of *access* and *relevance*. The first question concerns *access* and, specifically, whether the ATTENTION-DIRECTING CUES employed by the parents of sighted and blind children in this study provide a similar degree of accessibility to their intended referents. Most studies of joint attention focus on eye gaze as a crucial conduit to WORD-REFERENT CONNECTIONS, but the blind children in this study progressed in their word learning at a rate similar to their sighted peers. Were they in a different, but still effective manner afforded access to WORD-REFERENT CONNECTIONS?

The second question concerns the provision of *access* to WORD REFERENT CONNECTIONS through the employment of canonical ostensive naming during the toy play activities in this study. Most experimental studies of early word learning, put a narrow focus on ostensive naming, specifically, the pairing of a gesture toward a target referent while labeling the intended referent. In experimental studies this frame is most frequently instantiated in a *pointing gesture* toward an object while naming the object (GES + label). There have been few studies aimed at determining how much this canonical situation is actually employed in everyday activites. So the second question relates to how often this canonical ostensive labeling frame actually occurred within the toy play activity in this study.

The third question concerns how parents assisted their child in establishing a common ground in the toy play situation. In other words, how did parents make sure that their child was focused on what they were talking about, and that it was *relevant* for the child, and therefore attention worthy? What was *relevant* for the child would likely afford the best word learning opportunity.

In the coding for this study, there were three requirements for parents regarding the establishment of a *joint attentional engagement* that afforded an opportunity for word learning: (1) ensuring that the child knew that her intention was to share attention and (2) indicating nonverbally and/or verbally an object or action in the accessible toy play environment to be shared, and then (3) providing a label for or other content information about the particular item to be shared. For beginning language learners this type of *joint attentional engagement* can be achieved in two ways: (1) by directing the child's attention to a particular referent in the toy play situation, or (2) by following-in to the child's current focus of attention. In order to highlight the effect of vision on these interactions, only the data from the parents of the blind and sighted children are included in this analysis. The overarching question in this section is: *Within toy play joint attentional engagements, how did the parents in this study make available to their children opportunities for connecting words to their referents?*

4.3.1 WORD-REFERENT CONNECTIONS: Results

Assessment of reliability for identification of instances where the parent followed in to their child's current attentional focus.

To assess reliability for establishing joint attention through following in to the child's current attention focus, an independent coder was trained in using a protocol to identify the following three types of follow-in parent behaviors: (1) the parent provided a label or other content message for an object or action that the child was already looking, thus requiring no redirection of his attentional focus; (2) the parent provided a label or other content message for an object or action that the child was touching or holding (but not acting on in an instrumental manner), thus requiring no redirection of his attentional focus; (3) the parent provided a label or other content message for an object or action that the child was already acting on in an appropriate instrumental manner, thus requiring no redirection of his attentional focus. Touching or holding an object with attentional focus entails, for a sighted child, also looking at it, so these instances were consistently coded as looking rather than touching or holding an object. Nonspecific verbalizations that did not include a referent or a information about a referent such as, *Oh that's cool!* were coded as, Other. A verbalization such as, *Oh that's a cool toy!* would have been coded as above according to whether the child was (1) looking at the toy, (2) touching the toy, or (3) performing an action with the toy.

Assessment of reliability for following-in behaviors

Reliability between the independent coder and the author for the three parent following in behaviors was establish on the basis of coding 20% of each of the 300 records coded per child and per age slice. Agreement for follow-ins where the child was already looking at the referent was 88%. Agreement for follow-ins where the child was already touch/holding the referent was 85%. Agreement for follow-ins where the child was performing an instrumental action on the referent was 88%.

3. Did the parents of the blind and the sighted children provide nonverbal ATTENTION-DIRECTING CUES *concurrently with object labels and/or* CONTENT MESSAGES *with similar frequency to assist them in accessing a common ground across the seven age slices from 18- to 42-months?*

This question relates to how many times parents of the sighted children versus the parents of the blind children employed a nonverbal ATTENTION-DIRECTING CUE along with some type of verbalization for the purpose of directing their child's attention to a potential common ground. Observations indicate that cross the 18- to 42-months month age span of this study, the parents of the blind and sighted children employed a very similar number of nonverbal ATTENTION-DIRECTING CUES concurrently with providing labels and/or CONTENT MESSAGES. Specifically, the parents of the blind children employed 902 nonverbal cues and the parents of the sighted children employed 988 nonverbal cues concurrently with verbalizations. For the parents of the blind children the total number of nonverbal cues employed along with speech included *indicative action cues* (*tapping the object the child is holding, tapping for orientation, touching the child with the object* and *position/placing an object*) (n= 387 or 72% of their composite use of nonveral ATTENTION-DIRECTING CUES and speech), *physical directon cues* (*orienting the child's body to aid in perceiveing a referent* and *directing tactile contact with an object*) (n = 170 or 19% of their composite use of nonveral ATTENTION-DIRECTING CUES and speech) and *give/take deicitic gesture* to which the blind children consistently responded (n = 82 or 9% of their composite use of nonveral ATTENTION-DIRECTING CUES and speech). For the parents of the sighted children the total number of nonverbal cues employed along with speech included *deictic gestures* (*pointing*, *holding up an object*, and *give/take*) (n = 642 or

65% of their composite use of nonveral ATTENTION-DIRECTING CUES and speech and *indicative action cues cues* (*tapping the object the child is holding, tapping for orientation, touching the child with the object* and *position/placing an object*) (n = 346 or 35% of their composite use of nonveral ATTENTION-DIRECTING CUES and speech (see Table 22).

Table 22. ***Total percentages and raw counts for nonverbal ATTENTION-DIRECTING CUES used along with providing a label or a CONTENT MESSAGE for the parents of the blind children and the sighted children summed across the seven age slices***

Cue Type for Blind and Sighted	NV ATTENTION-DIRECTING CUE + label or CONTENT MESSAGE	*Combined Totals for Blind and Sighted*
Blind		902
Indicative Action Cues	9 (387)	
Physical Direction Cue	72 (650)	
Deictic Gesture Cues	9 (82)	
Sighted		988
Deictic Gesture Cues	65 (642)	
Indicative Action Cues	35 (346)	

3.1 How frequently did the parents of the blind and sighted children use canonical ostensive labeling in their toy play sessions during the period of rapid expressive vocabulary growth at age slices 18, 22, and 26-months?

This question relates more specifically to how many times during the period of rapid language growth from 18- to 26-months the parents of the sighted versus the parents of the blind children employed the much-studied canonical ostensive labeling frame to assist their child in making WORD REFERENT CONNECTIONS. By 26-months all of the blind and sighted children had reached at least an MLU of Level III, slightly ahead of expectations (Molly MLU = 3.49 Level early IV, Ethan MLU = 2.56 Level III, Ella MLU – 2.56 Level III, Tyler MLU 2.60 Level III) (See Table 3).

For the blind children, ostensive labeling included presenting a label concurrently with one of the *indicative action cues* most similar to the deictic gestures of the sighted children (e.g., *tapping the object the child is holding, touching the child with the object*, and *directing tactile contact with the object*). Ostensive labeling for the sighted children included presentation of a label concurrently with either a *pointing* or a *hold up* gesture. Each age slice included 300 coded records with one adult verbalization per record yielding 900 opportunities to use an ostensive labeling frame over the three ages slices at 18, 22, and 26-months. During this period of time of rapid word learning, the parents of the sighted children employed canonical ostensive labeling frames (*gesture* + label) overall in only 3% of their verbalizations. In addition, both of the parents of a sighted child used the *point*+ label frame in less than 1% of their verbalizations. They used the *hold up* + label frame slightly more in about 2% of their verbalizations (see Table 23).

Table 23. ***Total percentages and raw counts for ostensive labeling instances used by the parents of the blind and sighted children summed across three age slices (18, 22, 26-months)***

	Ostensive Labeling			
Child	Point Gesture + label	Hold up Gesture + label	Total Gesture + label	Total Indicative Action + label
Blind				
Mollie	0	0	0	3 (28)
Ethan	0	0	0	3 (23)
TOTAL				3 (51)
Sighted				
Ella	< 1 (5)	2 (19)	3 (24)	0
Tyler	< 1 (4)	2 (21)	3 (25)	0

The parents of the blind children also employed ostensive labeling frames rarely. Both parents of the blind children employed *indicative action* + label frames in 3% of their verbalizations over the 18, 22, and 26-months age slices, comparable to ostensive labeling frames used by the parents of the sighted children. While the use of *indicative actions* in ostensive labeling has not been previously studied, it is informative that ostensive labeling per se was rarely employed as method of connecting words and referents in toy play activity for any of the parents during a time of expansive vocabulary growth among their children.

3.2 Were there differences across the 18- to 42-months month age slices in the number of times parents established joint focus on a referent by following-in to what the child was already focused on?

Over the seven age slices, 96 to 98 percent of all parent verbalizations followed-in to their child's general focus of attention within their toy play activities (Molly n = 2062 or 98%, Ethan n = 2019 or 96%, Ella n = 2015 or 96%, Tyler n = 2029 or 97%). This suggests that all of the dyads remained focused on the toy play activities during the time they were being videotaped, and the parents very rarely referred something that was not immediately available within and/or *relevant* to the child's current activity (See Table 24).

Table 24. ***Total percentages and raw counts for the number of times a parent verbalization followed-in to what the child was already focused on across the seven ages slices from 18- to 42-months of age***

Child	Following-in to the child's attention focus: Already looking at the object	Already touching the object	Already doing an action on the object	TOTAL Alreadys
Blind				
Mollie	<1 (6)	60 (1251)	39 (811)	98 (2062)
Ethan	0	55 (1156)	41 (863)	96 (2019)
TOTAL	<1 (6)	59 (2407)	41 (1674)	(4081)
Sighted				
Ella	64 (1352)	0	32 (663)	96 (2015)
Tyler	71 (1481)	0	26 (548)	97 (2029)
TOTAL	70 (2833)	0	30 (1211)	(4044)

The parents of the blind children and the parents of the sighted children provided a label and/or other related information more when their children were more passively engaged with an object (a.g., looking at it or holding it) than when their children were performing an action with an object. Specifically, the parents of the blind children verbalized while their child was passively holding an object in 59% (n = 2407) of their overall verbalizations, and they verbalized while their child was performing an action on an object in 41% of their overall verbalizations. This pattern was somewhat more pronounced for the parents of the sighted children. They verbalized while their child was passively looking at an object in 70% (n = 2833) of their overall verbalizations, and they verbalized while their child was performing an action on an object in 30% (n = 1211) of their overall verbalizations.

There was some between group difference in the strength of this pattern, indication some personal variation in style, but not differences related to the child's degree of vision. For example, between the parents of the blind children, the pattern was stronger for Molly's parent than for Ethan's parent. While Molly's mother verbalized about the objects Molly was passively holding in 60% (n = 1251) of her total verbalizations, she verbalized about objects Molly was acting on in only 39% (n = 811) of her total verbalizations. The pattern was similar but less pronounced with Ethan's mother. She verbalized about objects Ethan was passively holding in 55% (n = 1156) of her total verbalizations, and she verbalized about objects Ethan was actively playing with in 41% of her total verbalizations. There was also some difference in this pattern between the parents of the two sighted children. Ella's mother verbalized about objects she was passively looking at in 64% (n = 1352) of her total verbalizations, however she verbalized about objects Ella was actively playing with in only 32% (n = 663) of her total verbalizations. The pattern was more pronounced with Tyler's mother. She verbalized about objects he was passively looking at in 71% (n = 1481) of her total verbalizations, but she verbalized about objects he was actively playing with in only 26% (n = 548) of her total verbalizations.

In summary, the pattern of verbally following-in more to what the child was just passively perceiving than to what the child was already acting on was clear for all parents, but more pronounced for the parents of the sighted children, somewhat variable across all parents. Differences, however, were not related to visual access (see Table 24).

4.3.2 WORD-REFERENT CONNECTIONS: Descriptive Examples

It is not just the *what*, the particular referent, that is important in the WORD-REFERENT CONNECTIONS that are at the core of joint attentional engagements, but also *how* these connections are established. The child must come to understand the ways in which his linguistic community makes available its conventional language forms. As parents encourage shared focus, the issues of *relevance* and *access* play crucial roles in how children come to expect that WORD-REFERENT CONNECTIONS will made available to them. Within *joint attentional engagements* in the context of toy play in this study parents provided *access* to WORD-REFERENT CONNECTIONS in three ways. First, they provided *access* by drawing the child's attention toward an object or action, and in doing so, signaling a desire to share something. The canonical form of this *joint attentional engagement* is exemplified in the following case (87) where the adult provides two ostensive signals, an ATTENTION-ELICITING CUE (*Emotive cue, Oh!*), and then an ATTENTION-DIRECTING CUE (*Hold up*) toward a referent while providing a verbal label for it (*Hold up* + label).

(87) Tyler 18-months TC2931 (sighted child)
MOT: GES_holds up a finch in front of the child
MOT: Oh! Here's a birdie.
CHI: Uh huh.
CHI: GES_reaches out for the finch

In the above canonical example (87), Tyler's mother chose the object, the *birdy*, to display and label, and she enabled *access* by directing his attention to it. In addition, Tyler and his mother had been successfully engaged with a set of different kinds of stuffed animals, so his mother could surmise that the new stuffed bird would be of interest, and therefore, *relevant* for Tyler. However, because his mother was the presenter, this new *joint attentional engagement* required not only a shift in attention by Tyler, but also the clear establishment of what exactly she was intending to share. The *hold up* gesture provides the clearest indication that the label being proffered is for the whole object (Schmidt, 1996).

Mothers of the blind children provided similar ostensive labeling through the use of *indicative action cues* as in the following example (88) where Ethan's mother introduced a slinky by touching it to Ethan's hand to provide a connection to the slinky as she labeled it. In this case, Ethan needed to reach out and take the slinky, but the presentation was embodied, so he did not have to shift his focus away from his body to either the slinky or his mother. Since his mother was handing him a whole object, it was likely that the word she proffered was for the whole object.

(88) Ethan 26-months TC1607 (blind child)
MOT: Here's a little slinky.
MOT: ACT_touches a little slinky to the child's hand
MOT: It's a mini slinky.
CHI: ACT_reaches out and feels then takes the slinky
CHI: ACT_child stretches the ends of the slinky
MOT: It's stretchy.

A second way in which parents provided *access* to WORD-REFERENT CONNECTIONS was to follow-in to their child's current focus and established that as the intended referent. In the following example (89), shared attention was also accomplished by providing an ostensive signal, an ATTENTION-DIRECTING CUE, indicating the intended referent while providing a verbal label. Note that even in this case the parent employs an ATTENTION-DIRECTING CUE, in this instance a verbal ATTENTION-DIRECTING CUE, a *deictic introducer* (*There's X*), to announce her desire for mutual focus before supplying the label for the referent (*pink dolphin*).

(89) Molly 22-months TC4330 (blind child)
CHI: ACT_takes the pink dolphin out of the toy bin and puts it to her mouth
CHI: Pink.[6]
MOT: There's pink dolphin.

In the above example (86), Molly was the one to present a referent/common ground which made the object automatically RELEVANT for her. In addition, she had direct embodied *access* to the referent, so she did not need to shift her focus or identify what

[6] Molly uses the adjective "pink" to indicate the whole object, the dolphin. This is not an anomaly; she does this with other objects as well. For example, she calls her red crab, "*red*." Her mother sometimes used color words in fixed frames that are frequently used for the presentation of whole object labels. For example, in talking about the color of her crab, Molly's mother might say, *This is red or That's red* while tapping on the red crab in her hand. Without the simultaneous visual presentation of the whole object, Molly had no way of knowing whether this word referred to a whole object or its attribute. It is likely that she gradually learned the words for attributes through hearing other example such as *There's the pink dolphin* and *That's the red one.*

her mother intended to share.

The third way in which parents provided *access* to WORD-REFERENT CONNECTIONS was to simply continue their joint activity in a conversational manner providing informative content (CONTENT MESSAGES) about objects and actions within the context of their toy play activity that, in and of itself, indicated an intention to share focus on an object or action. These *joint attentional engagements* will be discussed in the next section on CONTENT MESSAGES.

In addition to provided *access* to WORD-REFERENT CONNECTIONS, the particular referent must be of current *relevance* for the child in some way. A criterion for *relevance* is that the child must be motivated to engage in shared attention on the intended object (Bloom & Tinker, 2000). While this may initially be encouraged through the use of an ATTENTION-ELICITING CUE, that initial summons only serves to set up an expectation that something worth paying attention to is about to occur. If that expectation, in fact, is not *relevant* for the child, the child may glance at the object, then quickly turn away, or simply not respond at all, thus rejecting the parent's summons to engage. According to H. Clark, (1996) for something to be *relevant* it must contain some new information. In the following example (90), Sam's mother attempted to engage him in a 'name game' activity. Sam initiated the interaction by giving some toy frogs to his mother, thus, indicating that frogs were *relevant* for him. But he did not respond to his mother's engagement bids until she performed an action that was *relevant* for him. Sam already knew the word *froggy*, and he clearly was not interested in practicing it despite his mother's seven attempts to prompt a response. In this case, his mother's seven attempts to prompt a 'name game' engagement response indicated that she knew that Sam already knew the word *froggy* or she would have provided the word in the canonical GES+ (*deictic introducer*) label, (*hold up gesture* + Here's *froggy*) form after one or two failed attempts. What was *relevant* for Sam was how to make the froggy croak, and it is around this activity that *joint attentional engagement* occurred.

(90) Sam 22-months TC3450 (partially sighted child)

CHI:	ACT_picks up some frog toys and takes them over to Mom
MOT:	Oh what's that?
MOT:	What's this?
MOT:	GES_holds up the stuffed frog
MOT:	What's this?
MOT:	GES_still holding up the stuffed frog
MOT:	Do you know what this is?
MOT:	GES_still holding up the stuffed frog
MOT:	Is that froggy?
CHI:	ACT_picks up another frog toy from the floor
MOT:	You know froggy.
MOT:	Can you say froggy?
MOT:	ACT_squeezes the squishy frog and it croaks
CHI:	[laughs]
MOT:	[laughs]
MOT:	You wanna push?
CHI:	ACT_squeezes the squishy frog again to make it croak

The following four examples (Molly 91, 92, 93 and Ethan 94) provide evidence for the critical importance of *relevance* and *access* in socializing routines for the *joint attentional engagements* that enhance word-learning opportunities. The children in all of these example are blind, and thus, they highlight that it is the general principles of *relevance* and *access* that are important, not the modality or manner in which they are addressed within *joint attentional engagements*.

In examples 91, 92, 93, Molly and her mother engaged in episodes of joint attention where her mother used composite input comprised of directive speech coupled with *indicative actions* to provide a routine making WORD-REFERENT CONNECTIONS explicitly available to her in an embodied manner. At the 26-month age slice in the example below (91), Molly and her mother were playing with an animal train set. Molly had heard the word "*conductor*" before, but she did not yet use the word productively or connect the word with its particular toy object, rather it was just one of a set of plastic figures that fit on the animal train set. In other words, she did recognize the conductor piece as part of the animal train set. As Molly was exploring the object, her mother signaled that she wanted to enter into Molly's attention focus using by using an ATTENTION-ELICITING CUE *(Oh!)* followed by an ATTENTION-DIRECTING CUE, *a deictic introducer, (That's the conductor)* to let her know where she was attending before offering the label "conductor" for the object she was tactilely exploring. In addition, she provided a nonverbal *indicative action cue* (*tapping an object the child is holding*) to mark the particular object she was labeling.

This was a particularly opportune moment for establishing a WORD-REFERENT CONNECTON because this object, the conductor, was both *relevant* and accessible for Molly. It was clearly *relevant* for Molly indicated by the fact that she chose to 'observe' the conductor. She did not pick it up and immediately put it down, so presumably she was interested in learning more about it. She also had already established direct embodied *access* to the conductor, so it was not necessary shift her attention to something out of her current focus.

There were several other contextual factors that made this particular senario favorable for employing the canonical ostensive word-learning frame (*Indicative Action* + Label). First, Molly had had previous nonverbal explorative experience with the conductor. Second, she recognized it tactilely as a familiar object. Third, she possessed some prior conceptual knowledge about the conductor. For example, she knew it was part of a particular set of toys, some of which had similar size, shape and texture. She also knew that the conductor object she was holding was one of the plastic figures that fit on the animal train, and when placed on the train, made distinctive sounds.

In addition, this type of follow-in situation (91) is the most efficient and effective way to establish the kind of *joint attentional engagement* that affords connecting words and referents (Tomasello & Farrar, 1986), but it has received far less attention that the

Gesture + label situation. In fact, this is the more typical scenario for word learning within on-going activity, and far more prevalent for all parents in this study.

(91) Molly 26-months TC720 (blind child)
CHI: ACT_picks up the plastic conductor that goes with the animal train set and explores it with her hands and her mouth
MOT: Oh that's the conductor.
MOT: ACT_taps on the conductor in the child's hands
CHI: Uh huh.
CHI: ACT_explores the conductor in her left hand and then puts it down and feels around in front of her for more animal train objects

Between the 26-month age slice and the 30-month age slice Molly's mother's use of *indicative cues* had precipitously decreased from 51 to 14 instances within the 300 coded utterances per play session. In the following example (92), Molly's mother follows-in to her interest in the conductor, asks her for its label, then she provides additional information about the conductor without using any *indicative action cues* to locate the referent of their exchange. At 30-months, Molly was easily able to identify the referent, "that guy," by examining it quite cursorily and give its name within on-going activity without any nonverbal cues.

