Vision and the emergence of meaning

Blind and sighted children's early language

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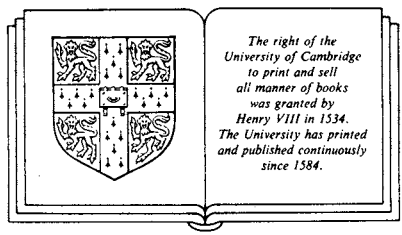

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1 Introduction

> If we tried to picture the most precocious child orator, we should think of a blind girl, the only daughter of wealthy parents.
>
> George Miller (1963, p. 157)

This provocative statement culminates a discussion of individual differences in language learning in Miller's pioneering text, which first appeared in 1951, for a fledgeling discipline that was to become known as developmental psycholinguistics. The book was the first to bring together various approaches for studying and analysing children's language and it was to influence several generations of child language researchers. While research techniques and the theories motivating them have changed, the text remains a fascinating historical document, articulating some important underlying assumptions about language learning.

Miller's description of the precocious child orator stems from an examination of factors in a child's environment and background that seem to be related to rapid language development. High family income, being a girl and being an only child have all been correlated, at least in surveys, with slightly facilitating language learning. But what possible advantage might blindness give a child?

In fact, the suggestion is derived from two interacting ideas about language acquisition. The first is what Miller calls "ear–voice reflexes" or the "ear-to-voice link" in infancy. Babbling stimulates a baby acoustically and kinesthetically, thereby encouraging the infant to continue making sounds. Eventually the child imitates sounds spoken by others and begins to learn words. Miller proposes that the blind may develop more rapidly in this area because of their verbal dependence on others. The second factor is an implicit assumption that once a child makes sounds and learns a few words, the course of language development will progress in a predictable and unremarkable way.

This line of reasoning motivated several decades of research into language development in deaf children, but until the late 1970s there was a total lack of interest in how blind children learn language. The neglect reflects the assumption that blindness should have little impact on language. Even more

importantly, it reflects a bias toward isolating language from its social context and conceptual underpinnings. Congenital blindness affects both cognitive and social development (see chapter 2 and Warren, 1985). Examining language acquisition in this population can thus provide a unique opportunity for evaluating whether and how language intersects with other capacities.

Moreover, since the mid 1970s, there has been growing evidence suggesting that vision itself plays an important role in the emergence of communication. An obvious corollary is that the absence of vision may have an impact on the course of language development.

Visual information has been implicated as an explanation for many facets of the process of language acquisition as it normally progresses. It is thought to be important in fostering early parent–infant interaction, in providing the child with a stimulus for hypothesizing about what language encodes, and in supplying the parents with clues about what a young child's early verbalizations mean. Furthermore, vision seems to be crucial in the infant's conceptualization of the environment, on which early language development is thought to depend.

The basis of early interaction between parents and their infants depends on visually based strategies. Stern (1974, 1977) points out that the infant's first exposure to the human world is composed of his mother's activities, especially her repertoire of "infant elicited behaviors." These center on exaggerated facial expressions, accompanied by vocalizations and gazing at the infant. The human neonate has a strong propensity to observe and even imitate these expressions (Meltzoff and Moore, 1977), with the result that they form the core of interactive play. The play episodes themselves are typically initiated by caregivers using a combination of eye gaze and vocalization in which the objective is to obtain mutual orientation in a face-to-face position with the infant (Stern, 1977; Tronick *et al.*, 1979; Kaye, 1979). Once the infant is attending, a play-dialogue ensues until the infant disengages by glancing away. The best predictor of when a mother will respond again to the infant is the moment that the infant's gaze again focuses on her (Brazelton *et al.*, 1974; Stern, 1974; Fogel, 1977). Thus, visual attention on the part of both the caregiver and the infant is crucial in initiating and maintaining early exchanges. These rudimentary exchanges are structured along the same lines as the adult discourse system and they develop very quickly into a communicative framework which increasingly permits linguistic interchanges. Without access to visual information, the structure of these interactions is necessarily disrupted and there seems to be no substitute for their effectiveness in establishing a bond between parents and infants, and in initiating the human infant into the social world from which language emerges (Fraiberg, 1977).