(92) Molly 30-months TC4034 (blind child)
CHI: ACT_picks up the plastic train conductor on the coffee table
MOT: Who's that guy?
CHI: A conductor.
MOT: You're right.
MOT: He drives that train.
CHI: Oh Mommy hold the conductor.
CHI: ACT_walks toward Mom and gives her the conductor then walks back to the coffee table and presses the sound buttons on the animal train

The above example (92) highlights the necessary components of establishing joint attention. Achieving joint attention involves both (1) letting the child know that you desire to share attention and (2) indicating an object or action for convergence. For sighted children, these requirements are generally satisfied through eye gaze. There have been numerous studies concerned with how sighted children know what the parent is labeling (Baldwin, 1993; Tomasello & Akhtar, 1995), and it is well established that sighted children know that people label what they, not the child, are looking at.

So without *access* to the parent's gaze direction, how does the blind child determine what the parent is labeling? A parent could use an *indicative action cue*, and that would make the referent quite clear. For example, Molly's mother could have used a *tap on the object the child is holding cue* as she did in example 91, but in example 92, Molly recognized and labeled the conductor with no assisting cues to specify the referent. The answer is likely found in the more fundamental assumption that people label what the other person has *access* to. Parents of sighted children don't label things in a word learning situation that their child cannot currently see; they label what they are looking at because the child has, and can exhibit, *access* to that information through their own eye gaze. The blind child, lacking that manner of *access*, is socialized to understand that the parent labels what she, the child, has direct *access* to. For the blind child, this *access* expectation is entrained initially through the use of the use of composite cues melding speech with ATTENTION-ELCITING CUES and ATTENTION-DIRECTING *indicative action cues* as exemplified in example 88. In example (91), at 26-months, Molly, through listening to her mother's verbal ATTENTION-ELICTING CUE and feeling her ATTENTION-DIRECTING CUE knew exactly where to 'look'. She understood that her mother's verbal vector 'pointed' to the object that she was currently exploring when she uttered the word "conductor." By 30-months (92) Molly was socialized to expect that her mother's words referred to what she had *access* to.

At 34-months of age, in the following example (93), Molly initiated the *joint attentional engagement* using memorized sentence forms learned through previous engagements in toy play. Her mother employed an initial *tap for orientation* to make the current toys available to her by providing a sound vector, and also to alert her that she was following-in to her focus on the animal train toys.

(93) Molly 34-months TC2426 (blind child)

MOT: ACT_taps the plastic conductor on the coffee table and places the other plastic figures in front of the child
CHI: What could we put in the train?
CHI: ACT_picks up the plastic conductor
CHI: What is that?
CHI: A conductor who can drive this train.
CHI: ACT_puts the conductor on the animal train and moves it back and forth
CHI: What color is the conductor?
CHI: Is he a man?
MOT: He is a man yes.
CHI: What color is the conductor?
MOT: He has a blue hat and a blue jacket and brown shoes and a red bandana and white gloves.
CHI: He has his goves.
MOT: He has his g<u>L</u>oves on his hands.
CHI: Where do those goves go?
CHI: The conductor is driving the animals to the zoo
CHI: He is driving the animals to the zoo.
MOT: He i::s?
CHI: ACT_presses the tiger sound button and it sounds
CHI: He's driving the tiger to the zoo.
CHI: ACT_[accidentally] knocks the animal train engine off the coffee table
MOT: Oh crash.
CHI: The toy [laughs] crash train.

Later, after the process *of joint attentional engagement* is routinized, a verbal comment followed by a child response is frequently sufficient for infusing WORD-REFERENT CONNECTION opportunities. In addition, the parent's offers of words are typically in the form of comments rather than assertions or questions (Clark & Wong, 2002) because more conversational commenting is sufficient to let the child know that she is referring to what the child is focused on in the on-going flow of activity. As the child, with visual *access* or not, is socialized in the processes of *joint attentional engagement* word-referent new words are offered and understood within a rich play environment where the child can make inferences about the meaning of words through familiar language formats and contextual knowledge. In example 90 above, Molly repeats language formats incorporating new words to practice and place them in sentences, and in this case, along with things a conductor might wear (*He has his g(l)oves. Where do those g(l)oves go?*). *relevance* is driven by on-going activity, and *access* to new words is increasingly achieved through less ostensive verbal means.

The following example (94) illustrates the importance of *relevance* for the child in on-going activity. Figuring out what is *relevant* and why is especially crucial in making accurate WORD-REFERENT CONNECTIONS available for the blind child. In example 91 below, Ethan and his mother were playing with a fire truck that had various parts: the whole object, a fire truck that made a siren sound when a button is activated; a plastic fireman and a fire dog that can fit in the driver's seat, an extension ladder with a basket at the top that can accommodate the fireman or the fire dog, and a small detachable ladder that fit on the side of the truck. Ethan's mom placed two fire trucks on the floor in front of her, and Ethan immediately moved toward the fire trucks indicating that they were objects of *relevance* for him. Indeed, he had played with these fire trucks before as part of various objects provided by the researcher, so the context was familiar to him. As soon as he had indicated interest, his mother provided a label (*They're fire trucks)*, a typical ostensive labeling situation for a blind child (*indicative action/placement of object for access* + label). In this case, Ethan had heard the word *fire truck* before, and he knew what object he was about to explore before he picked it up. He confirmed this by repeating the object name (*fire truck*) and verbalizing a typical object action (*turn on*). He then explored an unfamiliar object on the side of the fire truck and made an unintelligible verbalization. As he was exploring the ladder, his mother provided its label twice using two different *deictic introducers* (*It's a ladder*). This is another ostensive labeling situation where Ethan's mother was providing a label for the object that Ethan was actively exploring. He had been socialized to expect, on hearing *deictic introducers*, that his mother's intention was to provide a label for the object to which he had current *access*. However, at this point there was no clear evidence that he had made the appropriate WORD-REFERENT CONNECTION. His attention to the ladder waned, and he returned to his exploration of the whole object, the fire truck. Subsequently, exhibiting renewed interest in the ladder, he picked it up, explored it with his hands and made an unintelligible attempt at naming it. After his mother provided another ostensive label (*It's a ladder*), he put the ladder down again. To maintain his focus on the ladder, his mother used a *deictic introducer* in the form of a question to encourage an active response (*Where's the ladder?*), and then placed the ladder in its proper position on the fire truck. This *demonstrating action* on the part of Ethan's mother was clearly audible to Ethan because he responded by reaching appropriately for the ladder and removing it from the fire truck, but holding it close to where his mother had positioned it on the fire truck. His mother then used a question form to encourage his exploration of the relationship between the ladder and the fire truck (*Is that where the ladder goes?*). Ethan examined the ladder more closely with his fingers and labeled it a *comb*.

The remainder of this interaction is a negotiation of WORD-REFERENT CONNECTIONS. For Ethan, the ladder felt like a comb. His mother questioned him about the use of a comb, and he responded appropriately indicating that he had a full understanding of what a comb is and what it is called. He again placed the ladder in its position on the fire truck and when his mother provided the word *ladder*, he repeated it (*Call ladder*). But still not satisfied that he understood how this object that felt like a comb was actually a ladder, he repeated the word *comb*. His mother understanding this as a request gives him a comb. As he examined the comb with his fingers, his mother employed an ostensive label (*That's the big comb, huh?*) and extended its meaning by suggesting that he use it in its everyday function. His understanding of the appropriate WORD-REFERENT CONNECTION was clear when he took the ladder off the fire truck and labeled it (*It's a ladder*) and subsequently picked up the comb, labeled it and used it appropriately.

Ethan's mother employed ostensive labeling for both objects separately, while Ethan had physical *access* to each object. In addition, she provided information that connected the objects to Ethan's prior knowledge (*What's the comb for? That's what the firemen climb up to get into the houses to put out the fires.*) in order to highlight their quite different functions. Most importantly, she enabled exploratory and verbal contrasts (Clark, 1987) for the two objects that were a source of confusion because Ethan's tactile *access* alone did not provide sufficient information for differentiation. Given Ethan's mother's attention to providing *access* to objects that were *relevant* to Ethan in the context of active play with familiar objects the problem of referential indeterminacy was ameliorated. WORD-REFERENT CONNECTIONS were accurately established through joint attentional activity and negotiation.

(94) Ethan 22-months TC1140 (blind child)

MOT: Play with trucks?
MOT: ACT_places two fire trucks on the floor in front of her [audible]
CHI: ACT_moves closer to the fire trucks
MOT: They're fire trucks.
CHI: ACT_reaches out and pulls the big fire truck into his lap and explores it with his hands
CHI: Fire truck.
CHI: Turn on.
CHI: ACT_pulls the ladder off the side of the big fire truck and shakes it and explores it with his fingers
CHI: xxx.
MOT: It's a ladder.
CHI: ACT_exploring the ladder with his hands
MOT: That's a ladder.
CHI: ACT_puts the ladder down and tries to find the siren button on the fire truck
CHI: Turn on.
CHI: Turn it on.
MOT: You gotta push it and move it.
MOT: SD_makes engine sound
CHI: ACT_gets up on his knees in position to push the fire engine
CHI: xxx xxx xxx xxx.
CHI: ACT_picks up the fire engine ladder and explores it with his fingers
CHI: That's a xxx.
CHI: That's a xxx.
CHI: That's a xxx.
CHI: That's a xxx.
MOT: A hill?
MOT: It's a ladder.
CHI: ACT_puts the ladder down next to him
MOT: Where's the ladder?
MOT: ACT_reaches around the child and picks up the ladder and puts it back on the fire truck
CHI: ACT_takes the ladder off the side of the fire truck and holds it next to where it fits

MOT: Is that where the ladder goes?
CHI: ACT_explores the ladder with his fingers
CHI: Comb comb.
CHI: That's a comb.
MOT: Feels like a comb huh?
MOT: Ladder.
CHI: ACT_tries to put the ladder on the truck then puts it down on the floor
MOT: Will it fit in there?
MOT: GES_hands the ladder to the child
CHI: ACT_tries to put the ladder in the truck
CHI: Comb comb.
CHI: Comb comb.
CHI: Comb comb.
MOT: Comb.
CHI: Comb comb.
MOT: What's the comb for?
CHI: Comb for hair.
MOT: For your hair.
MOT: That's a truck.
CHI: ACT_fits the ladder on the truck
CHI: Comb.
CHI: For hair.
CHI: It's for hair.
CHI: ACT_takes the ladder off the fire engine
CHI: Comb comb comb.
CHI: ACT_picks up the ladder again and fits it on the fire engine
CHI: Comb comb comb.
MOT: Which feels like a comb?
MOT: The ladder?
CHI: Call ladder.
MOT: It's a ladder.
MOT: That's what the firemen climb up to get into the houses to put out the fires.
CHI: ACT_feels the ladder on this fire truck
CHI: Comb comb.
CHI: Comb.
MOT: Ethan do you want a comb?
CHI: Comb.
MOT: Reach your hand out.
MOT: GES_holds a comb out for the child to take
CHI: Reach your hand out.
CHI: GES_reaches out and takes the comb
CHI: ACT_explores the comb with his hands
MOT: That's the big comb huh?
MOT: We haven't combed your hair yet today.
CHI: ACT_combs his hair
CHI: ACT_puts the comb down and starts exploring the fire truck again and finds the ladder
CHI: It's a ladder.
CHI: ACT_picks up the comb again and explores it with his hands
CHI: Big comb.
MOT: Big comb yeah.
CHI: ACT_combs his hair

4.3.3 WORD-REFERENT CONNECTIONS: Discussion

The introduction of labels by parents to their children is not random and it is not isolated. The opportunities for making WORD-REFERENT CONNECTONS are severely contrained by the ways in which the child's attention has been socialized. For Western middle class children word learning is embedded in an orderly manner in the turn taking on-going activity that is relevant to the child's current interests. As Ninio and Bruner (1978) described it, "The most striking characteristic of labeling activity is that it takes place in a structured interaction sequence that has the texture of a dialogue." (Ninio & Bruner, 1978, p. 5). In Western middle class culture object naming purportedly occurs often in the context of what Brown (1956) called the 'original name game' in which parent and child supply each other with names for *pointed*-at objects and pictures, or point out things named by the other. Typically the 'game' is verbally mediated by more than just object names; it is full of questions and answers, deictic frames like *What's that?*, *There it is*, *That's a monkey*, *Where's the rooster*, *It's over there*. In addition, these kinds of expressions are integrated into a context of familiar objects, actions involving the objects, and deictic gestures that are crucial to making WORD-REFERENT CONNECTIONS clear in a total communicative environment within *joint attentional engagements*.

Young language learning children are also supported in making WORD-REFERENT CONNECTIONS by the particular ways in which they are afforded *access*. In this study, parents rarely employed ostensive labeling, a finding that applied to both parents of the sighted children and parents of the blind children. This is in accordance with other research that shows that ostensive labeling is far more common before 18-months than after 18-months (Namy, 2012). By 18-months, the children in this study appeared to no longer need to have referents clearly marked by deictic cues in most of their *joint* *attentional engagements*. This provides evidence that by 18-months the children in this study were socialized to the benefit of paying attention and they could direct their attention to referents without ATTENTION-DIRECTING CUES. Through the repeated multimodal use of ATTENTION-DIRECTING CUES, they had come to understand that when engaged together in toy play, speech is about objects and actions that both parent and child are attending to, and that by reaching a convergence of attention, there is a 'meeting of minds' (Tomasello, Carpenter, Liszkowski, 2007, p.705) the sense that interactants are talking about the same thing.

How were the children able to converge with their parent on a common ground without ATTENTION-DIRECTING CUES? First, through the repeated use of ATTENTION-ELICITING CUES and ATTENTION-DIRECTING CUES they were socialized to the understanding that paying attention means paying attention to *something* and by 18-months that something is an object or action outside the dyad.

Second, they had also been socialized through the repeated use of ATTENTION-DIRECTING CUES to know that their parent would be indicating something in the immediate environment that they had easy *access* to. For the sighted children this was likely to be what their parent was looking at because when their parents used a ATTENTION-DIRECTING CUES (*deictic gesture cues*) they were consistently looking at what they were indicating. For the blind children this was likely to be what they were touching because when their parent used ATTENTION-DIRECTING CUES (*indicative action cues*) they were 'pointing' to what the child was touching. Results of this study suggest that, although eye gaze is an important cue for sighted children, a wider view of how children make WORD-REFERENT CONNECTIONS is that child learn to direct their attention toward what they have efficient *access* to. In addition, the ways of accessing WORD-

REFERENT CONNNECTIONS are socialized through the repeated use of ATTENTION-ELICITING CUES and ATTENTION-DIRECTING CUES concurrently with verbalizations from very early on.

Third, the children in this study were able to make WORD-REFERENT CONNECTIONS with ease because the parents in this study almost exclusively followed-in to something they already had contact with. This may not be surprising given the toy play scenario. The parents and children were in a circumscribed situation with the expectation that they were to play with various sets of toys. At the beginning of the videotaping session the observer either set a bag of toys on the floor between the child and the parent or the parent asked the child which of the observers's toys they would like to play with or the child made an immediate request. But interestingly, even when new sets of toys were made available the parents allowed the children to explore the objects by looking, touching or acting on them before they used an ostensive labeling frame or presented any verbal information.

The "attention mapping" hypothesis maintains that labeling objects that the child has already established interest in is the most effective way to promote word learning (Bakeman & Adamson, 1984; Dunham, Dunham & Curwin, 1993; Tomasello & Farrar, 1986). This is said to be facilitative because the child does not need to expend resources attempting to determine the particular object of reference. But it is also facilitative because the two most important factors in determining whether a successful WORD-REFERENT CONNECTIONS will be made are moderated. The first is *access.* The object must be salient for the child. If the child is already looking at, touching or acting on an object *access* is established. The second is *relelvance.* The object of reference must in some way have special value for the child in order to motivate his attention toward it. When the parent follows-in to what the child already has contact with, the child has presumably selected something that is of interest to him. *Relevance* refers to what captures a child's engagement for interaction and learning (Bloom & Tinker, 2001). "Relevance is the single property that makes information worth processing and determines the particular assumptions an individual is most likely to construct and process" (Sperber & Wilson, 1986, p. 46). *Relelvance* determines the things that prompt a child's attention, interest, and emotional investment in the current context.

Language is made most accessible for learning either when the parent tunes in to what the child already has contact with, or when the adult directs the child's attention to other information within an on-going context that connects with the child's current focus of attention (Akhtar, Dunham & Dunham, 1991). The parents of both the sighted and the blind children very consistently followed-in to their child's already established focus. This finding is in contrast to earlier work suggesting that parents of blind children tend to have a more directive style than parents of sighted children (Kekelis & Anderson, 1984; Moore & McConachie, 1994) and more in line with the suggestion by Perez-Pereira and Conti-Ramsden (2001) that this may, in part, be related to a negative view of directives and also to the way in which they are coded in research studies. The coding for following-in in this study was based on the parents proclivity to watch and follow-in to the child's focus. Whereas some prior studies have coded the use of an imperative form as a directive behavior, in this study a parent could have used an imperative form in following in to the child's focus as in the following example (95).

(95) Ethan 18-months TC1709 (blind child)
CHI: ACT_puts the train car in his lap and fusses
MOT: Uh put it on its wheels.
CHI: ACT_feels the wheels
MOT: ACT_turns animal car over on its wheels in the child's lap
MOT: The wheels go down on the bottom.
CHI: ACT_fusses and kicks the animal train car off his lap

The use of the imperative, *put it on the wheels*, can clearly be viewed as facilitative in the context of shared activity along with other supportive actions and verbalizations.

Fourth, in this study, WORD-REFERENT CONNECTIONS were not offered randomly. They were frequently offered in favorable situations where the child had previous nonverbal experience with the referent, the ability to perceptually recognize the referent, and some prior conceptual knowledge about the referent.

Fifth, WORD-REFERENT CONNECTIONS were not made in single occurrences. Parents negotiate when there is a misunderstanding as in the above example (91) where Ethan was initially confused by the shape of the fire truck ladder and mistook it for a comb. Parents also negotiate when they have difficulty understanding an infant's expression by providing the words for what the child has in mind for recasting the message (Golinkoff, 1986). In the following example (96) Molly's mother helped her describe what she is holding.

(96) Molly 38-months TC645 (blind child)
CHI: Is that a fish?
CHI: Is that one of the fish?
MOT: I think so.
MOT: Is it a puffer fish?
CHI: Yes he has he is a very smooth fish.
MOT: Is he smooth or bumpy.
CHI: Bumpy.

All of the above considerations suggest that children are afforded a myriad of supports for making WORD-REFERENT CONNECTIONS within on-going activity, and these supports all apply to both sighted and blind children. However, there is one way in which blind children in this study did not appear to receive equal support. While it was possible that the ATTENTION-DIRECTING *indicative action cues* used by the parents of the blind children might fully substitute for the ATTENTION-DIRECTING CUES *deictic gesture* cues used by the parents of the sighted children, that was not the case. In fact, the parents of the blind children used far fewer ATTENTION-DIRECTING CUES over the seven ages slices from 18- to 42-months of age. Why might this be? How were they able to achieve similar language outcomes while receiving fewer ATTENTION-DIRECTING CUES? It is likely that the blind children needed fewer ATTENTION-DIRECTING CUES than the sighted children because their *access* to referents is embodied. In other words, when parents employed a follow-in strategy, the blind children had direct tactile *access* to the referent. In fact, for the blind child, the initial word-referent opportunities within *joint attentional engagements* always involved a direct tactile *access* that did not require shifting attention in coordination with a parent's *point* or *hold up gesture*, thus saving resources for learning WORD-REFERENT CONNECTIONS. Providing at least some of the elements of *relevance* described above are in place, *access* to WORD-REFERENT CONNECTIONS may actually be easier because the extra step of determining the parent's focus of attention is not required.

In summary, the parents of the blind and sighted children in this study provided access to referents in different, but equally effective ways. Neither the parents of the blind or the sighted children employed the canonical ostensive labeling frame (GES + label or IND ACT + label) frequently between the 18- to 26-months of rapdily word learning. The parents of the blind and the sighted children most frequently afforded their child access to *relevant* WORD-REFERENT CONNECTIONS by following-in to an already verbally or nonverbally expressed interest of the child.

4.4 <u>CONTENT MESSAGES</u>

Previous sections have explored how children might be socialized to participate in *joint attentional engagements* through the repeated use of ATTENTION-ELICITING CUES and ATTENTION-DIRECTING CUES. The last section suggested that WORD-REFERENT CONNECTIONS made within *joint attentional engagements* were infrequently established through the much studied canonical frame of *gesture* + label at least from the 18-month start point of this study. This was also true for the use of *indicative action cues* + label formats employed by the parents of the blind children. This finding is in agreement with previous research suggesting that participating in *joint attentional engagements* may be more important for word learning before 18-months than after 18-months (Cartenter et al., 1998). However, the research on *joint attentional engagement* has largely been focused on the establishment of WORD-REFERENT CONNECTIONS through canonical labeling. The acquistion of language clearly involves much more than learning specific isolated words. However, examining what else might take place in within *joint attentional engagements* that might foster a richer understanding of language for learning about how objects and actions fit into the wider world has received scant attention. Hence, this section, relates to the types of CONTENT MESSAGES that are delivered within *joint attentional engagements.*

CONTENT MESSAGES are described and analyzed in terms of their function in offering the child information about objects and actions in their toy play sessions. CONTENT MESSAGES include nonverbal *demonstrating gestures* and *demonstrating actions* presented along with speech (*demo* + speech) or speech alone (CM/speech). In this study *demonstrating gestures* and *demonstrating actions* always occurred along with speech. Specifically, *demonstrating gestures* and *demonstrating actions* consisted of a nonverbal display and a verbal offer of informative details about a referent (*demo* + speech). In this frame, it is information or content that draws the child's attention rather than a separate signaling *attention-getting* element. In a *demo* + speech frame both elements provide 'content' information about a referent. In other words, the parent concurrently talks about what she is doing or displaying regarding a referent. CONTENT MESSAGES provide a richer form of input than ostensive labeling (AD + Speech) because both elements provide content information. They promote word learning in a wider context of activity, and they also provide extended information about known words.

While *demonstrating gestures* and *demonstrating actions* always co-occurred with speech (*demo* + speech), CONTENT MESSAGES were also delivered through speech alone (CM/speech). CONTENT MESSAGES keep the flow of activity focused on information about the objects and actions. This section explores some elements of the parents' CONTENT MESSAGES that assist the child in learning, not just labels for referents, but also how locally relevant referents fit into the wider world. In this study, parents (1) offered verbal information about relevant referents within their toy play activity (*whole objects, actions, locations, object parts, object properties, types of objects, contrasive statements*) that was sometimes (2) coordinated with *demonstrating gestures and demonstrating* actions. In addition, (3) they used language in particular ways to facilitated the establishment of a common ground for imparting new information related to their child's current knowledge and interests (*lead and follow-in prescriptives, descriptives and questions*). The overarching question in this section is: *Within toy play joint attenional engagements, how did the parents in this study socialize their children in the culturally established ways of obtaining identifying and detailed information about objects and actions.*

4.4.1 CONTENT MESSAGES: Results

4. What kinds of nonverbal gestures and actions did the parents of the blind, partially sighted and sighted children employ along with their verbal offers of information about objects and actions in their toy play?

All parent verbalizations, gestures and actions were examined to determine their function in providing their child with indentifying information and further informative details about the objects and actions within their toy play *joint attentional engagements*. All *demonstrating gestures* and *actions* were presented along with speech (Rader & Zukow, 2012). Specifically, parents presented informative details about an object or action while concurrently performing a *demonstrating gesture* or *demonstrating action* on an object (see Table 25).

Table 25. Classifications used to describe nonverbal CONTENT MESSAGES

Demonstrating gestures	Tracing the outline of an object Iconic imagery
Demonstrating actions	Actions associated with an object or action demonstrated with tactile contact on the child
	Actions associated with an object or action demonstrated with sound input only
	Actions associated with an object or action demonstrated with both tactile contact and sound input
	Actions associated with an object or action that are visually presented without tactile contact or sound input

Demonstrating gestures included *tracing the outline of an object* and *iconic imagery movements.* Parents of children with vision generally traced the outline of objects with their index finger. For example, to suggest where a puzzle piece would fit, a parent might trace the outline of the puzzle cut-out. In a similar situation, the parents of the blind children directed their child's finger around the cut-out. *Iconic imagery movments* included hand and arm movements representing an action also identified in co-occcuring speech. For example, lifting an arm up to provide an additional cue regarding a tall tree.

Demonstrating actions included actions performed on an object co-occuring with speech. This 'saying and showing' (Rader & Zukow, 2012, p. 560) multimodal presentation facilitates not just the learning of labels, but also ties words to the wider opportunities their referents afford for acting upon in the world. In this study, *demonstrating actions* involved actions (1) delivered through tactile contact, in effect showing the child manually an object's affordances (2) actions delivered with sound, providing information about the sound produing aspects of an object, (3) actions delivered with both tactile and sound information, and (4) actions relating to the features of an object that were accessible only through visual means (see Table 26).

Demonstrating gestures and *demonstrating actions* were distinguished from ATTENTION-DIRECTING CUES because of their informational content as opposed to solely deictic cueing. For example, *indicative action cues* such as *directing tactile contact with an object*, in that they contained informative information about an object and not simply signals marking the location of an object. Of course, offering a gesture or performing an action within mutual toy play serves as an attention summon as well, hence, an attentional function is embedding within all *demonstrating gestures* and *demonstrating actions*.

Assessment of reliability for identification of demonstrating gestures and actions.

To assess reliabilty for identifying parental use of *demonstrating gestures* and *demonstrating actions* in their CONTENT MESSAGES, an independent coder was trained in the use of a protocol of definitions and the FileMaker Pro datebase coding system constructed by the author. Reliability between the independent coder and the author was established on the basis of coding of 20% of each of the 300 records coded per child and per age slice. Agreement for the consistent use of speech along with the presentation of gestures and actions was 100%. Agreement for *demonstrating gestures* was 95%. Agreement for identifying the four types of *demonstrating actions* was as follows: *Actions with tactile contact only*, 88%; *actions with both tactile contact and sound,* 90%; *actions with only sound only,* 90% *actions performed providing only visual access,* 87%. The high degree of reliability between the independent coder who did not know the parents or the children in this study and the author suggests that the presentation of *demonstrating gestures* and *demonstrating actions* is observable in on-going toy play activity.

To summarize, the coding emphasis here is on the type of input presented by the parent in naturalistic on-going activity. The coding of *demonstrating gestures* and *demonstrating actions* is meant to highlight parental offers to children of nonvisual multimodal forms of offering information along with verbal content. Sighted children typically look at the actions that their parents are performing (although not all the time within on-going activity). Visual impairment does not afford such access. Hence, in this study *demonstrating gestures* and *demonstrating actions* are coding on the basis of the additional nonvisual features of the input that provide identifying information and/or additional details about objects and actions. To illustrate, the *holding up gesture* was coded purely as a *deictic gesture* as was the *indicative action cue, tapping on the object the child is holding,* in order to highlight its primary deictic function. *Holding up* an object and performing an action on it, for example, making a stuffed monkey produce its sound, is coded in this section as a *demonstrating action with sound input*. This coding highlights the demonstrating function of providing additional information about an object.

4.1 With what frequency did the parents of the blind, partially sighted and sighted children employ different types of demonstrating gestures and actions?

4.1.1 Demonstrating gestures: Tracing an object or path and *iconic imagery gestures* were used by all parents, but quite infrequently over the seven age slices. Not surprisingly, given that these are visually directed cues, parents of the blind children used the fewest (Molly n = 9; Ethan n = 1). Parents of partially sighted children avoided using these cues as well (Amy n = 1; Sam n = 2). Parents of the sighted children used only a few more (Ella n = 10; Tyler n = 18) .

4.1.2 Demonstrating actions: The frequency with which *demonstrating actions* co-occurred along with verbal information included visually dectable actions only was, not surprisingly, related to degree of vision. As expected the parents of the blind children performed very few *action only demonstrating actions* (Molly n = 9 or 3% of her total *demonstrating actions*; Ethan n = 11 or 3% of her total *demonstrating actions*). For the blind children these actions were performed habitually and the child did not have access to them and thus, did not respond. *Action only demonstrating actions* were the preferred manner of demonstrating by both the parents of the partially sighted children (Amy n = 229 or 47% of their total *demonstrating actions*; Sam n = 251 or 59% of their total *demonstrating actions*) and the parents of the sighted children (Ella n = 279 or 63% of her total *demonstrating actions*; Tyler n = 321 or 71% of her total *demonstrating actions*), but the parents of the sighted children used them more frequently (see Table 26).

Table 26. ***Total percentages and raw counts for demonstrating actions used by the parents of the blind, partially sighted, and sighted children summed across the age slices from 18- to 42-months***

Child	Demonstrating Actions				TOTAL
	Action with Tactile	Action with Tactile & Sound	Action with Sound	Action only	
Blind					
Mollie	56 (185)	9 (31)	32 (104)	3 (9)	13 (329)
Ethan	39 (172)	14 (63)	44 (192)	3 (11)	21 (438)
Partially Sighted					
Amy	15 (71)	4 (18)	34 (165)	47 (229)	23 (483)
Sam	5 (23)	4 (8)	33 (141)	59 (251)	20 (423)
Sighted					
Ella	6 (28)	1 (5)	30 (132)	63 (279)	21 (444)
Tyler	8 (35)	1 (3)	21 (96)	71 (321)	22 (455)
TOTALS	514	128	830	1100	2572

Performing an *action with tactile input + verbal information* was, again not surprisingly, the most frequent *demonstrating action* employed by the parents of the blind children (Molly n =185 or 56% of her total *demonstrating actions*; Ethan n = 192 or 44% of her total *demonstrating actions*). The parents of the partially sighted child with less usable vision (Amy n = 71 or 15% of their total *demonstrating actions*) used *tactile actions* more than the parents of the other partially sighted child (Sam n = 23 or 5% of their total *demonstrating actions*), but still substantially less that the parents of the blind children. Like the parent of the partially sighted child, parents of the sighted children performed *tactile actions* very rarely (Ella n = 28 or 6% of her total *demonstrating actions*; Tyler n = 35 or 8% of her total *demonstrating actions (*see Table 27).

Performing an *action with sound input* along with informative verbalizations did not appear to be related to degree of vision as the parent of one of the blind children (Molly n = 104 or 32% of her total *demonstrating actions* performed *actions with sound input* less than the parents of all the other parents (Amy n = 165 or 34% of their total *demonstrating actions*; Sam n = 141 or 33% of their *demonstrating actions*; Ella n = 132 or 30% of her *demonstrating actions*; Tyler n =126 or 28% of her *demonstrating actions*. While this may seem surprising, the amount of *actions with sound input* is highly influenced by toy preference. For example, some of the stuffed animals toys, the ball toys, and the vehicle toys produced sounds that were a pleasing part of the play for some children and not for others (see Table 27).

None of the parents frequently combined the use of more than one modality along with speech (*action with tactile with sound* + verbal information) in their *demonstrating actions*. The parent of one of the blind children used combined input more than other parents but this type of action input was sparse even for her (Ethan n = 63 or 14% of her total *demonstrating actions*). Actions combining *tactile* and *sound input* were as follows for the other parents: Molly n = 31 or 9% of her *demonstrating actions*; Amy n = 18 or 4% of their total *demonstrating actions*; Sam n = 4 or 8% of their *demonstrating actions*; Ella n = 5 or 1% of her *demonstrating actions*; Tyler n = 3 or 1% of her *demonstrating actions* (see Table 27).

Overall the number of times parents used some kind of *demonstrating action* on a referent synchronized with a verbalization about that referent (*demonstrating actions* + verbal information) ranged from 438 to 483 instances with the exception of Molly's parent who preformed a *demonstrating action* while verbalizing information much less (Molly n = 329) (see Table 27).

4.1.3 Across the 18- to 42-months month age slices were there changes in the use of demonstrating actions?

For the blind and partially sighted children the use of *demonstrating actions* declined precipitously between the 30- and 34-month age slices. Across the 18- to 42-

months month age slices these parents decreased their use of *demonstrating actions* by at least one half. The parents of the sighted children used *demonstrating actions* at fluctuating, but not declining rate over the 18- to 42-months ages slices (see Table 27).

Table 27. ***Total raw counts for Demonstrating Actions used by the parents of the blind, partially sighted, and sighted children at each age slice from 18- to 42-months of age***

	Demonstration Actions							
	Months of Age							
Child	18	22	26	30	34	38	42	TOTAL
Blind								
Mollie	70	67	58	54	31	21	28	329
Ethan	105	84	73	70	37	33	36	438
Partially Sighted								
Amy	106	87	86	81	48	36	39	483
Sam	97	79	73	62	39	32	41	423
Sighted								
Ella	60	56	88	42	46	75	77	444
Tyler	79	59	65	70	59	58	64	455
TOTALS	517	422	434	369	260	255	285	2572

4.1.4 Did the blind, partially sighted, and sighted children exhibit reliably observable contingent engagement behaviors to their parent's use of demonstrating actions?

For each record containing a *demonstrating action* any observable child engagement was coded on the same record. Child engagement behaviors included following: the parents physical direction, emotive behavior related to the mutual activity, gestures and actions initiating or responding to the content of the adult verbalization or related action, and verbalizations initiating or responding to the content of the adult verbalization or related action. (see Table 4).

To establish reliability for coding child engagement behaviors related to *demonstrating actions* an assistant independently coded a random sample of 20% of all author-coded records for each child at each age slice. The assistant received 1 hour of training spread over two days in order gain a fluid understanding of the coding definitions for *demonstrating actions* and the coding for response type (see Table 4). Training occurred on a separate, but similar data set and was continued until a reliabilty of at least 95% was achieved. Training and coding of *demonstrating actions* took place independently of training and coding for other reliability measures for this study.

Reliability was high across all types of *demonstrating actions* for all children regardless of degree of vision (see Table 9). Reliability for coding of each child's engagement behaviors overall age slices and all *demonstrating actions* was as follows: Molly 99%, Ethan 99%, Amy 98%, Sam 98%, Ella 98%, Tyler 98% (see Table 28).

Table 28. ***Percentages for identification of child joint attentional engagement behaviors to demonstrating actions across all age slices from 18- to 42-months.***

	DEMONSTRATING ACTIONS				
Child	Actions with Tactile	Action with Tactile & Sound	Action with Sound	Action Only	Mean response rate
Blind					
Mollie	100	100	98	n/a	99
Ethan	100	100	97	n/a	99
Partially Sighted					
Amy	100	100	97	95	98
Sam	100	100	96	92	98
Sighted					
Ella	100	100	98	93	98
Tyler	100	100	95	97	98

4.2 Were there differences in the types of referents addressed by the parents of the blind, partially sighted, and sighted children?

The percentages in this section are based on the total number of each parent's verbalizations that contained a word or words referring to (1) a whole object, (2) an action of an object or person (3), an object part or (4), a property of an object (see Table 29).

Table 29: ***Total percentages and raw counts for types of referents used by the parents of the blind, partially sighted, and sighted children in their verbalizations to their children across the age slices from 18- to 42-months of age***

Child	Referent Type Used				
	Whole Object	Action	Object Part	Object Property	**TOTAL**
Blind					
Mollie	33 (897)	44 (1189)	10 (274)	12 (334)	(2694)
Ethan	33 (858)	44 (1134)	10 (251)	13 (321)	(2564)
TOTAL					(5258)
Partially Sighted					
Amy	35 (805)	48 (1111)	6 (130)	12 (268)	(2314)
Sam	36 (813)	49 (1114)	5 (112)	10 (223)	(2262)
TOTAL					(4576)
Sighted					
Ella	37 (893)	48 (1159)	5 (129)	10 (245)	(2426)
Tyler	36 (867)	46 (1106)	6 (149)	11 (267)	(2389)
TOTAL					(4815)

The amount of talk referring to whole objects was fairly similar for all parents ranging from 805 instances to 897 instances and from 33% to 37% of their own coded referents. The differences did not appear to be related to visual access (Molly n = 897 or 33% of her coded referent types; Ethan 858 or 33% of her coded referent types; Amy n = 805 or 35% of their coded referent types; Sam n = 813 or 36% of their coded referent types; Ella n = 893 or 37% of her coded referent types; Tyler n = 867 or 36% of her coded referent types) (See Table 29).

All parents referred to actions about 10% more in their verbalizations than they referred to objects. The amount of talk about actions was similar for all parents ranging from 1106 instances to 1189 instances and from 44% to 49% of their own coded referents. Differences did not appear to be related to degree of vision (Molly n = 1189 or 44% of her coded referent types; Ethan n = 1134 or 44% of her coded referent types;

Amy n = 1111 or 48% of their coded referent types; Sam n= 1114 or 49% of their referent types; Ella n = 1159 or 48% of her coded referent types; Tyler n = 1106 or 46% of her coded referent types (see Table 29).

The parents of the blind children talked about *object parts* (Molly n = 274 or 10% of her coded referent types; Ethan n = 251 or 10% of their coded referent types) almost twice as much as the parents of the partially sighted (Amy n =130 or 6% of their coded referent types; Sam n = 112 or 5% of their coded referent types) and the sighted children (Ella n = 129 or 5% of her coded referent types; Tyler n = 149 or 6% of her coded referent types (see Table 29).

The parents of the blind children also talked more about *object properties* (Molly n = 334 or 12% of her coded referent types; Ethan n = 321 or 13% of her coded referent types) than the parents of the partially sighted children (Amy n = 268 or 12% of their coded referent types; Sam n = 223 or 10% of their coded referent types) and the parents of the sighted children (Ella n = 245 or 10% of her coded referent types; Tyler n = 267 or 11% of her coded referent types (see Table 29).

Overall the parents of the blind children offered their children about 8% more verbalizations referring to referents about whole objects, actions, object parts and object properties than the parents of the sighted children and about 12% more than the parents of the partially sighted children (see Table 29).

4.3 Were there differences in the use of content talk relalted to object types and contrastive statements about objects by the parents of the blind, partially sighted, and sighted children?

The number of parent verbalizations referring to object type and the use of contrastive statements were counted separately and are shown in Table 31. Total counts revealed that the parents of the blind children used words referring to *object type* (Molly n = 89; Ethan n = 85) more than twice as much as did the parents of the partially sighted (Amy n = 31; Sam n = 25) and the sighted children (Ella n = 36; Tyler n = 52 (see Table 28). Parents of the blind children used *contrastive referents* (Molly n = 108; Ethan n = 112) almost twice as much in their talk about objects as did the parents of the partially sighted (Amy n = 45; Sam n = 42) or the sighted children (Ella n = 55; Tyler n = 39) (see Table 30).

Table 30: ***Total raw counts for object types and contrastive statements used by the parents of the blind, partially sighted, and sighted children in their verbalizations to their children across the age slices from 18- to 42-months of age***

Child	Object Type	Contrastive Statements
Blind		
Mollie	(89)	(108)
Ethan	(85)	(112)
Partially Sighted		
Amy	(31)	(45)
Sam	(25)	(42)
Sighted		
Ella	(36)	(55)
Tyler	(52)	(39)

Parents of the blind children used *contrastive referents* (Molly n = 108; Ethan n = 112) almost twice as much in their talk about objects as did the parents of the partially sighted (Amy n = 45; Sam n = 42) or the sighted children (Ella n =; Tyler n = 39) (see Table 30).

4.4 What language forms did parents of the blind, partially sighted, and sighted children employ to assist their child in obtaining identifying and detailed information about objects and actions in the flow of their toy play activity?

In order to examine questions related parent language input during toy play activities, all parent verbalizations were examined for *lead* and *follow-in prescriptives, descriptives* and *questions*. *Lead-prescriptives* were defined as commands, containing no descriptive (modifiers) information, intended to direct the child's behavior toward something not in the immediate toy play situation. *Follow-in prescriptives* were defined as commands intended to direct the child's behavior that (1) contained a reference to an object that the child was holding and/or looking at; or (2) were related to the task in which the was already engaged.

To contrast parent use of prescriptives with the use of verbalizations employed specifically for the purpose of giving the child information about referents, the use of *lead* and *follow-in descriptives* were also coded. *Lead descriptives* were statements that described the behavior or appearance of a person or object not in the immediate toy play activity. *Follow-in descriptives* were statements that described the behavior or appearance of a person or object that (1) contained a reference to an object that the child was holding and/or looking at; or (2) were related to the task in which the child was already engaged.

In addition, parents frequently use question forms with young children for the purpose of directing their child's behavior or providing informative details about objects or actions. Hence, questions were coded when they were used for these purposes. *Lead questions* were question forms used to direct the child's behavior to something not in the immediate toy play activity. *Follow-in questions* were question forms that contained a reference to an object or action that the child was currently holding and/or looking at; or (2) was related in some way to the task in which the child was already engaged. (see Table 31).

Table 31. ***Coding classifications for lead and follow-in language***

Category	Criteria
Lead prescriptives	Commands intended to direct the child's behavior that are related to objects or actions not in the immediate toy play situation. (e.g., *Look at what she's got, Come sit with Mommy*)
Follow-in prescriptives	Commands intended to direct the child's behavior that (1) refer to an object that the child is looking at and/or touching; or (2) are related to the task in which the child is already engaged. (e.g., *Put the fire truck on its wheels, Okay push that in, Show Mommy*)
Lead descriptives	Statements describing the behavior or appearance of a person or object not in the immediate toy play situation. (E.g., *I heard a bird, I'm gonna try this one, There's a real kitty right here, We got a new bag of stuff*)
Follow-in descriptives	Statements describing the behavior or appearance of a person or object that (1) refer to an object that the child is looking at and/or touching (2) are related to the task in which the child is already engaged. (e.g., *That's a duck, That's too big, You go like this, You don't want that*)
Lead Questions	Question forms relating to the behavior or appearance of a person or object not in the immediate toy play situation. (*What's in here? Remember this one? Do you want to go play ball?*)
Follow-in Questions	Question forms that contain a reference to an object or action that (1) refer to an object that the child is looking at and/or touching; or (2) are related to the task in which the child is already engaged. (*Is that froggy? Does that make noise? What's that in there? Remember what cows give us?)*

Assessment of reliability for identification of lead and follow-in prescriptives, descriptives and questions

To assess reliabilty for identifying parental use of *lead* and *follow-in prescriptives, descriptives and questions* in their CONTENT MESSAGES, an independent coder was trained in the use of a protocol of definitions and the FileMaker Pro datebase coding system constructed by the author. Reliability between the independent coder and the author was established on the basis of coding of 20% of each of the 300 records coded per child and per age slice. Agreement for identifying *lead prescriptives* was 95% while agreement for identifying *follow-in prescriptives* was 84%. Agreement for identifying *lead descriptives* was 97% and agreement for identifying *follow-in descriptives* was 88%. Agreement for identifying *lead questions* was 97%, while agreement for identifying follow-in questions was 88%.