As the child begins to use language, visual information seems to provide an important stimulus for building hypotheses about meaning. For example, in

ascribing meaning to words, the child appears to abstract certain salient attributes from early referents and uses these as a basis for extending the domain of application for words (Bowerman, 1976, 1978; Clark, 1973; Nelson, 1973a; Rescorla, 1980). This process is essential in helping the child move from using a word as a "name" for a specific referent, to using words as symbolic vehicles to denote a heterogeneous class of referents. The overwhelming evidence is that such visually based properties as shape, size, and movement are the most important criteria used in constructing these classifications. Not only is visual information important in the child's organization of referent properties, but it appears to underlie adult categorization and the structure of many lexical fields as well (Andersen, 1978; Clark, 1977b; Rosch, 1975, 1977). Some of the evidence for this comes from the analysis of classifier systems in a variety of natural languages. Classifiers are expressions which group together entities that share some particular attribute. English does not exploit these, though the principle can be seen in the utterance "She bought four *lengths* of material." Some languages classify all varieties of countable objects yielding such sentences as "She has seven *round-things* eggs." Clark's (1977b) analysis of classifier systems reveals that perceptual information, again largely visual, is the primary basis of groupings. The features round, long and flat are especially important. For example, the Indonesian language groups such objects as fruit, peas, eyes, balls, and stones together on the basis of roundness; Nung groups together trees, bamboo, thread, nails, and candles on the basis of length; Kachari groups together leaves, fans, and cloth on the basis of flatness. Even in cultures which do not have classifier systems, these features are important. As the result of a number of experiments conducted in a variety of cultures, Rosch (1973, 1975, 1977) has found that people tend to group objects on the basis of perceptual features, especially the visual perception of shape. Thus, there appears to be a human propensity to exploit perceptual features in constructing sets of objects and in defining lexical classes which operates from infancy on, and visual information seems to be central in this.

Vision is an important basis for concept development in general. During its first year, the infant comes to learn a great deal about the physical environment in which it lives. The Piagetian notion of interaction with the environment as the basis of sensorimotor intelligence specifically involves perception, especially visual attention to objects and events, as well as purely motoric behavior. Moreover, visual information coordinates other schemata (Piaget, 1927, 1951, 1952a, 1952b, 1955; Piaget and Inhelder, 1969). In particular, the infant attends to the movements that entities can perform, identifies the relationships between people and objects, and recognizes and comes to know how things are used. The quantity and quality of the information available without the aid of vision is drastically reduced and it appears that the course of development is hampered for infants who are born

blind (Piaget and Inhelder, 1969). This is significant for the present discussion, since language acquisition seems to depend on the emerging conceptual system and the young child's developmental task involves matching linguistic and cognitive structures (Clark, 1977a; Nelson, 1974; Pylyshyn, 1977). One area where this is particularly evident is in the child's early expression of semantic roles in which such fundamental relations as Agent + Object or Agent + Action are thought to reflect the child's understanding of and experience with his immediate environment.

Perhaps the most frequent explanation for how very young children come to understand and produce language is that they depend on the "here and now," which has been defined as "whatever is directly under the child's eyes" (Clark and Clark, 1977, p. 322). The child learns about the matching of language and world largely through context. A now classic example is Shatz's (1974) analysis of how toddlers successfully respond to such directives as "Can you shut the door?" Basically, the child maps maternal speech onto the objects and actions he sees in the world with the aid of the mother's non-verbal clues. In this instance, the child follows his parent's eye gaze and gesture which are directed toward the door, a strategy which crucially depends on vision. The child's previous observations and explorations equip him with the knowledge that doors can be opened and closed, and the child may pick up the parent's intonation and recognize the utterance as a directive. (Stern and Wasserman, 1979, among others, have presented considerable evidence that infants as young as six months old are sensitive to basic intonational contour, though they do not associate it with grammar until much later.) If the door is open, the child closes it. We do not infer that the toddler understands the grammatical components of his parent's utterance, or the meaning of each word, or how the meanings are combined, but through context, the child comes to solve the puzzle of language. Much of this context, and certainly most of the parent's non-verbal clues, depend on vision for their interpretation. Similarly, the "here and now" provides parents with clues that enable them to interpret their infant's first efforts to communicate. In particular, they rely on eye gaze and the children's conventionalized gestural complex (e.g., pointing, reaching) in order to understand early vocalizations and to distinguish the focus of their child's attention (see Bates *et al.*, 1979; Carter, 1978, 1979; Pechman and Deutsch, 1980; and many others). Without the aid of vision, these clues are lost.