4.4.1 Were there differences among the parents of the blind, partially sighted, and sighted children in their use of lead and follow-in prescriptive, descriptives and questions?

Recall that results referred to in the WORD-REFERENT CONNECTIONS section indicated that when parents in this study used ostensive labeling, they provided labels for objects their children were already either looking at, touching, or performing an action on. The current question is concerned with the specific ways in which parents presented extended information in a CONTENT MESSAGE about the available objects and actions within the flow of conversation and activity. Results indicate that all of the parents in this study rarely used lead-in verbal initiations. In accord with Akhtar, Dunham & Dunham (1991), follow-in behaviors in this study were liberally construed to include not only parental utterances that referred to objects and actions in the child's current focus, but also to objects and actions that were related to the wider play activity.

Across all seven ages slices, parents very rarely introduced an entirely new object into the play using any type of *lead* verbal form. In fact, the use of all *lead* verbal forms was below 1% for all parents. Results were as follows: For offers of information delivered with *lead prescriptives:* Molly n = 10 or less than 1%; Ethan n = 1 or less than 1%; Amy n = 3 or less than 1%; Sam n = 8 or less than 1%, Ella n = 7 or less than 1%;

Tyler n = 2 or less than 1%. For offers of information delivered with *lead descritions* results were as follows: Molly n = 5 or less than 1%; Ethan n = 6 or less that 1%; Amy n = 1 or less than 1%; Sam n = 12 or less than 1%; Ella n = 8 or less than 1%; Tyler 4 or less than 1%. For offers of information delivered with *lead questions* results were as follows: Molly n = 17 or 1%; Ethan n = 5 or less than 1 percent; Amy n = 7 or less than 1%; Sam n = 18 or 1%; Ella n =2 or less than 1%; Tyler n = 3 or less than 1% (see Table 32).

Table 32. ***Total percentages and raw counts for Lead and Follow-in Prescriptives, Descriptives, and Questions used by the parents of the blind, partially sighted and sighted children summed over the seven age slices from 18- to 42-months***

	Parent Lead and Follow Language								
Child	Lead Prescriptives	Follow-in Prescriptives	Lead Descriptives	Follow-in Descriptives	Lead Questions	Follow-in Questions	Total Lead	Total Follow-in	TOTAL
Blind									
Mollie	<1 (10)	15 (317)	<1 (5)	44 (922)	1 (17)	38 (823)	(32)	(2062)	(2094)
Ethan	<1 (1)	20 (399)	<1 (6)	61 (1243)	<1 (5)	19 (385)	(12)	(2019)	(2031)
Partially Sighted									
Amy	<1 (3)	21 (422)	<1 (1)	51 (1033)	<1 (7)	28 (577)	(11)	(2032)	(2043)
Sam	<1 (8)	12 (256)	1 (12)	34 (696)	1 (18)	52 (1060)	(38)	(2012)	(2050)
Sighted									
Ella	<1 (7)	17 (349)	<1 (8)	59 (1090)	<1 (2)	33 (576)	(17)	(2015)	(2032)
Tyler	<1 (5)	6 (122)	<1 (4)	54 (1098)	<1 (3)	40 (797)	(12)	(2017)	(2029)
TOTALS	(34)	(1865)	(36)	(6082)	(52)	(4218)	(122)	(12157)	(12279)

Parental preference for using *follow-in* verbal forms to offer information was highly consistent with all parents using *follow-in prescriptives* substantially less than the other forms (Molly n = 317 or 15%; Ethan n = 399 or 20%; Amy n = 422 or 21%; Sam n = 256 or 12%; Ella n = 349 or 17%; Tyler n = 122 or 6%. All parents except the parents of Sam preferred to use *follow-in descriptives* (Molly n = 922 or 45%; Ethan n = 1235 or 61%; Amy n = 1033 or 51%; Sam n = 696 or 34%; Ella n = 1193 or 59%; Tyler n = 1098 or 54%) over *follow-in questions* (Molly n = 823 or 39%; Ethan n = 385 or 19%; Amy n = 577 or 28%; Sam n = 1060 or 52%; Ella n = 576 or 29%; Tyler n = 797 or 39%. This distribution suggests that the use of particular verbal forms of offering information in the toy was not related to the degree of vision of the child, and in particular the parents of the visually impaired children did not use a more directive verbal style (see Table 32).

4.4.2 CONTENT MESSAGES: Descriptive Examples

Demonstrating gestures

All parents employed *demonstrating gestures* (*tracing an object or path, iconic imagery gestures*), but they all produced them infrequently. These gestures, particularly *iconic imagery gestures*, are likely generally used preferentially by some parents more than others as a matter of style. In addition, their sparse employment might reflect their primary function in highlighting a particular aspect of an intended referent, rather than employment in the general flow of activity. Not surprisingly, given that these are visually directed cues, parents of the blind children used the fewest. The fact that the parents of the blind children sometimes employed *demonstrating gestures* suggests that they are well established modes of communicating and were easily translated into an accessible form for their children.

Parents sometimes *traced the outline of an object* or area to emphasize form or path as in the following case (97), where Ella and her mother were playing with a shape box. Ella's mother *followed-in* to Ella's visual focus using an ATTENTION-ELICTING CUE (*Wow!*) to emphasize the special attention that needed to be paid to the object's roundness in order to complete their activity. Then she employed a composite *demonstrating gesture* + CONTENT MESSAGE, describing the 'roundness' property of the circle while illustrating the word *round* with a visually available movement.

(97) Ella 38-months TC4214 (sighted child)
CHI: EG_looking at the shape box with a circle in her hand
MOT: Wow! it's round.
MOT: GES_traces her finger around the circle
CHI: Round goes in here.
CHI: ACT_puts the circle in the shape box

In example (98) below, Prior to presenting a CONTENT MESSAGE, Molly's mother followed-in to her current interest acknowledging her request (*Okay*) and providing an ATTENTION-DIRECTING *physical direction cue* guiding her hand to the location of mutual focus along with a verbal comment (*feel up here for where his claws go*). This AD + speech frame contained two different types of information, *where* to focus attention, and *what to do* in that location to accomplish their common task. With the common ground established, she then employed a *Demo* + speech frame that included a *tactile outlining gesture,* guiding her child's fingers around the cut-out shape in a puzzle form as she verbalized their mutual action (*And his feet go down here feel*). This CONTENT MESSAGE offered two types of information about the common ground, in this case not a specific referent, but a task to be mutually accomplished. The *demonstrating gesture* provided embodied information about how to accomplish their task (the parent *outlines with the child's fingers* the place where the crab's feet fit in the puzzle), and the verbalization provided the words for what they were doing (*And his feet go down here feel*).

(98) Molly 38-months TC2359 (blind child)
CHI: Well should he go back in the ocean?
CHI: ACT_feeling the crab puzzle cut out
MOT: Okay feel up here for where his claws go.
MOT: PHYD_takes the child's hand and puts it on the edges of the place where the crab's claws fit.
MOT: And his feet go down here feel.
MOT: GES_guides child's hand around the place where the crab's feet go
CHI: So he's then he stands in his home.

Parents of sighted children occassionally used a tactile form of *outlining* in a CONTENT MESSAGE in much the same way during puzzle play as in the following example (99).

(99) Ella 38-months TC2257 (sighted child)
CHI: I need mommy to put…help me do it.
MOT: GES_guides child's hand around the puzzle edges
MOT: Feel around.

Parents also used *iconic imagery gestures* that employ the hand and/or arm in order to suggest an action (Goldin-Meadow, 2003). The "up gesture" of raising the arms above the head is commonly used by parents of young children pairing the action of moving upward with the word *up* as in the following example (100) where Ella is reaching up on a shelf for a stuffed animal.

(100) Ella 22-months TC1430 (sighted child)
MOT: They're up up high.
MOT: GES_lifts her arms up
CHI: Yeah.

The WORD-REFERENT CONNECTION between the action of moving upward and the word "up" occurs quite early in a physical pairing that is available regardless of visual access. Parents of sighted children frequently say "up" as they lift up their child's arms before they hoist them up for a hug. Children very quickly learn to repeat the pairing when they want to be picked up. Not surprisingly parents of blind children offer the same pairing as in the following example (100):

(99) Ethan 18-months TC3 (blind child)
MOT: Do you wanna come up?
MOT: GES_lifts the child's arms up
CHI: Up.

In the following example (100), Amy's father twists his fingers to suggest a motion that would be effective in using the key to open her shape box accompanying this motion with a CONTENT MESSAGE that describes the *demonstrating gesture* (*Turn it around*):

(100) Amy 42-months TC1407 (partially sighted child)
CHI: ACT_takes the key out and tries to put it in again
FAT: Turn it around.
FAT: GES_makes a twisting motion with his fingers

Parents of blind children employ *imagery gestures* as well, but they substitute tactile for visual access. In the following example (101), Molly and her mother were engaged in acting out a pretend story about fish. Molly's mother made a swimming motions with Molly's arms along with a CONTENT MESSAGE that described what they were doing together (*Here let's swim around*).

(101) Molly 34-months TC5642 (blind child)
MOT: Here let's swim around.
MOT: ACT_places her arms around the child
MOT: GES_places her arms around the child and swings her arms in a swimming movement
MOT: SD_swimming sound
CHI: Is she swimming around in water?
MOT: She is.
MOT: GES_continues swimming movement
MOT: And dow:::n.
MOT: GES_moves the child's arms down.

The fact that parents of blind children sometimes employed *tracing or outlining an object* and *imagery gestures* suggests that these types of *demonstrating gestures* are robust in the minds of parents, and they are able to smoothly translate them into an accessible for for their blind children.

Demonstrating Actions

In this study, the four identified ways in which parents offered *demonstrating actions* along with verbal information reflected issues of visual access. The parents of children with partial sight and the parents of children with typical sight employed few *demonstrating gestures* through tactile means, and the parents of the two blind children employed alternative tactile means in order to provide access denied through vision. The use of sound toys appeared to be related mostly to factors unrelated to vision such as the child's particular toy preferences or their comfort level with the sometimes intrusive and abrupt nature of sounds produced by toys. Overall the the parents in this study used *demonstrating actions* with about the same frequency except for Molly's mother who used substantially fewer. Her reduced overall use can be explained by her use of far fewer sound toys. Ethan, the other blind child, chose to play with objects that produced sound (i.e., emergency vehicles, musical toys, an animal circus train, cooking toys) more often than Molly.

Demonstrating actions with sound

Parents in this study used *demonstrating actions with sound* in ostensive word learning presentations particularly with sound making animal toys as in the following example (102).

(102) Sam 22-months TC4310 (partially sighted child)
CHI: GES_gives the chick to Mom
MOT: Oh look a chick.
MOT: GES_holds up the chick
MOT: ACT_ squeezes the chick to make it chirp
CHI: ACT_reaches out and touches the finch

The parents of the blind children used sound toys to assist in recognition of particular objects in the flow activity where similar objects were immediately available (see example 103 below). While some stuffed animals are distinguishable on the basic of tactile information, the sounds produced by the various kinds of stuffed animals used in the study provide more reliable identity cues. In addition to the sounds that animals typically produce there were variations in the loudness of the sounds for some animals of the same type. Previously on her own, Molly had established a sound difference between two stuffed horses; one produced a 'loud' neigh and the other a 'quiet' neigh. In the course of their play with various stuffed animals, a *demonstrating action* included the activation of the horses' sound buttons for recognition much like *holding up* a particular horse might facilitate visual recognition of a particular horse for a sighted child. In the following example, Molly identifies the quiet horse by pressing its sound button after she pulls it out of the toy bag (thus, using a *demonstrating action* for herself). Once the identity of the particular horse was established the interaction proceeded without a need for another *demonstrating action* until another horse was introduced. When Molly pulled the second horse out of the bag (she was 'looking' for a sheep but identified what she found as a horse), in order to help her identify the specific type of horse, her mother used a *demonstrating action with sound* (ACT_squeezes the horse in the child's hand and it produces a quiet neigh) along with a verbalization acknowledging that she had found another horse (*I think you did find another horse*). The use of *demonstrating actions with sound* with blind children can provide important identifying and location information within the flow of activity.

(103) Molly 34-months TC2733 (blind child)

CHI: ACT_pulls a horse out of the toy bag
MOT: Oh what did you find?
CHI: ACT_squeezes the horse and it neighs
CHI: A quiet horse.
CHI: GES_holds the quiet horse out to Mom
MOT: A quiet horse.
MOT: Should I put him down?
MOT: ACT_puts the quiet horse on the floor
CHI: Can you put the quiet horse down?
MOT: I did.
MOT: I put him down over here on the carpet.
MOT: ACT_picks up the quiet horse and touches it to the child then taps it on the floor
CHI: ACT_reaches over and feels the quiet horse on the floor
CHI: Can we put him down?
MOT: Yeah.
CHI: We put the quiet horse down.
MOT: He's gonna rest right here on the carpet.
CHI: He's gonna rest on the carpet.
CHI: ACT_puts her hand into the toy bag
CHI: I want the sheep.
MOT: Well you have to keep digging in.
MOT: ACT_opens the bag more
MOT: Let's reach for him.
CHI: ACT_reaches deep in the toy bag and touches a horse
CHI: We have to reach for the horse. [she recognizes that she found a horse not a sheep]
MOT: I think you did find another horse.

MOT: ACT_squeezes the horse in the child's hand and it produces a quiet neigh
CHI: The loud horse.
CHI: The quiet horse is resting.
MOT: Yeah he's over here.

Parents of the blind children also used *demonstrating actions with sound* to elicit attention and maintain attention to familiar objects within the flow of their toy play activity. In the following example (104) Molly's mother employed three CONTENT MESSAGES that included *demonstrating actions with sound*. First, she initiated a new activity by activating the sound of a familiar toy (ACT_starts the timer on the toy hot plate) and employing an ATTENTION-ELICITING CUE (*Do you wanna X*) paired with a linguistic form referring to what they could do with the hot plate toy. Second, she activated the sound of bubbling water on the hot plate toy, while she labeled the action (*Do you hear our water boiling?*). Third, she activated the same sound (bubbling water), as she provided the linguistic form for a different action that they could perform together (*Should we make some soup in that pan?*). Providing a different linguistic message with the same sound makes it clear for the child that people's talk about objects is flexibly related to their on-going actions on them. In other words, the information within a CONTENT MESSAGE extends current knowledge about objects to their properties and functions within a given situation.

(104) Molly 26-months TC5213 (blind child)

MOT: ACT_starts the timer on the toy hot plate on the coffee table and it ticks and the timer bell goes off
MOT: Do you wanna cook some snacks with Mommy?
CHI: ACT_walks toward Mom
CHI: Wanna cook some snacks?
MOT: Or some dinner?
MOT: ACT_puts a pot on the hot plate and it makes a bubbling sound
MOT: Do you hear our water boiling?
CHI: A water.
[the hot plate bubbles]
CHI: A water.
MOT: Did you hear the water?
CHI: ACT_searches the table for and explores other objects that go with the hot plate
[the bubbling sound stops]
CHI: Again.
MOT: ACT_puts a pot on the hot plate to make it bubble again
MOT: Should we make some soup in that pan?
CHI: Some soup.
CHI: ACT_hands the yellow pot to Mom
MOT: Want some soup?
MOT: ACT_with the child's hand on the pot Mom places the pot on the hot plate

In the following example (105), Molly's mother used several tactile *demonstrating actions* while simultaneously verbalizing important details. First as she said, "*I found another toy,"* (making the toy a relevant item by connecting it to other toys in the set they were playing with), she demonstrated what the new toy afforded (winding and wiggling) by activating its sound. Note, in addition, a deictic cue is a part of the sound presentation of the *demonstrating action* because the sound provides an auditory *point* to the lobster that facilitated access. Second, she demonstrated the movement of the lobster's tail as she gave verbal details about the winding action and what it affords (floating). Third, she demonstrated 'grabbing' and 'pinching' as she verbally referred to their function for lobsters. These three *demonstrating action* + speech pairings illustrate how the options for connecting objects and actions are constrained for the child within an activity that provides a rich context for integrating current parental input with prior knowledge.

Of course, in addition, these particular *demonstrating action* cues are not presented in an isolated manner. They are applied within a familiar, connected context, in this case along with other sea creatures. And they are applied according to the referent's particular affordances. For example, the movement of the lobster's tail affords a *demonstrating action*. In contrast, Molly's mother also employed several ATTENTION-DIRECTING composite cues (AD + speech) to locate specific details about the lobster. Notice that these composite cues locate static information: *where* something is and *what* it is. For example, Molly's mother employed an *indication action cue* (*tapping on an object the child is holding*) along with locational terms referring to where the referents (*pinchers* and *tails*) are typically found (pinchers are *up here*, tails are *back here*). She also used an *indicative action cue* (*tapping on an object the child is holding*-the lobster's claw) and *physical direction cue* (to present embodied comparative/contrastive information (*The labster's claws are like your hands*).

Molly's exporation of the lobster was not to connect a label. She already knew the word 'lobster.' For Molly, her mother's *demonstrating actions* provided rich information about what makes a lobster, a lobster. Her mother's CONTENT MESSAGES afforded her not only immediate assistance in identifying this particular object, but also they demonstrated a process for identifying objects in general. While sighted children can attach a known label to its referent in a glance, blind children must build up knowledge about features and properties overtime to faciliate recognition of objects and apply accurate labels. The redundant multimodal nature of CONTENT MESSAGES facilitate the accumulation of this kind extended knowledge about referents.

(105) Molly 38-months TC1725 (blind child)

MOT: **I found another toy.**
MOT: **ACT_winds up the toy to make it click in a wiggling motion**
CHI: GES_reaches out and takes the toy
CHI: ACT_explores the wind up lobster with her hands
CHI: A bug.
MOT: It sort of looks like a bug doesn't it.
MOT: He's got pinchers up here.
MOT: ACT_taps on the claws
MOT: And a tail back here.
MOT: ACT_taps on the tail
MOT: It starts with an L and he's red.
CHI: ACT_brings the lobster close to her eyes
CHI: A lobster.
MOT: Right.
CHI: ACT_exploring the lobster with her hands and shakes it
MOT: You wind that lobster.
MOT: **If you wind that lobster his tail moves up and down like this and he floats around the bathtub**.
MOT: **ACT_moves the tail up and down in the child's hands**
CHI: ACT_moves the tail up and down
CHI: See what he does.
MOT: The lobster's claws are like your hands.
MOT: ACT_taps on the lobster's claw and then touches child's hands
MOT: **He can grab things with them.**
MOT: **ACT_squeezes child's hand**
MOT: **He uses them as pinchers**.
MOT: **ACT_pinches child's hand**
MOT: Pinch pinch pinch pinch pinch pinch pinch pinch pinch.
MOT: ACT_pinches up child's arm shoulder neck and chin
MOT: Here find where his little pinchers are.
MOT: ACT_rubs her fingers along the place where the claws go.
CHI: ACT_feels for the spot where the claws go
CHI: Right there.

Demonstrating actions with only visual accessiblity

In the following example (106) Tyler and his mother were playing with a set of emergency vehicles including a rescue helicopter. This example contains two CONTENT MESSAGES (*demonstrating action* + speech). The first instance illustrates the use of a CONTENT MESSAGE as an *attention-getter* within the flow of on-going activity. Tyler's mother employed a *demonstrating action* (flying the helicopter in the air) with a familiar object while verbalizing its action (*This one's flying*)[7] for the purpose of eliciting his attention. She then connected her verbalization with another *demonstrating action*

[7] The linguistic form, *This one is flying*, presented along with a demonstration is often considered an ostensive verb learning situation, albeit not the preferred form (Tomasello & Kruger, 1992). But here Tyler already knew the verb *flying*, so word learning was not the current function for this form.

directing his attention to how a helicopter flies (spins the propellers). Tyler's response included a semantic error (*rolls* for *spin*), for which she then provided a second CONTENT MESSAGE including a *demonstrating action* along with a recast (*You could **spin** them like this*). Because of their inherent multimodal redundancy CONTENT MESSAGES provide an especially favorable environment for verb learning within the context of on-going activity.

(106) Tyler 34-months TC4811 (sighted child)
MOT: ACT_picks up the helicopter and flies it in the air
MOT: This one's flying.
MOT: ACT_spins the propellers
CHI: These peller rolls.
CHI: GES_points at the propellers
MOT: You could spin them like this.
MOT: ACT_spins the helicopter propellers
CHI: ACT_takes the helicopter and spins the propeller

CONTENT MESSAGES with multimodal input in a larger slice of activity

While the above examples focus on particular input modalites, it is important to acknowledge that within on-going play *joint attentional engagements* that foster language development contain a complex array of input that involves shifts in modality presentation according to the current task demands as well as the child's ability to access particular information. Within activity in this study, parents consistently talked about what they were doing with the child, infusing language very specifically related to on-going action.

In the following example (107), Molly and her mother were learning to play catch. What took place in this activity is common to all 'ball catching learners', but the multimodal cues here are highlighted because vision is missing for Molly. Her mother used the sound of a wiggly-giggly ball, to invite her to play with a familiar object. The sound provided not only the location of the ball, but also alerted her to the identity of the ball, knowledge that would be available to a sighted child by eye gaze. Molly knew the word “ball” but her mother took this play opportunity to infuse many other words related to balls. She used repetition, annotation of actions, and child-directed speech to highlight labels for objects and actions. She made the meaning of unknown or less familiar words more salient by substituting pronouns for the known word “ball.”(She repeated and extended Molly’s use of the word “ball” (CHI: *Ball*. MOT: *It’s your ball.*).

(107) Molly 18-months TC20 (blind child)
MOT: ACT_bounces the wiggly-giggly ball
MOT: Come find your BALL.
CHI: Ball.
CHI: ACT_walks toward the sound of the wiggly-giggly ball
MOT: ACT_squeaks wiggly-giggly ball
MOT: Do you HEAR it?
CHI: Ball.
MOT: It’s your BALL.
CHI: Ball ball.
CHI: ACT_approaches Mom and sits down facing away from her
MOT: Here turn around here so we can play catch.
MOT: PHYD_takes the child by the feet and swings her around positioning her legs in a V for catch
MOT: ACT_squeaks the wiggly-giggly ball
MOT: Here it comes.
MOT: You want the ball?
CHI: Nu:::h (happy sound)
MOT: Here it comes.
MOT: ACT_rolls the wiggly giggly ball and it squeaks and hits the child’s foot
CHI: ACT_reaches out when the ball hits her foot and rolls it toward mom
MOT: Oh you kicked it.
CHI: ACT_reaches out and picks up the ball
MOT: Good job.
MOT: PHYD_repositions child’s legs in a V
MOT: Can you THROW it to mommy?
CHI: ACT_let’s go of the ball and it squeaks and she picks it up again
MOT: Throw it to mommy
CHI: ACT_throws the ball generally toward mom
MOT: Oh good job THROWING it to mommy
MOT: Do you want more? Do you want to pl>
CHI: <More.
MOT: More.
MOT: Here it comes.
MOT: ACT_bounces the wiggly giggly ball and it squeaks
MOT: Here it comes.
CHI: ACT_reaches her body forward to catch the ball
MOT: ACT_pushes the ball so it touches the child and the ball squeaks
CHI: ACT_reaches for and picks up the ball
MOT: You got the BALL.

The above example (107) illustrates how affordances (i.e., the sound of the ball, the positioning for activity, the actions of catching and throwing, the infusion of language) can be made prominent and available to blind children who lack access through vision. According to the social-ecological approach children are not faced with an infinite number of options in making word-referent connections, rather parents guide their children to notice word-object relationships by limiting the child's area of focus to objects and actions of relevance in the environment. However, as with other approaches, the social-ecological approach heavily weights the sense of vision in facilitating the critical connections. "When seeing is disrupted, visually guided action is severely hampered. The information that we are temporarily unable to detect prevents us from continuously monitoring and ascertaining the opportunities for action afforded by the environment" (Zukow-Goldring & Ferko, 1994. p. 173). However, as the above interaction between Maddie and her mother shows, "opportunities for action afforded by the environment" can be made continuously available through the careful use of sound and touch. The problem for the child is to connect what mother is saying to what is occurring in the immediate environment. The child must be able to detect stable patterns among the particular perceptual objects and events specified by the language she hears. In the above example, Maddie's mother facilitates or affords Maddie's catching of the ball by positioning her legs in a V and using a ball that provides sound information about its trajectory. Thus, the pathway of the ball from mother to child is made perceptually available through sound and physical placement of the child. When the ball does not follow the necessary trajectory exactly, Maddie's mother adjusts the path by pushing the ball so it touches Maddie's leg; thus giving a tactile cue for Maddie to reach out. In addition, she gives verbal translations of information that is perceptually available, although not through vision, to Maddie. For example, when the ball hits Maddie's foot, her mother says, *Oh, you kicked it.* When Maddie throws the ball toward her, her mother says, *Oh, good job throwing it to mommy.* And When Maddie reaches for and picks up the ball, her mother matches Maddie's action with, *you got the ball*.

Types of referents used in CONTENT MESSAGES

As discussed earlier, referents need to be *relevant* and they need to be *accessible*. After 18-months, in this study, attention was garnered and managed more through the choice of appropriate referents and the use of complementary language about those referents within activity than through the use of overt attentional cues. There were similarities and some differences in the types of overt attentional cues that were facilitative for blind and sighted children. There were also notable similarities and differences in the use of various types of referents found in parental verbalizations. For example, the amount of speech referring to actions and whole objects was similar for all of the parents in this study, but the parents of the blind children made more references to object parts and object properties. Hence, in their CONTENT MESSAGES the parents of the blind children supplied more language relating to specific aspects of referents that could help them build up knowledge about objects and actions that is not available to them through vision. In addition, the parents of the blind children used more words relating to an object's type or kind, and they made more contrastive statements. These findings suggest that the parents of the blind children used specific language that would help their children make generalizations about things in the world they could not connect through tactile means alone.

Objects, actions, parts and properties

CONTENT MESSAGES including *demonstrating gestures* or *actions* supplied complementary information about actions being performed as in the following example

(108). In this example Molly's mother provides explicit information about the affordances made available by the lobster toy (the moveable parts), and she verbally describes how to engage the affordances in an action (*wind that lobster*) and the results the action (*he floats*). In this study the parents of the blind children tended to supply more verbal information about actions than the parents of the partially sighted children and the sighted children.

(108) Molly 38-months TC1757 (blind child)
MOT: If you wind that lobster his tail moves up and down like this and he floats around the bathtub.
MOT: ACT_moves the tail up and down in the child's hands
CHI: ACT_moves the tail up and down
CHI: See what he does.

While verbs were sometimes included in sentences along with their noun agents as in the above example (108), actions were more commonly emphasized by pronominalizing the noun while using descriptive verbs to emphasize particular actions. In the following example (109) Ethan and his mother were playing with rescue vehicles and she uses action verbs to cue his recognition of the flight affordance of helicopters.

(109) Ethan 34-months TC5247 (blind child)
MOT: Do they drive on the ground or fly in the sky?
CHI: ACT_pushes the siren button on the rescue helicopter

As discussed earlier, parts are particularly important for blind children because they need to sequentially put together the parts to get the whole 'picture' of an object; whereas vision affords sighted children an immediate snapshot of a whole object (refer to example 52, p.179). Simliarly, object properties afford alternative ways for the blind child to identifying objects. For example (110), the sounds made by certain objects and actions are distinctive enough to afford easy aural identification.

(110) Ethan 26 TC1302 (blind child)

CHI: ACT_pushes the sound button on the hot plate and it makes a frying sound
MOT: Sizzling.
MOT: ACT_presses the button on the hot plate again and it makes a bubbling sound
MOT: Boiling water.
CHI: ACT_reaches out and feels the hot plate
MOT: ACT_presses the button on the hot plate again and it makes a frying sound
MOT: Sizzling bacon.

While tactile exploration can be helpful in identification of familiar objects, most objects, including common children's toys, do not afford enough distinguishing tactile information that is related to their real life forms. Assumptions about objects based on shape are often misleading for blind children as observed in Ethan's mistaking a ladder for a comb in example (92). On the other hand, with enough practice blind children are able to make fine distinctions among objects. Molly was able to recognize and label many types of very small plastic dinosaurs based on their distinguishing features. For blind children objects are frequently used as platforms to talk about the distinguishing features and actions of the real objects they represent, in a pretend play manner not unlike sighted children. Children learn words through the actions they perform. Performing actions on objects in a pretend world is an extension of acting in the real world, and affords extensive language learning opportunities. In the following example (111), Ethan and his mother are engaged in pretend play with plastic dinosaurs.

(111) Ethan 42-months TC496 (blind child)

CHI: And then he says Where's my family?
CHI: ACT_making walking movements with a dinosaur
CHI: I wanna eat.
MOT: Oh he's hungry now?
CHI: This one has a long tail and a long neck.
MOT: That looks like a tree-eater then.
CHI: Where's his talker-to-me?
MOT: Talker-to-me?
CHI: I wanna make him talk.
MOT: That one doesn't have a sound button.
MOT: Well he probably sounds very similar to the other one with the long neck and the long tail.
MOT: Or maybe it's a she because there are boy and girl dinosaurs.
CHI: This is a boy dinosaur.
MOT: Where's his friend?
MOT: Where's the other one just like him?

MOT:	Because he's asking Where's my friend?
MOT:	Hm a friend is behind you.
MOT:	ACT_reaches behind the child for another dinosaur
MOT:	Here he comes.
MOT:	ACT_walks the dinosaur from behind the child and places it in front of the child
CHI:	This dinosaur says I wanna go in the tree.
MOT:	We're gonna go eat trees because we have long necks.
CHI:	Those friends that are eating the trees up there.
MOT:	They walk over with their straight legs.
MOT:	ACT_walks the dinosaur
MOT:	They don't climb and they don't hop.
MOT:	They walk boom boom boom.
MOT:	ACT_pounds the dinosaur on the floor
MOT:	And the ground shakes.
MOT:	And then they get to the tree and they eat.
MOT:	The tree vibrates.
MOT:	ACT_shakes the dinosaur
CHI:	He found his friend in that tree.
CHI:	He's eating the tree with his friends.
MOT:	Oh well that's awesome.
MOT:	Now he's not lonely.
CHI:	ACT_moves his dinosaur away from Mom
CHI:	And now he is eating by himself.
MOT:	He's gone off by himself?
CHI:	Yeah he's hungry for something else.
CHI:	He's eating all the leaves.
CHI:	ACT_hold the dinosaur up
CHI:	ACT_makes eating sounds
MOT:	Oh he is.
MOT:	That's right. He's a leaf eater.
CHI:	ACT_puts the dinosaur on the floor
CHI:	He standed on the ground to eat those leafs.

Types of objects

The parents of the blind children used more words for types of objects and more contrastive statements than the parents of the partially sighted and the sighted children. Around 18-months children's accumulation of new words tends to rise according some researchers because of a new understanding that words refer to categories of things (Gopnik & Meltzoff, 1992). While the sighted children in this study were putting all of their dolls on the couch or their stuffed animals on their beds or lining up trucks, what kind of evidence was there that the blind children had this kind of understanding of categories? According to prior research, forming categories has been seen as problematic for blind children (Andersen, Dunlea & Kekelis (1993; Dunlea, 1984).

However, observations of the blind children in this study suggest that they were afforded many opportunities to extend words to new instances and to build up knowledge of categories, albeit, in a different manner than sighted children. In accord with Bigelow (1987), the following examples from the 18-month play sessions of the two blind study participants, suggest that it is experiential opportunity rather than blindness per se that is critical in learning to extend words to different instances within the same category and to form an understanding that words belong to categories of objects. Both Ethan and Molly were able to abstract relevant unifying features of objects from different sources of input through tactile, embodied means.

As reported by his mother, Ethan used the word *kitty* for both of the family cats that had distinctly different body types, fur texture and temperaments. He also overextended the word *kitty* using it when he heard the neighbor's dog scratching on the fence. Ethan used the word *cracker* for crackers with different shapes and textures, and he used the word *Cheeto* only for *Cheetos.* In Molly's video session she used the word *pillow* when she was lying on the floor nestling her head into her soft stuffed elephant, *Ellie*. Her mother indicated that she also used the word *pillow* to refer to the pillows on the sofa and to her stuffed elephant when she put her head on it in her crib. Although Molly did not yet use the word *Ellie* to refer to her stuffed elephant, she did not respond to hearing the word *Ellie* as if it were a pillow. In the video, in a repetitive game format, holding out two objects, her mother asked, *Where's your Ellie?* and then *Where's the ball?* Molly clearly knew her Ellie. It is likely that when she said *pillow* while resting her head on *Ellie*, she was *using* Ellie like a pillow. Molly's use of the word *whoa* also illustrates that she was able to generalize the meaning of a word; she had done so based on embodied action across multiple contexts. She used the word *whoa* when riding on her rocking horse in her bedroom, and again later in the video when she was rocking the ottoman in the living room. She also used the word *whoa* when prompted to tell her papa on the telephone about riding on her rocking horse, and again when she heard her mother, in conversation with the author, use the word *rocking horse*. It is likely that for Molly the word *whoa* was linked to the activity of rocking, first on her rocking horse, then it was extended to other rocking situations. Her use of the word when she overheard it being used conversationally by her mother and the author, illustrates her understanding of the social, communicative use of language. She was tuning in and likely wanted to be part of the conversation.

Given these word-learning examples from blind children who are progressing well in developing language, it is not likely that blind children who do have difficulty decontextualizing words have this difficulty because blindness is related to a cognitive deficiency in the ability to conceptualize as Andersen et al. (1984, 1993) proposed. Molly's ability to form categories of objects provides further support for this view. Her toys were stored in bins on an easily accessible rack, each bin containing a variety of types of objects, for example, balls, musical toys, things that you shake, and things that squeak. Two of Molly's first categories were 'shakers' and 'squeakers.' While she did not exhibit spontaneous sorting behavior like Emily who frequently collected all of her dolls and put them into a stroller, Molly was able to find the bin with the 'shakers' (bells and rattles) and the bin with 'squeakers' (various rubber bathtub toys) when her mother used a verbal prompt (*Go find your shakers* or *Where are your squeakers*?). In addition, Molly could extend her understanding of these categories by placing new exemplars (*shakers* and *squeakers* of different sizes and shapes) in the categorically correct bins. These categories were based on the different types of actions Molly performed on these objects. Piaget (1962) long ago observed that children's first words tended to be objects that they acted on as opposed to things that are not easily manipulated. Katherine

Nelson (1974) extended this view suggesting that children's first use of words derived from their prelingustic concepts about what objects do. In addition, recent work by Childers and Tomasello (2003) shows that children are able place objects in their associated category groupings on the basis of the actions performed on them as well as their object labels. Molly's 'shaker' and 'squeaker' bins contained numerous objects that Molly had observed individually through the channels of touch and sound for many months before she comprehended their general category relations and coordinated her mother's linguistic labels with them. In addition, these were objects that *she* operated on, and in so doing, realized her own ability to make happen the sounds that were critical to their categorical likeness. What a child *does* with particular groups of objects may not be so different for blind and sighted children. Hence, object function may provide a particularly assistive marker in the formation of categories for blind children. Dunlea (1984, 1989) observed that the blind children she studied did not engage in spontaneous or elicited sorting behavior and concluded that this was a cognitive deficit that inhibited language development. Molly, however, was able to exhibit an ability to form categories by extracting pertinent nonvisual information using alternative nonvisual strategies. While she lacked the ability to look around a room for visually similar objects, move to them and gather them together, she did not lack the knowledge that similar things go together.

Blind children, then, appear to be quite able to form categories based on information they have access to; however, it is possible that some particular categories are more difficult for blind children to conceptualize because tactile and sound information are not as germane to some core meanings as visual information. The particular categories first learned by blind and sighted children merit further study, particularly to establish whether blind children have difficulty categorizing in situations that might inhibit their ability to learn crucial information about the world around them. It may be, however, that the ability to form categories and understanding the concept that words function as categorizers is more important than any particular categories learned.

All parents in this study used words referring to categories within the flow of their activity. The following list provides a sampling of the types of sentence formats employed to expose their children to language related to the types of objects available in their on-going play.

> *What kind of a birdy?*
> *We have a whole lot of zoo animals.*
> *Do you wanna feel a different kind of horse?*
> *They're reptiles.*
> *What kind of cookies did we make?*
> *That one goes in the sea creature bag.*
> *You wanna do the farm sounds?*
> *A tropical bird.*
> *Do you think that kind of umbrella is for the rain?*
> *Oh all the barnyard animals fell out.*
> *I thought diesel ten was a choo choo.*
> *Do you remember what kind of fruit we gave her?*

The blind children did not appear to have difficulty responding to these types of conversational utterances or learning new categories as they were introduced verbally through toy play. The toys presented in this study were arranged in bags containing different types of toys (cooking toys, balls, stuffed animals, birds, plastic animals, farm toys, a doll house, sea creatures, dinosaurs, etc.).

Contrastive statements

E. Clark (1987), suggests that word learning is facilitated by a Principle of Contrast which holds that different words mean different things. In other words, a difference in the form of a word, indicates a difference in meaning. For young language learners this means that they can use the meaning of a word they know to assist in learning other words. In Clark's view children do this automatically in the flow of language they hear. In this study, parents used explicit contrastive language to help explain new words to their children and the parents of blind children did this more often that the parents of the partially sighted or the sighted children. Explicitly contrasting one word with another might allow parents of blind children to tailor their contrast offers to the particular experiential knowledge of their children. Using contrastive language directs the child to notice how things are connected. For example, parents frequently related a new toy to something they were familiar with through a family members or friend (*It's like Papa's truck. Colin has one like that*.) or something that belonged to them (*Does that sound like your birdie?*). They also connected new items to sensory experiences. For example, Ethan and his mother often cooked together, so Ethan was familiar with words related making cooking as in the following example (112).

(112) Ethan 38-months TC4932 (blind child)

MOT: ACT_holds the jar of catnip up the child's nose
MOT: Actually it kind of smells…well I thought it was oregano.
CHI: Catnip.
MOT: Or some kind of tea.
CHI: Catnip.

Children also are assisted in their understanding of types through verbal constrasts presented as negative examples and prompts to help children organize their knowledge. In the following example (113), Molly's mother was aware that Molly knew some examples of crustaceans and she uses this knowledge make clear a contrast between *fish* and *crustaceans.*

(113) Molly 38-months TC2334 (blind child)

CHI: Where does this fish fit in go back in the sea?
MOT: That's not a fish.
CHI: Uh.
CHI: He wants to go back in the ocean.
MOT: Okay.
MOT: What is it?
CHI: A crustacean.
MOT: Yeah.
MOT: What else is a crustacean?
CHI: A lobster are crustaceans. A lobster is a crustacean.
MOT: Yes it is.

That fact that the parents of the blind children used more words relating to types of objects and more contrastive statements may reflect important ways in which they adapted their input to make available information that was unavailable through sight. Contrasts, in particular, provide an effective and efficent way to make connections both about pieces of known information and also about how new information can be learned through contrasts with known information.

Prescriptives, descriptives and questions

In this study parents used prescriptives, *descriptives* and *questions* in flexible ways primarily in following-in to bring shared attention to some aspect already of current interest to the child. Previous research has focused on how the use of these forms, particularly applied with a directive function, support or inhibit the child's future success in learning language. This study takes a different perspective. The primary concern of this study has been to bring to the fore a *joint attentional socializaton process* by documenting the ways in which parents use gestures, actions and language within activity to entrain in the child the importance of paying attention and the ways in which attention is elicited and directed for learning about the world. Specifically, this study focuses on how these forms are used in real time toy play to assist the child in bringing his attention to just those aspects of his activity that will extend his learning about objects. Observations from the toy play interactions suggest that all of the parents in this study used prescriptive, descriptive and question language forms to assist their child in learning on what and where to focus attenton to extend something already relevant for the child to other present and conjectured aspects of the world. By the 18-months starting point of this study the child's attention was primarily guided through the flexible use of these language forms, and less through explicit attentional ATTENTION-ELICITING CUES, ATTENTION-DIRECTING CUES and CONTENT MESSAGES that included *demonstrating gestures* and *demonstrating actions*. In other words, CONTENT MESSAGES became increasingly verbal expressions of information that related to the child's current interest, and thus were inherently attention focusing in that shared attention flowed through language and participation in activity Since the prescriptives, *descriptives* and *questions* used by the parents in this study were overwhelmingly employed in following-in to rather than leading the child's attention, the following discussion will pertain only to the coded follow-in parental utterances.

Prescriptives

Prescriptives were used least by all of the parents in this study. Of the three linguistic pragmatic forms coded (a.g., *prescriptives, descriptives, questions*) they are the most directive in nature and the simplest in form. Used in following-in to the child's current interest they establish for the child the parent's interest in sharing attention. In this study they were most frequently used to direct the child's attention to what to do in order to accomplish a task. In the following example (114), Sam and his father were putting balls down a ball chute and Sam had selected a ball that was too large. At younger ages prescriptives are frequenlty preceded by ATTENTION-ELICITING CUES (*Okay, Let's X*) to mark that the child's action is being solicited.

(114) Sam 18-months TC2321 (partially sighted child)

FAT: Okay let's get a smaller one.
FAT: Okay put it in
CHI: ACT_puts it in the hole
FAT: Okay push that in.
CHI: ACT_pushes the ball in the opening to the ball chute
FAT: There.

At older ages the child has been socialized through repeated interactions involving prescriptives that her action is to be the next step in the flow of their joint activity. In the following example (115) Amy's father introduced the task of opening a zip lock bag using a descriptive form to set the task, then he used a series of prescriptives to succinctly indicate what Amy needed to do to open the bag successfully.