Taken together, the evidence strongly suggests that visual information is crucial in the development of fundamental social, cognitive, and linguistic structures, and it is not surprising that vision has been inferred as an underlying mechanism in the process of language acquisition. But there has been little effort to test this by examining how development progresses when visual information is not available. The motivation for the present

investigation is precisely this. It is an effort to begin to evaluate the extent to which visual information can account for the process of language acquisition.

Three key areas were selected for investigation: *the acquisition of early words*, *developments in the use of illocutionary force*, and *the emergence of propositional structures*. These form the core of the study of meaning in semantic and pragmatic approaches to linguistic theory and they represent those areas in ontogenesis in which concept development and linguistic development seem to be most interrelated. Lexical acquisition is intimately related to category formation; the use of illocutionary force involves the ability to exploit various aspects of the context to convey messages and to use language to gain access to the environment; propositional structures represent the ability to encode relations which obtain between elements of the environment. A synopsis of the principal issues considered in each of the chapters follows.

Chapter 2 presents a summary of general development in the young blind child. It begins by discussing the common causes of childhood blindness and the effects of that blindness on sensorimotor and early cognitive development. In particular, the central role of haptic-kinesthetic information in the construction of concepts is examined. The chapter concludes with a review of what is presently understood about the emergence of language in young blind children.

Chapter 3 is a description of the methodology used in the present study. The work is based on media recorded samples made during regularly scheduled home visits, and is supplemented by parental diaries and individualized experiments. The structure of these visits is outlined and the way in which the data were gathered, transcribed, and prepared for analysis is discussed. Each of the children who participated in the study is introduced: two are totally blind, two have minimal residual vision, and two are fully sighted.

Chapter 4 examines the earliest form of conventionalized meaning: the emergence of words. Drawing largely on data from diary records kept by mothers, the acquisition of each child's first 100 lexemes is documented. The first use of a word and the way in which its meaning evolved and was extended is considered. Since visual information seems to provide the sighted child with criterial information for extending the domain of application for early words, and since it seems to be a stimulus for the sighted child's developing hypothesis about the nature and meaning of words, this chapter explores the extent to which the absence of vision alters the process of lexical acquisition in the blind child. In doing this, we can begin to assess the extent to which visual information can explain lexical development as it generally progresses.

Chapter 5 investigates a further aspect of semantic meaning: the expression of semantic roles and the development of propositional structures.

It also examines a strategy that seems to be unique to the blind children – the incorporation of stereotypic maternal speech patterns into their communicative repertoire – and discusses how this may influence other aspects of language and conceptual development. Drawing on transcripts of the home visits, the content of the first proposition-like structures occurring in sequences of related single word utterances is evaluated and the semantic roles that are expressed in early multi-term utterances are analyzed. Children in a variety of cultures have been observed to encode the same fundamental relations early on – relations which directly reflect information about objects, entities, and activities that they have observed in their environment. The child without vision has much less information available. By exploring the differences in the kinds of semantic relations that are encoded by blind and sighted children, we can begin to determine the extent to which visual information is a catalyst for the emergence of apparently universal semantic categories.

Chapter 6 explores a more pragmatic aspect of early meaning: the communicative function of the child's utterances. The semantic content of an utterance is only part of its meaning; also important is the kind of message that is intended by the utterance (i.e., whether it is an assertion, a request, a greeting, and so on). This chapter uses transcripts of the home visits to consider how access to visual information affects the way in which children use language. It identifies some of the strategies that are available to young blind children to help them express the communicative force of their utterances in lieu of the gestural and eye-gaze clues that are exploited by sighted children. It also considers how blind children use language to increase their access to the environment. Since there is no fully comparable work evaluating the development of illocutionary force in young (sighted) children, a system for conducting a fine-grained analysis of early communicative intent is developed and presented. Its application reveals an ontogenetic progression in the use of illocutionary acts that has not been previously appreciated.

Chapter 7 summarizes the principal findings of the study. It draws them together and identifies a number of recurrent themes which point to an interaction between concept development and language acquisition and it articulates how visual information plays an even more important role in explaining the emergence of meaning than has previously been proposed.