(116) Amy 34-months TC420 (partially sighted child)

FAT: You get to pull this side.
FAT: ACT_puts his hands on the zip lock opening
CHI: ACT_reaches down toward the bag
FAT: Pull that one.
FAT: ACT_puts his fingers on the side of the opening closest to the child
CHI: Okay.
CHI: ACT_puts her fingers on the opening to the bag
FAT: Right there.
FAT: PHYD_puts the child's fingers on the opening to the bag
FAT: Grab that.
FAT: ACT_holding the bag for the child
FAT: And pull.
FAT: ACT_pulls the bag open in the child's hands
CHI: ACT_reaches into the Lego bag
CHI: Look oh look.
FAT: I see them.

Questions

Questions were used more frequently than *prescriptives*, but less frequently than *descriptives* for all of the parents except Sam's parents who used questions more than the other parents in the name game format (*What's that? Is that a X? Who's this?*). Questions served many attention-maintaining functions during the toy play. For example, with younger children parents frequently used a *question* as an indirect request, then followed up with a *prescriptive* if the child did not response to the question as in the following example (117) where Molly's mother was rocking her on her rocking horse.

(117) Molly 18-months TC1109 (blind child)

MOT: Can you hold on to the handles?
CHI: ACT_continues feeling the mane with her left hand
MOT: Hold on to his handles.
CHI: ACT_puts her hands on the handles
MOT: Okay here we go.
MOT: ACT_tips the rocking horse backward

Within the toy play activity parents also used *questions* to call attention to and to provide a label related to the child's current action. Sam's mother used a question as a descriptive in the following example (118)

(118) Sam 18-months TC830 (partially sighted child)

CHI: ACT_rattling a toy
MOT: Does that make noise?

In addition, parents used questions as requests for engagement calling their child's attention to available and appropriate objects within their toy play as in the following example (119).

(119) Tyler 26-months TC1835 (sighted child)

MOT: Can you share some watermelon?
MOT: GES_holds her bowl out to the child
CHI: No not some of mine.
CHI: ACT_pulls his bowl toward his body

Parent's followed-in to their child's activity by calling attention to possible options for completing an on-going task as in the following example (115120) where Tyler was assembling a truck.

(120) Tyler 38-months TC926 (sighted child)

MOT: How would you keep that wheel on?
MOT: Do you think you need a NUT or something?
CHI: This this fix it.
CHI: ACT_picks up a screwdriver piece and puts it into the wheel
MOT: Something like that?
MOT: Would you put one of these on there?
MOT: GES_hands the child a nut
CHI: GES_takes the nut and twists it into the wheel

The parents of the blind children, in particular, frequently entered into their child's on-going play activity verbally, sometimes using questions in a conversationally participatory manner. In the following example (121), Molly was playing with a barn and farm animals talking herself through her activity. Her mother entered into her play using a question letting Molly know that she wanted to share attention and participate in her activity through conversation.

(121) Molly 38-months TC4724 (blind child)
CHI: The horse stepped out of the stable.
CHI: The cow came out of the stable.
MOT: Are they gonna play catch or chase?
CHI: Yeah.

Parent's also used questions to solitcit their child's opinions calling attention to thoughts that appear in the mind as in the following example (122).

(122) Molly 38-months TC5747 (blind child)
CHI: She's going to put vegetables in the wheel barrel.
MOT: What else will she put in there?
MOT: Do you think she'd like to put fruit in there too?
CHI: No she doesn't want any fruit.
MOT: Why not?
CHI: Because the sheep all the sheep want the fruit.
MOT: Oh what kind of fruit do the sheep like?
CHI: The daddy likes apples.
MOT: Really?
CHI: Yeah and the baby likes oranges and the mommy likes hmm oranges.
MOT: She likes oranges too?
MOT: Do any of them like grapes?
CHI: No they don't want any grapes.
MOT: Do they like bananas?
CHI: No.
MOT: Why not?
CHI: Because they don't taste very good for them.

Descriptives

Within the toy play activity parents used *descriptives* most frequently. At younger ages parents labeled what the child was playing with (*That's kitty.*). At later ages they used descriptive statements to call the child's attention to connections with other similar objects (*Like the one grandpa got you.*) and other informative details. Most importantly, they used descriptive statements about objects in the current play activity to extend the child's understanding about how objects might fit into the wider world. When children know how to direct their attention to the connections between words and referents in the here and now, within activity attention is directed through the content of the activity. Parents add informative details to what is already relevant and accessible in the on-going flow of activity offering new information in relation to what is currently known.

With this attentional structure in place, objects in the here and now can be used as platforms to focus attention outward toward possibilities remembered and conjectured in the mind. This kind of *joint attentional engagement* has its common ground not in the here and now objects, but in a new location, in a meeting of the minds. The shared element in this kind of engagement is attention to what went on in the past, what might happen in the future, and what could possibly happen. The descriptive focus is not on what is concretely present, but rather on what is present in thoughts; thoughts that are accessible, through the kinds of words that are used. Parents in this study used words like *remember*, *forget*, *yesterday*, *long-long-ago*, to signal that their description was about something currently in the mind, but in actual occurrence in the past. They used words like *we will, tomorrow, the next day* to signal that their description was about something currently in the mind, but in actual occurrence pending. Typically, something in the here and now served as a trigger for transfering attention to the new shared location to the mind as in the following two examples (123, 124).

(123) Sam 18-months TC113 (partially sighted child)
MOT: You were a froggys for Halloween remember
CHI: ACT_holding frog squeezing it laughs at the sound

(124) Ella 34-months TC438 (sighted child)
MOT: Remember we saw...when we were with Gramma and grampa we were going for a walk.
CHI: Yeah and I seed a pig.
CHI: ACT_holds the pig up and squeezes it to make it oink

These examples (123, 124) and the following example (125) illustrate how objects in the present can shift attention to thoughts in the mind. When this happens as in the pretend play vignette below (125), attention is focused primarily through the words used to describe the pretend actions and less through explicit cueing. In the following example (125), Molly's mother directs Molly's attention to thoughts she might have in her mind for the story she is telling about animals on the moon using flexible, conversational use of *descriptives* and *questions.*

(125) Molly 34-months TC1037 (blind child)

CHI: ACT_feels all the stuffed animals on the coffee table
CHI: All the animals came back. All the animals came back.
CHI: All those animals came back.
MOT: Where did they come back from?
CHI: The moon.
MOT: The moon?
MOT: How did they get to the moon?
CHI: How do they...are they going to the moon again?
MOT: Did they drive to the moon?
CHI: ACT_moves the sheep to the back of the coffee table with some other animals
CHI: Right there in the moon.
CHI: ACT_moves the sheep to the front of the coffee table
CHI: Sheep came back from the moon.
CHI: Did the sheep come back from the moon?
CHI: Is the sheep...did the sheep came back from the moon?
MOT: What did sheep ride on to get to the moon?
CHI: The space shuttle.
MOT: She did?
CHI: Was she an astronaut?
MOT: Oh she was?
MOT: Can sheep really be astronauts?
CHI: ACT_pushes some animals together and some fall off the coffee table
CHI: There's xxx at the moon with him.
MOT: Oh my goodness I'm so glad.
MOT: He would be lonely if he went by himself.
CHI: The animals are by themselves.
CHI: ACT_starts sitting on the table
MOT: Where are you going?
CHI: To the moon.
MOT: I would be sad if you went to the moon.
MOT: Would you come back and visit?
CHI: You can come back and visit from the moon [means "I" can come back"]
CHI: ACT_pushes another toy off the coffee table
CHI: They're all in the moon.
CHI: ACT_crawls onto the coffee table
MOT: They're all in the moon?
CHI: ACT_crawling across the coffee table to the other side
CHI: You're all we in the moon.

4.4.3 CONTENT MESSAGES: Discussion

Elements of the *joint attentional socialization process* documented in this study have included explicit signals employed by parents for the specific purpose of eliciting and directing the child's attention. This section has explored some ways in which parents directed and maintained their child's attention through the content of their interaction. By performing *demonstrating gestures* and *actions* along with informative verbal messages within their mutual activity, parents assisted their child in 'seeing' their intended meaning as it was verbalized. Through these multimodal activities, the parents gave their child repeated practice in bringing their attention to the relation between the words being expressed and just those particular aspects of objects that afforded new information about how those objects fit into the their current activity. Prior research has shown that when parents direct their children's attention using a series of demonstrations along with descriptive verbalizations, their child has more success in completing tasks than when supported by verbalization alone (Zukow-Goldring & Ferko, 1994; Rader & Zukow-Goldring, 2012). Hence, *demonstrating gestures* and *actions* reduce referential ambiguity and enhance the possibility of achieving mutual understandings about words and their referents.

While the primary purpose of CONTENT MESSAGES is to impart information about available objects and actions, the attentional functions of summoning and directing attention are embedded within CONTENT MESSAGES. This study suggests that through the use of repeated ATTENTION-ELICTING CUES and ATTENTION-DIRECTING CUES children become socialized to the notion that talk is for someone's benefit and it is about something in the world. Observations from this study indicate that when their children were between 18- and 42-months (and particularly after 34-months) most talk directed to the children did not include explicit ATTENTION-ELICITING and/or ATTENTION-DIRECTING CUES, but the children very consistently remained engaged in on-going play interactions using appropriate verbal and nonverbal responses to shared referents. This suggests that during this time frame these children, regardless of their degree of vision, were quite able to focus their attention and understand adult input through CONTENT MESSAGES alone without additional attentional cueing. Sometimes parents employed nonverbal *demonstrating gestures* and *actions* regarding specific referents in their toy play, but more often they supplied information only through verbal means in an increasingly conversational manner. In addition, within increased verbal only interactions during their toy play, the parent-child dyads employed local objects as platforms to talk about more abstract contents of the mind.

Demonstrating gestures were employed most frequently to provide a model for action (i.e., a twisting motion for opening a jar) or in highlighting a path or configuration to facilitate spatial relationships (i.e., outlining the cut-out of a puzzle form). In some studies the *hold up gesture* is considered a *demonstrating gesture,* however, in this study *hold up gestures* were considered as deictic markers. If they were employed along with other informational elements such as *holding up* a stuffed animal and pressing a button to make it sound, the sound producing element was coded as *demonstrating action with sound* and the *hold up* element coded as an ATTENTION-DIRECTING CUE. All parents used some *demonstrating gestures,* including the parents of the blind children who adapted them from visual presentation to presentation. However, *demonstrating gestures* were not used frequently by any of the parents.

Demonstrating actions were used primarily to assist the child in 'seeing' ways to complete an activity or highlight an object's affordances. Parents produced *demonstrating actions* in a scaffolding manner adjusting their presentation to their child's current understandings (Bruner, 1977; Vygotsky, 1978) and their access modalities.

Thus, parents guided their child to notice specific elements, relations and actions of objects making clear connections to the words they were using. The parents of the sighted children performed actions directed in the child's line of sight and rarely employed tactile means of demonstration. Hence, the tactile means of demonstrating object features and affordances employed by the parents of the blind children appear to be adaptive strategies aimed a providing access in an alternative modality.

The use of sound cues varied according to the types of objects that the dyads chose. While it might be expected that parents of blind children would encourage the use of sound-making toys, some blind children, and indeed some sighted children find the sound made by some toys intrusive and even scary, so the use of these toys is largely based on personal preference. Interestingly, all of the parents employed simultaneous sound and tactile cues only rarely, perhaps, indicating that a distinctive presentation in these modalities is more effective. For example, separate verbalizations co-occurred with each presentation in a different modality. Parents first presented a sound cue along with a verbalization (*Is that a froggy?*), then proceeded to show the child how to make the object produce its sound using a tactile cue (placing the child's fingers on the sound button), along with a corresponding verbalization (*There's his button*).

All parents used *demonstrating actions* with about the same overall frequency except for Molly's parent whose reduced use primarily resulted from her use of fewer sound cues. Over the 18- to 42-months month time period of this study the parents of the blind and partially sighted children reduced their use of *demonstrating actions* by half, with a marked decline between 30-months and 34-months. The parents of the sighted children employed *demonstrating actions* at a fluctuating but not declining rate over the 18- to 42-months month age span. One possible explanation for the differential usage might be that *demonstrating actions* are not as effective for visually impaired children, and specifically, that *demonstrating actions with tactile input* are not as informative as *demonstrating actions with visual input.* In fact, if the *demonstrating actions with sound input* are eliminated from consideration, the parents of the blind and partially sighted children employed far fewer *demonstrating actions* overall. This alternative consideration of input modality is reasonable because sound information, (and in particular sound making toys) was used primarily at earlier ages for bringing attention to an object's sound for labeling purposes as in calling attention to the sound that a monkey makes. It is possible that with increased language ability by 34-months, language alone is a more effective way to impart content information for visually impaired children. While there are always situations where physically assisting a child in learning how to operate a toy, for example, would be facilitative, over all after 34-months of age these instances were not common in the parent-child toy play sessions in this study. Zukow-Goldring (2012) notes that even adult "musicians, dancer, athletes, and sushi chefs will tell you that experts very often guide novices through the motions of a new movement" (Zukow-Goldring, 2012, p. 570). Certainly, sometimes just observing how something is accomplished is not sufficient even for adults. But while parents in this study did employ *demonstrating actions* to make the aspects of their verbalizations perceptually available for their children during their on-going activities, these types of coordinated actions and verbalizations were not ubiquitous. Indeed, most of Zukow-Goldring's work on how caregivers make their messages intelligible by directing children's attention through their actions on objects has involved infants from 6 months to 18-months, and it may well be that *demonstrating actions* socialize children at these earlier ages to make the connection between actions and the concurrent referential and explanatory language. Zukow-Goldring has given many informative ethnographic examples of such scaffolding, but more research is needed regarding the frequency with which *demonstrating actions* are employed in everyday interactions and their use overtime.

The overall amount of content talk about whole objects, actions, object parts, and object properties was somewhat greater for the parents of the blind children, thus lending some support for the special importance for them of language input specifically related to things that are not available to them through vision. In addition, the parents of the blind children used more words related specifically to objects parts and object properties. As mentioned above, blind children build up their understanding of whole objects through learning about their parts. While sometimes this knowledge is manually directed, once blind children develop a procedural routine for exploring objects themselves, parents can scaffold their understanding by talking about what the child is currently perceiving as he is tactilely scanning an object or performing an action.

Parental talk about object properties also allows blind children to build understandings about concepts that are not available through vision. Language plays an important role in the construction of knowledge and can partially compensate for the absence of visual experience in blind children during conceptual development (Landau & Gleitman, 1985; Perez-Pereira & Conti-Ramsden, 1999). Vinter, Fernandez, Orlandi & Morgan (2012) found that it was not possible to discriminate between blind and sighted children based on their use of visual verbs. Their findings suggest that blind children adapt to the language spoken in their surroundings. For example, the blind children in this study used the terms "look" and "see" systematically to refer to visual perception in their parents and to tactile perception in themselves. They also uses color words appropriately for common words such as *green grass*, *green trees, blue sky,* and *red fire truck* as has been reported in others studies (Fraiberg, 1977; Landau, 1983; Rosel, Caballler, Jara, Oliver, 2005). Landau & Gleitman (1985) found that the blind children in their study produced color words at approximately the same time as sighted children, and that they knew that while concrete objects can all have colors, events and abstractions cannot have colors. Because color words are ubiquitous in language to sighted children, it is important that parents of blind children expose their children to these words in the same way they would with sighted children.

The results of this study indicating that between 18- and 42-months all parents used more words relating to actions than objects are consistent with other research with sighted children (Schmidt, 1996; Hoff & Naigles, 2002; Tomasello, 2003). For example, Schmidt (1996) in a study of gesture-speech coordination found that mothers in his study tended to name objects more often with infants and actions more often with toddlers. In the current study, the use of more action words reflected a richer use of content language to describe object functions and affordances. In addition, parents foregrounded action elements in their play by the frequent use of indirect pronominal reference in their talk about objects affordances, thus making salient the connection between the actions they were performing and they words they were using (i.e., *Let's spin it.*)

In order to make connections between what is occurring and what is heard, children must be able to perceive how these relations are instantiated in on-going activity. Children can make these connections in two ways: (1) by directly perceiving objects and actions and (2) by understanding communications about objects and actions from other people. Blind children are largely dependent upon other people for their learning because while tactile information may with repeated practice be sufficient for identification, tactile information alone is frequently not sufficiently relevant for developing conceptual knowledge. For example, at least early, on sighted children rely heavily upon visually available attributes such as shape (Smith, 2000), but shape by tactile exploration often does not provide adequate comparative information among exemplars for children without sight. But even for sighted children the role of shape and perceptual similarity, in general, in extablishing conceptual knowledge is controversial (Bloom 2000; Landau, Smith & Jones 1998). Indeed, shape similarity is clearly not esential for assigning the same label. For example, a digital clock and Big Ben are both *clocks* (Bloom, 1996). In addition, even for those with sight, children process a vast store of conceptual information that allows them to make inferences and to categorize objects, this kind of information is frequently processed through language even for sighted children. For example, the kind of verbal input Ethan was exposed to in the dinosaur play (see example 108) would enable him to make connections between 'tree-eaters' and 'long-necked dinosaurs' without the benefit of vision. Also the 'animals on the moon' episode (see example 120), suggests that Molly was able to build conceptual knowledge about *astronauts, the space shuttle,* and the *moon* through pretend play in much the same manner as sighted children.

The use of verbal contrasts may be especially important for blind children who are not able to make visual contrasts between, for example, what fish and crustaceans generally look like (see example 113). But similarities (ocean creatures, edible) and differences (scales, don't have limbs, live in water only vs hard shell, have limbs, amphibious) are often verbally presented even to sighted children without concurrent visual displays. While it is helpful to expose blind children to tactile experiences with objects much information about objects types can be conceptualized through verbal means. Indeed, some tactile experience may be important more for the opportunity it affords to talk about concepts than from the actual information available through tactile exploration.

5.1 OVERAL USE OF ATTENTIONAL CUEING: Results and Discussion

Recall that each type of attentional cueing involved summoning the child's attention. In other words, when a parent employed an ATTENTION-ELICITING CUE, the primary intention was to summon the child's attention. When a parent employed an ATTENTION-DIRECTING CUE the intention to summon the child's attention was implicit in directing the child's attention. Likewise with *demonstrating actions,* summoning the child's attention was implicit in providing a demonstration for him. In addition, these types of attentional cueing were not employed independently. In other words, parents often employed both an ATTENTION-ELICITING CUE (or sometimes more than one) along with an ATTENTION-DIRECTING CUE in the same utterance (i.e., *Oh look Ella there's your doll.* GES_points at doll).

Results

5. Across the 18- to 42-month age slices were there overall differences in the number of attentional cues used by the parents of the blind, partially sighted, and sighted parents?

Across the 18- to 42-month age slices, in aggregate, the parents of the blind, paritally sighted, and sighted children employed 6787 attentional cues across a total of 12,6000 parent verbalizations (see Table 33).

Table 33. ***Total raw counts for attentional input during joint attentional engagements by each parent summed across the seven age slices from 18- to 42-months***

Child	Initial ATTENTION-ELICITING CUES	ATTENTION-DIRECTING CUES	DEMONSTRATING ACTIONS	TOTAL ATTENTIONAL INPUT
Blind				
Mollie	249	460	329	1038
Ethan	260	467	438	1165
Partially Sighted				
Amy	291	489	483	1263
Sam	289	453	423	1165
Sighted				
Ella	265	501	444	1210
Tyler	236	515	455	1206
TOTALS	1590	2885	5272	6787

With regard to overall attentional cueing through the use of ATTENTION-ELICITING CUES, ATTENTION-DIRECTING CUES and *demonstrating actions* over the 18- to 42-month age slices, parents tended to use fewer ATTENTION-ELICITING CUES (n = 1590) and a few more ATTENTION-DIRECTING CUES (n = 2885) than *demonstrating actions* (n = 2572) to summon their child's attention. Overall the parents of the sighted children employed more attentional cues (Ella n = 1210, Tyler n = 1206) than the parents of the blind children (Molly n = 1038, Ethan n = 905). The parents of one of the partially sighted children (Amy n = 1263,) employed more attentional cues than all parents. The parents of the other partially sighted child employed fewer attentional cues than the parents of the sighted children, but less than the parents of one of the blind children and exactly the same number as the other parent (see Table 34).

Discussion

During the 18- to 42-month period of their children's expanding language use, parents employed surprisingly few explict cues to summon and direct their attention to objects and actions in their on-going toy play. In fact, the actual impact of these cues was likely less than the numbers above suggest. Because the parents often employed more than one attentional cue within one utterance, this total number suggests an overall cueing rate per utterance much smaller. The number, in actuality, represents the number of times each child heard a specific type of cue over the course of 2100 parental utterances, not an average per utterance. Along with consideration of other results indicating that the children exhibited observable contingent engagement behaviors, this suggests that the children, regardless of degree of vision, did not need extensive attentional cueing to participate fluidly in their toy play interactions.

Interestingly, the parents of the blind children employed the fewest number (although not widely different) of attentional cues. One possible explanation is that, as discussed above, the parents of the blind children referred mostly to objects and actions that were embodied, and hence, directly and immediately perceivable to the child. This suggests that when blind children are socialized to expect that within parent-child play the parent's words refer to the objects and actions they have access to, the need for eliciting and directing attention is reduced. However, if there is not on-going talk within activity, parents might need to use attentional cueing to let the child know that they are attending concurrently to what their child is focusing on.

CHAPTER FIVE

General Discussion

Joint attention has been studied primarily in relation to its felicitous role in language acquisition (Moore & Dunham, 1995). Most studies of joint attention have occurred in a laboratory setting focused on the child's ability to establish a triadic point of convergence for WORD-REFERENT CONNECTION. Rather than focusing on what the child can do at a particular moment, the overall goal of this study was to create a larger framework for exploring how children come to participate in *joint attentional engagements* and how language is used more generally within these engagements to guide the child in acquiring language to learn about the wider world. Specifically, this study documents how parental input to children might socialize them to attend in shared focus to a common ground where language is carefully melded with on-going activity. Paying attention to what someone says and what they are doing is critical for language development. However, there has been little research regarding how parental input might assist children to "perceive referring actions" (Zukow-Goldring, 2001, p.139).

Through a longitudinal, retrospective analysis of observable practices in a naturalistic setting, this study posits a *Joint Attentional Socialization Process* (See Table 1, p. 50) comprised of four elements that are entrained overtime and practiced locally in real time interactions: (1) ATTENTION-ELICITNG CUES, ATTENTION DIRECTING CUES, WORD-REFERENT CONNECNTIONS and (4) CONTENT MESSAGES. In other words, overtime parents socialize their children in culturally established ways of eliciting and directing attention in order to highlight word referent connections and offer information about how those referents are situated in the wider world. Observations of the parent-child dyads in this study suggest that overtime through repeated multimodal practice (gestures, actions, physical direction and verbal input), the child comes to automatically recognize attentional demands and participate in an increasingly reciprocal manner in *joint attentional engagements* that afford learnings that are currently accessible and relevant to him. Locally, the elements of the *Joint Attentional Socialization Process* become part of a menu of options for the adult to flexibly provide input to the child within on-going activity. Hence, how the child is engaged and what type of information is imparted depends on the local, or on-going, attentional and informational demands of current reciprocal communicative participation.

This study employed an observational, descriptive approach in exploring the process of joint attentional engagement, and specifically, in documenting how children's participation might be socialized in multimodal ways that afford differential modes of access. In contrast to traditional definitions of joint attention, gaze following was not employed as a measure of joint attention. The inclusion of parent-child dyads where a child who was successful in meeting productive language milestones, yet lacked typical visual access, was intended to highlight possibilities for participating in felicitous joint attentional engagements through nonvisual means. Nonvisual verbal and nonverbal input related to *joint attentional engagements* have received little research attention, but must be crucial for, at least, those successful language learners who lack visual access to the much studied visually oriented attentional cues. Specifically, in this study, *joint attentional engagement* was defined, within a naturalistic toy play situation, as observable engagements that included a parental verbalization surrounded by any other co-occurring gestures, actions, and/or physical direction related to that verbalization and marked by reliably identifiable and contingent child engagement.

Joint attention has been studied primarily with regard to the capacity of the child to engaged in and learn specific words from shared interactions. This study examined the variety of parental input that might foster such behaviors. The effect of parental input was documented through observable child engagement and presupposed based on the successful language outcomes of the child participants. Parent-child interactions have been referred to as the 'cradle of social understanding' (Rochat & Striano, 1999, p. 3). Language learning is an inherently social process initially guided by the parent's socialization of culturally established ways of paying attention. The four elements of parent input described in the *Joint Attentional Socialization Process* are based on the social-pragmatic view that, from the very beginning of life, parents engage their infants in social activity through predispositions involving child-directed speech, multimodal redundancies and contingent responses (see Table 1). The primary question addressed in this study was: *What kinds of parental input are made available to the child within joint attentional engagements that, in Western middle class culture, are purported to enhance word learning opportunities that result in felicitous language outcomes.*

Summary of Findings

1. Elements of the Joint Attentional Socialization Process as documented in this study

ATTENTION-ELICITING CUES were ostensive signals that summoned the child to engage in a shared experience with an anticipatory stance. In other words, parents employed these cues for the pragmatic purpose of signaling their communicative intent and encouraging the child to expect something to follow. Connection with the child was fostered through affective emotive expression in child-directed speech. As documented in the children's CDIs these types of cues were employed from the beginning of the child's life to draw attention to the parent in anticipation of dyadic play, but by 18-months, in this study, they were employed to create an expectation involving activity in a triadic relation with objects outside the dyad. They were short, emotive, primarily vocal *attention getters*, which overtime and repeated usage socialized the child to the notion that paying attention is important. Reflecting their purpose in summoning attention, they were grammatically located at the periphery of utterances. Utterance initial cues served as conversational entrance markers. These included *physical cues* that nudged the child to pay attention to the parent, *emotive cues* or interjections delivered with affective tone, *vocative cues* that employed the child's name or other affectionate term, *alerting cues* or specific words that prompted anticipation, and *formulaic engagement cues* that invited active participation. *Retrospective cues* were utterance final cues that served as conversational exit markers. In addition, they socialized the notion that what just occurred was attention worthy (see Table 5).

ATTENTION-DIRECTING CUES provided deictic marking directing the child's attention to a particular location in an observant stance. Parents employed these cues to provide access to a common ground for the pragmatic purpose of sharing information about some object or action immediately available in their toy play environment. Hence, these cues are always *about* something outside the dyad. Connection with the child was fostered through the cognitive understanding that the parent can serve as a conduit to affordances in the world. In other words, as children become socialized in the routines of responding to these cues they come to use their parents as tool for learning (Vygotsky, 1986).

ATTENTION-DIRECTING CUES were presented in both nonverbal and verbal forms, and in this study, almost exclusively together in composite form. From the beginning of life, parents talked to their children as they engage with them through touch, facial expression, and activity. The multimodal nature of ATTENTION-DIRECTING CUES, thus, follows and continues to entrain the expectation that speech is embodied and connected to things that are tangible and available in the here and now. Nonverbal ATTENTION-DIRECTING CUES included *deictic gestures* (*pointing, holding up and/or* toggling an object in the child's line of sight, and *give/take reaches*), *indicative actions* (*taps for orientation*, *tapping an object the child is holding, touching the child with an object*, and *placing/positioning an object to make it maximally observable*), and *physical direction cues* (*orienting the child's body to aide in perceiving a referent* and *directing tactile contact with an object*). Verbal ATTENTION-DIRECTING CUES included *deictic introducers* and *perceptual imperatives* (see Table 9).

WORD-REFERENT CONNECTIONS were made through *joint attentional engagements* where the attention of the child was in a convergent stance with the parent on a common ground while the parent presented a label for a shared referent (Tomasello, 1995). This language connection was fostered through parental attention to what was *relevant* and *accessible* for the child (L. Bloom, 2000). *Relevance* relates to the things in the current context that intrinsically entice a child's attention, interest and emotional investment. Parents indicated referents in their immediate environment to which their child had efficient *access*. For the blind children those were things they were touching; for the sighted children those were things that the parent was looking at.

There were other factors frequently evident within the context of successful WORD-REFERENT CONNECTIONS. First, the child had had previous nonverbal exploratory experience with the referent to be labeled. Second, the child could perceptually recognize the object, which for blind children meant through tactile means. Third, the child had some prior conceptual knowledge about the object, for example, its particular physical features, its function, or its place in a category of objects.

CONTENT MESSAGES included *demonstrating gestures* and *demonstrating actions* presented with verbalizations (or verbalizations alone) directing the child's attention for the pragmatic purpose of offering informative details about how the objects and actions they were sharing fit into the wider world. This knowledge connection put the child in a bidirectional stance involving the negotiation of meanings through scaffolding new understandings based on the child's current interests and level of knowledge (Bruner, 1977; Vygotsky, 1986).

Demonstrating gestures and *demonstrating actions* were presented through tactile, sound, and visual cues and adjusted to meet the access capabilities the children (see Table 25). Verbal forms included leading and following-in prescriptives, descriptives and questions directing the child's attention toward informative details about objects, actions and object parts, properties, types and contrastive information (see Table 32).

To summarize, ATTENTION-ELICITING CUES were used to prompt the child to pay attention to the communicative intention of the parent, ATTENTION-DIRECTING CUES were used to prompt the child regarding where to direct and share his attention, WORD-REFERENT CONNECTIONS focused the child's attention on a label for what was being shared and CONTENT MESSAGES directed the child's attention toward information about how what was being shared fit info the wider world (seee Table 1).

2. Frequency, patterns in use, and differences related to degree of vision for attentional cueing

Overall parents used more ATTENTION-DIRECTING CUES, fewer *demonstrating actions,* and the least number of ATTENTION-ELICITING CUES, but these cues were not used ubiquitously to manage the child's attention even at 18-months. During a period of rapid language growth for all of the children, 18- to 26-months, parents used very little canonical ostensive labeling to make directed WORD-REFERENT CONNECTIONS. Subsequently, between 30- and 34-months there was an overall drop in the use of attentional cues. All parents consistently paired language with nonverbal attentional cues across all ages from 18- to 42-months. Strikingly, all of these findings were true for all of the children in this study regardless of their degree of vision.

With regard to ATTENTION-ELICITING CUES, all parents used more *formulaic lead-in cues* than all other ATTENTION-ELICITING CUES combined. They used *emotive cues* and *alerting cues* at about the same rate, but while *emotive cues* declined sharply between 26- and 30-months, *alerting cues* were used at a more constant rate across 18- to 42-months. The use of *vocative cues* varied among the parents suggesting that some parents preferred more than others to use the child's name or an affectionate term to summon their child's attention. Overall use of vocatives declined gradually. These cues were vocally produced and there were no differences in the use of these cues that could be attributed to the child's degree of vision. *Physical direction cues* were rarely used by any of the parents, but the parents of the blind children used them more than parents of children with any degree of usable vision.

Parental use of ATTENTION-DIRECTING CUES declined sharply between 26- and 30-months for all cue types. The *hold-up/toggle gesture* was used more frequently than the *pointing gesture* and the use of both of these *deictic gestures* was, not surprisingly, inversely related to degree of vision. G*ive/take reaches* were the most frequent *deictic gesture* for all parents regardless of degree of vision.

While all parents used *indicative actions cues* involving tapping and touching, these cues were primarily used as alternative *deictic cues* by the parents of the blind children. As with *deictic cues,* there was a sharp decline in the use of *tapping* and *touching cues* between 26- and 30-months. The most frequent *indicative action cue* for all parents regardless of degree of vision was *placing/positioning an object for maximal access.*

With regard to verbal ATTENTION-ELICITING CUES, *deictic introducers* were used by all parents at similar rates and their use was not related to degree of vision. *Perceptual* *imperatives,* however, were used more by parents of children with at least some usable sight than by the parents of the blind children.

Physical direction cues were used very sparingly by all of the parents. The parents of the blind children used *orientation of the body* some before 26-months, but rarely after 26-months. They used *directing tactile contact* occasionally with no particular decline in use.

All parents used *demonstrating actions* with parents of the sighted children performing demonstrations that were within the child's line of sight. Parents of the blind children performed demonstrations that they made tactilely available to their children. The use of sound to demonstrate an object's affordances was primarily related to whether the child liked to play with sound-making toys. The use of *demonstrating actions* dropped between 30-and 34-months for the parents of the blind and partially sighted children, but the parents of the sighted children fluctuated in the use of these cues.

In summary, parents provided attentional cueing to their children in a manner that reflected their child's increasingly fluid participation in *joint attentional engagements.* In other words, attentional cueing was reduced as the children (1) understood the importance of and the ways of managing their attention, and (2) developed sufficient language skills to use the content of speech alone as an attentional signal. In addition, parents provided cues in the modalities of most efficient access for their child, summoning attention in other modalities quite rarely. In other words, while parents of sighted children did occasionally use nonvisual cues, providing access in the child's primary sensory modality appeared to be more important than cueing their children employing a variety of modalities. ATTENTION-ELICITING CUES were primarily vocally or verbally delivered as were *deictic introducers*, the most frequently used ATTENTION-

DIRECTING CUE, thus affording access regardless of degree of vision. In addition, parental employment of the most frequently used deictic gesture, *give/take reaches*, and the most frequently used indicative action cue, *positioning/placing*, were not related to degree of vision.

Table 34. ***Frequency of use, pattern of use, and differences related to degree of vision for attentional cueing types***

	Frequency of Use	Pattern of Use	Differences related to level of vision
ATTENTION-ELICITING CUES			
-*Formulaic Lead-in Engagement Cues*	-More than all other A-E cues combined	-Sharp drop in use between 30-34-months	-None
-*Emotive Cues*	-Similar overall to *alerting cue* use	-Sharp drop in use between 26-30-months	-None
-*Alerting Cues*	-Similar overall to *emotive cue* use	-Constancy in use overtime	-None
-*Vocative Cues*	-Personal preference use	-Decline in use over 18- to 42-months	-None
-*Physical Cues*	-Rarely used	-Rare over all ages	-Used primarily with blind children
ATTENTION-DIRECTING CUES			
Gestures			
-*Pointing*	-Less frequent than *holding up/toggle*	-Sharp drop in use between 26-30-months	-Inversely related to degree of vision
-*Holding up/toggle*	-More frequent than *pointing*	-Sharp drop in use between 26-30-months	-Inversely related to degree of vision
-*Give/Take*	-Most frequent A-D cue for all	-Sharp drop in use between 26 -30-months	-None (except partially sighted more)
Indicative Action Cues			
-*Three tapping/ touching cues*	-Frequency for blind similar to deictic gesture use for sighted	-Sharp drop in use between 26-30-months	-Inversely related to degree of vision
			-Inversely related to degree of vision
-*Placing/Positioning*	-Most frequent IA cue for all	-Gradual decline almost by one half over 18-42-months	-Range of use but not related to level of vision
Verbal Cues			
-*Deictic introducers*	-Most frequent for all	-Used 18-30-months in 'name game' contexts; used 30-34-months within on-going activity	-None
-*Perceptual imperative*	-Far less frequent than deictic introducers for all	-Used to provide sensory access	Inversely related to degree of vision
PHYSICAL DIRECTION			
-*Orientation of the child's body*	-Rarely used	-For blind children some before 26-months	-Inversely related to degree of vision
-*Directing tactile contact with object*	-Rarely used	-Occasional use with no sharp drop	-Inversely related to degree of vision
DEMONSTRATING ACTIONS	-Overall similar frequency by modality	-Drop between 30-34-months for blind and partially sighted -Fluctuating use for sighted	-Inverse tactile and visual demonstrations
TOTAL ATTENTIONAL CUEING	A-D Most DEMO ACTIONS A-E Least	-Overall drop in attentional cueing between 30-34-months	-Slightly less attentional cueing for blind

3. The use of language content for attentional cueing in the socialization of joint attentional engagements

Direct attentional cueing was not necessary during much of the parent-child toy play observed in this study. More often attention was focused through the verbal and activity content of what they were 'doing together.' All parents employed a consistent strategy of providing verbal labels and/or informative details by following-in to something the child was already looking at, touching or performing a actions on, thus providing a WORD-REFERENT (or language-referent) convergence on something eminently *accessible* and of immediate *relevance* for the child. They followed-in to the child's current focus most when the child was more passively looking at or touching an object than when the child was performing an action on the object.

Verbalizations about the actions and objects in the toy play were also related to the child's need for particular types of information. While the amount of content talk about *actions* and *objects* was not related to level of vision, the parents of the blind children used words relating to *parts* and *properties* to describe unseen object attributes. In addition, the parents of the blind children used more language referring to *object types* and *contrasts* in order to transfer knowledge unavailable through sight.

In presenting CONTENT MESSAGES, the parents very consistently followed-in to the child's current interest thus making clear the connection between the knowledge they were imparting and its referent. They used primarily descriptive language, questions and fewer prescriptives to offer informative details about objects and actions within the toy play setting. In addition, they sometimes used objects in the toy play as platforms to extend opportunities for learning beyond what was directly perceivable, for example, to related, but not present, objects, and also to thoughts imaginable only in the mind.

Thus attention was increasingly managed through the content of their activity through speech alone.

4. Child Responses to attentional cues within joint attentional engagements

In this study *joint attentional engagement* was defined by coding child behaviors on either side of a parental verbalization. These were observable contingent engagement behaviors that exhibit a responsive shift in attention toward the content of the adult's verbalization, behaviors initiating the parent's verbalization or behaviors that suggest continued engagement through on-going activity related to the parent's verbalization (see Table 4). In this study the ability of two coders to reliably observe these engagement behaviors was taken as evidence of child attentional engagement.

Implications from Findings

1. *Communicative intentions are made manifest through repeated attentional cueing within activity*

Through the repeated use of attentional cues within joint activity the parents in this study made manifest their communicative intentions. Each of the cue types was delivered for a specific pragmatic purpose that entailed an intention to engage in a particular way and for the child to participate in a particular way. ATTENTION-ELICITING CUES made manifest the parent's desire to engage in shared attention, entraining the child to anticipate something attention worthy. ATTENTION-DIRECTING CUES made manifest where shared attention was to occur, entraining the child to bring his attention to a particular place. WORD-REFERENT CONNECTIONS made manifest an ostensive word learning routine, entraining the child to expect a connection between a word and an object. CONTENT MESSAGES made manifest a transfer of knowledge about what 'we are doing together', entraining the child to expect that the language proffered would provide informative details connected to their on-going activity.

There is likely a sequential nature to the way in which these cues are entrained in the child. Certainly children must come to understand the importance of attention first, before learning to direct it, and they make WORD-REFERENT CONNECTIONS before they can grasp the range of information imparted in CONTENT MESSAGES. Another way to look at the sequential nature of these cues is that the intentions manifest in one cue type become implicit, or nested, in the next (see Table 35). For example, using an ATTENTION-DIRECTING CUE manifestly prompts a 'looking' attentional response, but implicit in directing attention is an intention to engage. Furthermore, in making an ostensive WORD-REFERENT CONNECTION implicit is that this connection will take place in a certain location and that it is attention worthy. Finally, proferring a CONTENT MESSAGE implicitly connects language to shared activity in a particular place for the purpose of sharing something attention worthy. Each successive cue type requires less direct attentional cueing. Presumably this is because, the child, as he becomes entrained in the importance and ways of managing his attention, gives it more fluidly through bidirectional conversational negotiation. In support of this socialization process view, at 18-months of age all of the children in this study exhibited engagement behaviors that reflected an understanding of how to act in relation to all attentional cues. However, none of the attentional cues were ubiquitous in the toy play interactions at 18-months. In addition, there was sharp decline in most attentional cueing between 26- and 34-months for all children regardless of their level of sight. This pattern suggests that they had had repeated early experiences that entrained, first and foremost, the importance of paying attention. Then through embodied, multimodal, repeated experience with the routines of engagement, they learned the communicative intentions specified by the various attentional cues. As with language, once children 'get it' they proceeded to use their attentional skills fluently in their engagements with others without explicit cueing. Attentional cueing increasingly became more adult-like, employed for the exigencies of particular moments. These situations may demand an *emotive cue* calling for engagement in something surprising, an instrumental *placing* of an object strategically to evoke an action, a *deictic point* accompanying the name of an unknown mountain, or a CONTENT MESSAGE about how to put a toy helicopter together paired with a *demonstrating action.* This progressive understanding of the communicative intentions involved in *joint attentional interactions* suggests that this understanding may evolve through activity. That is, it is social practice and repeated engagement in the multiplicity of communicative expectations that grounds the child's concept of intentionality (Racine & Carpendale, 2007).

Table 35. ***Nested manifest and implied intentions within attentional cueing***

ATTENTION-ELICTING CUES	ATTENTION-DIRECTING CUES	WORD-REFERENT CONNECTIONS	CONTENT MESSAGES
To engage in shared attention	*To direct shared attention to a location*	*To connect a word with an object*	*To transfer knowledge*
	To engage in shared attention	*To direct shared attention to a location*	*To connect language to current activities*
		To engage in shared attention	*To direct shared attention to a location*
			To engage in shared attention

2. Children first learn language that is connected to what they are currently doing, but through the process of socializing attention children learn that language is also about thoughts located in the mind.

The reduced use of ATTENTION-DIRECTING CUES between 26- and 30-months suggests that the child has consolidated the understanding that language heard in on-going activity is important to attend to and that it is *about* 'what we are currently doing together". Repeated experience in here and now object or action directed activity may overtime entrain this understanding and support a subsequent developmental sequence of understandings that talk is not just about things in the here and now, but that objects can be platforms to talk about related unseen (or tactilely available) objects, and, also can reflect 'a meeting of minds' expressed in talk about what we are currently 'thinking about together'. So children must learn that ATTENTION-DIRECTING CUES *point* to *where* to *look* to connect spoken language with referents in the world, and they also must come to expand their understanding of what *where* might entail. Specifically, they must understand that the *place* of talk may be located in embodied, directly perceivable objects and actions or it may be located in current thoughts that were triggered by some internally driven connection.

Interestingly, some evidence for this view may be provided by children, themselves, and particularly blind children, as they are developing their concept of where *where* is located. The language of blind children sometimes appears to come out of nowhere, thus leading some researchers to conclude that it is nonmeaningful or out of context or that they use language randomly to maintain connection with other people (Perez-Pereira & Conti-Ramsden, 2999). However, another possibility is that blind children express thoughts that are triggered by internal connections to something that is not immediately evident (or visible) to others. For blind children, the parent's ability use her knowledge of the child's current store of experience and information to potentially grasp their child's intended reference may be crucial in facilitating and encouraging their child's use of language. In example 95, for example, Ethan's mother was able to quickly understand his use of the word *comb* in relation to the fire truck ladder in terms of what he was thinking, and she was able to synchronize their thoughts. Of course, all parents and children (and adults talking to other adults) must go through what becomes an increasingly fluid process of matching their referents so that mutual understanding is possible. However, this process may be more difficult, especially in initial language learning, with blind children. For parents, holding a belief that their child's language is, more likely than not, meaningful in some way, makes discovering the child's intended reference a potentially fun sleuthing process rather than a discouraging dead-end.

3. Attentional cueing is an important prerequisite to language learning, but many aspects of such cueing have received little prior research investigation

Some of the most frequently used attentional cues have received little research investigation. *Formulaic engagement cues*, for example, have been documented as grammatical slot filler phrases that contribute to the development of a 'usage-based grammar' (Cameron-Faulkner *et al*, 2003, Tomasello, 2003). Early on they were recognized by Snow (1977) for their role in developing the turntaking skills basic to conversational engagement. *Emotive cues* have a frequent and special role from the beginning of life in entraining dyadic engagement, but they have been discounted by some as devoid of semantic content (Quirk, Greenbaum, Leech & Svartik, 1985). However, it seems they may have a very crucial role early in language development in 'getting to' semantic content.

Retrospective cues have also not received due consideration as *attention-getters,* generally, or for the role they play in closing joint attentional engagements. Their frequent use and their lack of decline over 18- to 42-months of age suggests that they have a persistent and necessary role in joint attentional engagements. Their role in conversational turning taking in adults has been explored (Schegloff & Sacks, (1973), but documentation of their role in conversational skill development in child is lacking. Certainly their place in ending a parental conversational turn and providing an opening for child action is a key element in developing attentional skills. Additionally, their emotive force in marking the previous utterance as attention worthy in a nuanced fashion may play a valuable role in pointing to the importance of just heard information in joint attentional engagements. In this study, *retrospective cues* were not further categorized in terms of their specific forms. Indeed, some of their forms are also used as initially placed ATTENTION-ELICITNG CUES, and investigating this dual usage further may be of pragmatic interest.

Give/take reaches have received considerable research attention in fostering early communicative skills, but they have received less attention for the role they play in later word learning within activity. For example, through the *give/take game* children have much early embodied practice in matching what is said with what is done or felt, but nouns, verbs, adjectives, and adverbs are often used nonostensively, embedded in longer utterances, in the act of giving and taking in everyday activity and children, by 18-months, are primed to make these connections or negotiate them if need be.

Because so much word-learning research has been focused on visually based *deictic gestures*, the role of *indicative actions* in word learning has been largely overlooked (but see Messer, 1981, 1983). Akhtar & Gernsbacher (2007) have recently suggested that typically developing children might use multiple perceptual modalities to establish joint attention with others. Interestingly, observations from the current study suggest that, although the parents of sighted children do use *indicative action cues*, they do so rather sparingly. While it is possible that more nonvisual cueing, particularly touch, is employed more frequently in interactions with infants, the parents of the sighted children between 18- and 42-months employed visually oriented cues, first and primarily. For these parents, it is not that they didn't ever offer cues in an alternative modality, but when they did, it was because an object strongly afforded a distinctive odor, texture, sound or flavor. In other words, other modalities such as smell, touch, audition and taste might override the use of a visual presentation with the object itself affords another more salient attribute or when the parent wants to emphasize a particular sensory aspect of an object. Vision may, in fact, be so powerful for those that have it, that cueing attention in other modalities is much less efficient and effective. In addition, variety does not appear to be an important aspect of providing attentional cueing; rather parents tend to stick with canonical nonverbal forms that provide the best access for their child.

The use of *physical direction* for cueing attention has also received little attention, but may, in fact, be more prevalent in other cultures. For example, Zukow (2001) suggests that Latino mothers use more *physical direction* in their interactions with their children in everyday activities such as peeling an orange. Further investigation of how attentional cueing is used in other cultures would lend support to the view that children are socialized in the particular ways in which their cultures manage attention.

4. How does joint attentional engagement mediate the issues of referential indeterminacy and perceptual availability

Through parental use of ATTENTION-ELICITING CUES, ATTENTION-DIRECTING CUES, *demonstrating gestures* and *demonstrating actions* and their concurrent verbalizations, children received considerable guidance regarding how to manage their attention so that referents were made clear within on-going activity. In addition, parents very consistently matched their speech to referents that were perceptually available through their child's most efficient mode of access. Most importantly, this study suggests that while eye gaze delimits referential options for sighted children, this is not the best way to generalize how WORD-REFERENT CONNECTIONS are made. Rather is it more informative to frame this situation in more general terms that relate to how parents socialize their children to pay attention. Observations from this study suggest that within the toy play situation, parents socialized their sighted children to understand that people talk about what they are looking at. The parent's attentional cueing was directed toward attaining mutual eye gaze toward a referent that was simultaneously labeled. On the other hand, the parents of the blind children used attentional cueing to let the child know that their words were directed toward what their child had concurrent tactile contact with. Interestingly, at the initial stages of learning how to make WORD-REFERENT CONNECTIONS, this may be an easier process for the blind child because referents are always embodied and directly perceivable, while the sighted child must shift his current point of reference to coordinate with the parent's *point* or *hold up gesture* in order to establish mutual gaze toward a referent. Even if the parent is following-in to what the child is already focused on, the child must check the parent's gaze to verify where she is looking. These observations suggest that a more general way of framing WORD-REFERRENT CONNECTIONS is that parents socialize their children to expect that they are labeling what they have *access* to.

5. New measures of joint attention need to be considered

Learning to understand the actions involved in giving attention is an essential first step in learning to communicate. This 'understanding' for young language-learners means that they know what to *do* in response to the actions that signal communicative intention. Since attention involves action, perhaps it is more realistic to describe it in terms of how it manifests within communicative activity. The eyes have received almost exclusive attention in the study of joint attention in children, but even for adults the eyes do not always reflect attention to the speaker. One can look without listening and listen without looking. If the eye gaze of adults is not sufficient for signaling attention, are researchers requiring an unrealistically stringent measure for children?

In addition, while parents of blind children often indicate that they have difficulty determining if their child is attending to them (Perez-Pereira & Conti-Ramsden, 1999), this study shows that trained coders can observe contingent engagement behavior during parent-child toy play quite reliably even in blind children. This suggests that joint attentional engagement is not depedent upon continued gaze following, but can be assumed in the flow of continued appropriate initiations and responses within activity.

6. Deciding whether joint attention is really necessary depends on how it is defined. A broader definition might be more informative about language learning in general than the current model

Social pragmatic theory rests heavily on the notion that language is primarily learned in situations where the attention of a parent and a child is simultaneously coordinated in a triadic manner to each other and to a mutually shared object or action. However, some researchers have called into question the quite restricted manner in which this situation is generally framed (Akhtar, 2005). Indeed, the current study could not have been accomplished under the typically accepted paradigm for documenting joint attentional engagement.

The study of joint attention and word learning has tended to focus on just that—word learning, and specifically, learning words as labels for things. Some research has found that *joint attentional engagements* may be most important before 18-months of age

(Carpenter, Nagell, Tomasello, Butterworth, & Moore, (1998). Observations from this study are in agreement with that finding, if it is restricted to canonical word learning formats. In the current study, within their *joint attentional engagements,* the parents offered their children very few canonical labeling opportunities. But *joint attentional engagement* can also afford opportunities for language learning in a much wider view. For example, within joint activity, language and gesture can be complementary, as well as ostensive in orientation, the gesture providing the referential connection and the language providing informative details. Also parents talk about what they are doing highlighting action words using pronominalization and sometimes concurrent *demonstrating actions* to make verbs more salient. Indeed, as was evident in the current study, they employed many more words for actions than objects over the 18- to 42-month time period of this study. In addition, they frequently just talked in a conversational manner using objects as platforms to talk about thoughts. These are all examples of jointly engaging with no obligation for joint *visual* attention.

7. Why did the blind children in this study do so well in learning language?

While, as Akhtar & Gernsbacher (2007) point out, it is not likely that most Western middle class parents spend many hours each day in one-to-one interactions with their children, the parents in this study, at least until their children were two-and-a half, did spend very large amounts of their day in play activities with their children. Particularly for the blind children this may have contributed to their success in learning language, and provide an explanation for why not all blind children, even other blind children without concurrent cognitive issues, exhibit the same felicitous language outcomes. For example, prior research with blind infants has suggested that mothers do not engage their children in the *give/take* routines (Norgate, Collins & Lewis, 1998) that provide an opportunity for learning the social turntaking routines that are foundational for language use (Bruner, 1975). In addition, Bigelow (2003), in her study of two young blind children who were delayed in joint attentional engagement, noted that they did not initiate give/take routines. In contrast, results from the current study indicate that the blind children by 18-months were socialized to giving and taking objects particularly with verbal prompts and familiar objects. Participation in *joint attentional engagements* may also have been particularly important for the blind children in this study, in initially limiting the options for connecting speech and referents to a close dyadic unit. An early grasp, through embodied play, of the notion that talk is meaningfully connected to the self and to things in the world may assist blind infants in becoming especially attuned to learning through language.

8. Some implications for the investigation of joint attention and language development in blind and partially sighted children

The performance of the blind and partially sighted children in this study reflects findings in prior research that suggests that blindness per se does not hinder the course of early language learning (Bigelow, 1990; Landau & Gleitman, 1985; Mulford, 1988). On the one hand, this achievement does not seem surprising because language, itself, is of course, typically available through audition. But on quick second thought, learning language is dependent upon making connections between what is heard and things in the world that are typically made available through vision. Indeed, vision provides the basis for all theories of how language is initially learned. Theorists sometimes acknowledge that visually based elements of language learning may be available through other modalities (Akhtar & Gernsbacher, 2008; Akhtar & Tomasello, 2000), but such alternatives have not been detailed.

There are some methodological issues involved in studying visually impaired children that were avoided by choosing to observe selected parent-child dyads. As described in the literature review above, the population of visually impaired children is so heterogeneous that a statistical mean regarding their developmental accomplishments is not very informative with regard to how specific outcomes are achieved. By videotaping many visually impaired children longitudinally and then selecting a set that were successful language learners, the videotapes could be reviewed retrospectively for elements of parental input that might have fostered this success. It is important to note that of the 16 dyads including a visually impaired child videotaped for possible inclusion in this study, only the four selected had met typical language milestones by 42-months. Those that were not selected had other cognitive developmental issues or less than optimal parental, extended family and/or professional support. Hence, only one-fourth of a field of potentially successful language learning children was functioning in a fashion similar to their sighted peers. In light of prior research documentation, this was not unexpected. While search and serve efforts and increasingly refined training for teachers of the visually impaired have allowed many more children and their parents access to supportive services in the child's early development, there are still many visually impaired children who suffer delays.

This study is consistent with prior research that highlights the importance for blind children of participation in early games and routines (Preisler, 1997). Blind children have the same predispositions as sighted children that allow engagement in multimodal routines promote contingent responsivity. The type of child-directed speech that is infused in early routines is highly salient for blind children. While eye gaze is typically a delightful part of these routines, blind infants do produces smiles, giggles, and physical movements that can also provided needed enjoyment and feedback for parents.

There are conflicting views regarding the amount and kind of verbal input that blind children receive (Andersen, Dunlea & Kekelis, 1993; Perez-Pereira & Cont-Ramsden, 1999), as generalizations based on small sample sizes these results are not particularly helpful, but what they all do have in common is the suggestion that descriptive language input is especially important for blind children. This study suggests some specific ways of using language in a *joint attentional socialization process* that can be particularly facilitative for the blind child, and, on the whole, are not all that different from the ways in which sighted children learn language. For example, the early infusion of child-directed speech into embodied routines and games makes manifest for infants the connection between language and activity. In addition, the employment of ATTENTION-ELICTING *emotive*, *vocative*, *alerting*, and *formulaic lead-in engagement cues* in dyadic and triadic activity can entrain the blind child to understand the communicative intentions of their parents. Because these cues are verbally presented, blind children have similar access to their function. While blind children lack access to visually based ATTENTION-DIRECTING CUES, alternative *indicative action cues* employed along with following-in to the child's current interest enable embodied WORD-REFERENT CONNECTIONS that are transparent for the child. After repeated multimodal practice (touch and verbalization) the blind child is socialized to understand that what the parent labels is what he has access to through touch. Then much like sighted children the understanding of words comes through CONTENT MESSAGES and *demonstrative actions* in the flow of activity.

Blind children are often described as passive and unmotivated to explore their surroundings (Bigelow, 1995; Fraiberg, 1977). Vision does present a multitude of options for exploration, and affords the sighted child constant stimulation for independently moving toward and exploring objects that capture his interest. To be sure, the children in this study with vision, full or partial, moved about their familiar toy play environment earlier, more often, and more distally, than the blind children. However, the parents of the blind children were particularly attuned to their child's needs and sensitivities, and they spent large amounts of time daily interacting with their child in *joint attentional engagements*—just those situations where a child is most attentive and motivated to process language input. They used ATTENTION-ELICITING CUES to create an expectation of something attention worthy to motivate engagement. They made special efforts to arrange their child's environment in ways to afford access to a variety of explorative opportunities and to organize their world in ways that promote making independent choices and discovering what kinds of things go together. This study suggests that the use of ATTENTION-ELICITING CUES imbued with emotive expression can present a vocal mode of encouragement leading to the expectation that there are interesting things to reach out for and enjoy.

Parents of blind children frequently report that they have difficulty knowing when their children are paying attention to them, but the parents of the blind children in this study engaged fluidly with their children negotiating miscommunications as is quite typical of parents with sighted children. It is possible that engrained expectations regarding visual attentional signals is the greatest barrier to recognizing other possible indicator of attention. Of course, the eyes provide much more than ostensive signals of attention, and the missing joy of mutual eye gaze may slow the process of finding joy in sending and receiving communicative signals in other ways.

Blind children have difficulty perceiving the physical world and themselves in it (Bigelow, 1995; Millar, 1994). Knowledge of spatial relations between objects and themselves is built up overtime through sequential exploratory activity, whereas sighted children are surrounded by stable visual input that is apart from them; hence spatial relationships can be grasped at a glance. Input to the blind children in this study included entraining engagement in *give/take reaches* that encouraged children to reach out for things on hearing verbal cues. These *composite cues indicative action cues + speech*) not only promoted a pattern of response expectation that lead to the child more independently searching his environment for objects, but also entrained a reaching behavior that allowed a more natural social engagement with others.

Sharing their own desires and needs seems more difficult for blind children at least until they 'get' language. Language itself is the most powerful way that blind children have of directing the attention of others to objects of their own focus. Sighted children typically adopt *pointing* and *holding up* deictic gestures by 12 months to share their interests with others, but there was no indication that blind children adopt *indicative action cues* like touching or tapping in the same manner. While both Molly and Tyler were taught to hold up objects in response to requests such as, *Show her your Elie* and *Can I see that*, in this study, they did not use these gestures spontaneously. In addition, protoimperative and protodeclarative pointing emerge between 9 and 12 months of age in sighed children, and these early nonverbal communicative efforts are generally seen by researchers as important precursors to the emergence of language (Bates, Camaioni, & Volterra, 1975; Liszkowski, Carpenter & Tomasello, 2007; Tomasello, Carpenter, & Liszkowski, 2007).

An even stronger case for the importance of early gestures, particularly *pointing, holding up,* and *gimme gestures*, has been made by Kelly (2006) who suggests that children learn to build their early language constructions around their consistent gesture use. On her view, first words emerge along with preverbal gestures forming multimodal combinations that are the basis for later constructions such as argument structure. She points out that this is not necessarily an obligatory path to language. While this study pertained to parental input rather than the development of the child's language skills, it would be interesting to explore parallels in the one gesture that blind children did use by 18-months in this study. The *give/take gesture* (or *gimme gesture* in Kelly's terminology) was entrained early on and an analysis of its use along with early verbalizations in blind children might be informative in terms of how robust the connection between gesture and early language constructions is in a population of children who use very few (Iverson & Goldin-Meadow, 1997; Iverson & Goldin-Meadow, 2001; Iverson, Tencer & Lany, 2000).

Limitations and Future Study

The focus of this study has been on the input of parents to their children in a naturalistic, but circumscribed, setting. This limited the use of attentional cueing to near point targets and did not address the needs of, particularly the blind and partially sighted children for directing attention to distal objects and actions.

This study did not address 'typical' ways of socializing joint attention, and the findings are likely not 'representative' of what actually transpires in everyday interactions for many parent-child dyads who have not had access to excellent services, or where there was not the possibility of spending extensive time engaging with children. In fact, there were 16 other videotaped children who did not meet with similar success in learning language. As with many studies of blind children, these children presented with very diverse characteristics that would make generalizations about why this was the case suspect. Instead, this study was designed to observe parameters of possibility in successful parent-child dyads in order to document some patterns that might facilitate felicitous outcomes.

This study began when the children were 18-months of age, but many of the precursors to participation *joint attentional engagements* purportedly occurred much earlier, and their attainment was based on parental report. The importance of prerequisite abilities and participatory activities has been discussed in relation to the process and elements of *joint attentional engagements*, but they have not been specifically documented in this study. Further study might examine dyadic exchanges between visually impaired infants and their parents to determine the frequency with which parents employ ATTENTION-ELICITING CUES, ATTENTION-DIRECTING CUES and *demonstrative gestures and actions* at earlier ages.

The primary focus of this study was on the social structuring of *joint attentional engagements* that are purported to foster language growth. Observatons included analyses of parental input, but did not include analyses of the children's progress in using communicative behaviors including language. The only longitudinal measures of the children's language were MLU and word counts that do not provide information about important aspects of the children's language comprehension and pragmatic usage. In addition, the blind children's use of imitative language may have inflated their MLU scores. The examples examined in this study provide some description of the children's understanding of concepts, but how closely the blind, partially sighted and sighted children were matched in their comprehension of language was not addressed. Also, where language has been seen as an area of strength for blind children, this has been, for the most part, limited to structural language characteristics with generally poorer performance seen in pragmatic aspects of language use. In some cases this has been related to a lack of participation in *joint attentional engagements*. This study did not address pragmatic language outcomes for the children in this study who did participate in *joint attentional engagements.*

This study examined parental input to children that might foster participation in joint attentional engagements with little attention given to the child's role in initiating and participating in these engagements (Bloom, Tinker & Margolis, 1996). There are clearly interesting questions about how children develop skills in eliciting and directing the attention of others. Prior research has indicated that these skills are delayed in blind children. Specifically, because of their lack of gestural communicative skills, their ability to initiate joint attention appears to await sufficient language skill (Bigelow, 2003). Sighted children have access to the visually based communicative cues extended to them by their parents. Blind children have tactile access to the *indicative action cues* extended to them, but there was no evidence in this study that they adopt these attentional strategies, and certainly they do not do this in the same way that sighted children use gestural attentional cueing. There was, however, evidence that the blind children adopted language-based attentional strategies. Examining the developmental trajectory, and the effectiveness of their use of language in eliciting and directing the attention of others, particularly in relation to the skills of sighted children, might suggest assistive strategies for developing pragmatic language skills.

The view of joint attention in this observational study is considerably more liberally construed than is typical in experimental studies of joint attention in sighted children. For example, careful measuring of directed and alternating eye gaze are generally assumed to reflect the child's understanding of the adult's communicative intention to share mutual attention on a particular referent. The coding for child response used in this study was not timed or related to standard measures of eye gaze for obvious reasons. In this study, the child was assumed to be jointly engaged if he produced observable behaviors (i.e., acting on a toy in an on-going shared activity, looking or moving toward the parent or an object referred to by the parent, verbalizing about an object or on-going activity) indicating continued engagement in on-going activity (see Table 4). These behaviors do not guarantee attention on the part of the child, on the other hand, as has been pointed out neither does eye gaze (Akhtar & Gernsbacher, 2008).

CHAPTER SIX

Conclusion

Paying attention is critical to language acquision. Cultures may vary in how and to what attention is socialized, but in order to make initial WORD-REFERENT CONNECTIONS, attention must be focused simultaneously on a target and its corresponding sound/language symbol or more specifically some person who uses the word and his intention in using it (Wittgenstein, 1955) in some way at some time. In addition, in order to become part of his/her cultural and communicative community, the child must in some way through the use of culturally determined ATTENTION-ELICTING CUES come to know that there is a POINT, a pay off, to paying attention to people who use language, and to the particular situations that afford language learning. In Western middle class cultures the people are generally the parents, and the situation is often triadic *joint attentional engagement*, shared focus on an object and/or action in the current and available environment (Tomasello, 1992). The participants in this study were quite effectively able to get the POINT through *joint attentional engagements* that afforded multimodal opportunities to make language-world connections.

This study has outlined a process for the socialization of *joint attentional engagement* through parental input that utilized early predispositions toward social interactions. Through the use of attentional cueing parents made manifest their communicative intent, entrained in their children the understanding that paying attention is important, and socialized them in culturally prescribed ways of summoning attention and directing it to shared locations that afford language learning and knowledge transfer. The parents and children in this study consistently talked about what they were doing together within their shared toy play activity following-in to objects and actions of current relevance to their child. They managed their child's attention through multimodal means that afforded the most efficient and effective access for their child's degree of vision.

"Gradually from naming an object we advance step by step until we have traversed the vast distance between our first stammered syllable and the sweep of thought in a line of Shakespeare."

Helen Keller, 1903.

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