

CHAPTER

5

The Beginnings— Infant Communication

The small group had wandered some distance from their village. Their ancestors had warned them about the strange people living beyond the giant forest. Perhaps they had gone too far, but this particular day they had experienced such good fortune in gathering plump, sweet berries. In fact, they had been scolding one another for eating too many as they picked them. After such a long absence, it would be especially important to return with a good supply to show for their efforts.

As they consumed more berries they became increasingly thirsty. Thirst soon became an urgent issue. With few words and many gestures, they decided to head toward “laj bon”—the lost stream. They traveled quietly with a measure of apprehension. The stream was called “lost” because once the people beyond the forest began using it, no one from their tribe had ever returned to it. As they approached the water, they heard a strange sound. A gurgling, bubbling sound. At first it sounded like the stream itself, but as they drew closer they noticed a large round basket lodged against a rock in the babbling brook. Over the rim they could see two small hands. It was a “tiny one!” (They had no word for infant.) This tiny one made so many noises.

As they retrieved the basket and withdrew the tiny one, a note fell to the ground unnoticed. In a language alien to them nonetheless, it read, “Please, take care of my baby! He is 9 months old.” As they carried this tiny one back to their village, they discussed a name for him. As they walked he continued to produce a stream of noises different from any of their tiny ones who rode in their mothers’ slings all day. As they approached their village, they determined that his name should be Ilo Kushinari, which translates as “Look who is talking.”

This chapter addresses the following questions:

- Which motor, cognitive, and social developments contribute to infants' communication behaviors?
- How do infants' auditory abilities contribute to the development of speech behavior?
- What traditional milestones of speech behavior are achieved by infants prior to the first words?
- What infant behaviors prompt the interactions that lead to communication?
- How do caregivers interact with infants to establish and facilitate communication?
- How do infants adapt their behaviors to influence those around them?

Several decades ago this chapter may not have existed in a text on language development. The prevailing view for many years had been that language does not begin until the first word has occurred. The traditional "rule of thumb" for the first word places its occurrence around the first birthday. Therefore, the first year of life was thought to precede true language development.

According to the *American Heritage Dictionary* (1970), the word *infant* is derived from the Latin "enfant" meaning "one unable to speak." Traditional accounts typically acknowledged the development of infant vocal behaviors (cooing, babbling, vocal play, etc.) and presumed that they were somehow related to the eventual form of speech. However, beyond this, there was little recognition that the first year of life was directly related to language development.

Subsequently, researchers and the prevailing models of language expanded their scope of interest from the forms of language to its meanings and, finally, to the functions of language. This latest development resulted in a surge of information regarding the interactions of infants and caregivers from birth through the first year. As research focused on the pragmatic functions of language, it provided the framework to analyze communication behavior.

In this chapter, it will become apparent that there is a continual evolution of infant and caregiver behaviors throughout the first year. However, infants' evolution can no longer be viewed as going from *no* communication toward the *onset* of communication; communication, at some level, is *present from birth*. The repertoire of behaviors available to infants, their emerging control over them, and the ability to interact effectively is evolving from the beginning *as a result of* communicating with those around them (Locke, 1993).

 In fact, the custom of organizing information in chapters is an unfortunate one. It obscures the continual evolution of our communication behavior throughout the life span. ■

Development in Related Domains

Language does not develop in isolation as a separate system of behavior with special status. The behaviors that eventually evolve into recognizable language behavior are supported by the child's whole development in the motor, cognitive, and social domains.

Each domain—motor, cognitive, and social—builds on development in the others. Although our focus is on language, it is important to view the entire process and to understand how these related domains set the stage for language to evolve.

The first year is an eventful one. So many changes occur so rapidly in all the domains: motor, cognitive, and social. The changes in these systems do more than precede language. These changes continuously channel infants' evolution toward true language. What follows is a brief summary of the highlights that characterize developments in each area throughout the first year (Lane & Molyneaux, 1992; Owens, 2005; Shulman, 1994). These selected highlights can only provide a glimpse of the myriad of significant developments that occur so rapidly. However, it is hoped they will provide a backdrop against which the evolution of language makes sense.

Motor Developments

Motor development arises from biological maturation of the nervous and skeletal muscle systems and each individual's experiences in coordinating their use. Infants generally progress from random, involuntary movement to more controlled, volitional actions. The following developments are evident throughout the first year:

- Motor control begins developing from the head down following birth.
- Visual acuity is best within 8 inches from birth until around 1 month.
- Achieves visual focus around 2 months.
- Reaches for and grasps objects around 3 months.
- Establishes head control around 4 months.
- Sits up with slight support around 5 months.
- Jaw control for chewing improves; grasps and transfers objects with both hands around 6 months.
- Crawls and pulls self to standing around 7 months.
- Manipulates objects and explores with index finger around 8 months.
- Stands briefly without support and rolls into and out of sitting position around 9 months.

 Children do not develop at precisely the same rate. To emphasize this, the developmental ages are stated as approximations, as in "around 6 months." ■

- Makes stepping movements; holds and drinks from cup around 10 months.
- Takes first independent step around 11 months.
- Walks with one hand held; picks up objects with thumb-finger apposition around 12 months.

Cognitive Developments

Cognitive development describes the process of experiencing and understanding the world. Infants' cognitive abilities develop with accumulated experience with objects, people, and events. These developments are illustrated by the following characteristics during an infant's first year:

- Visually prefers movement and contrasting visual patterns following birth.
- Demonstrates regard for caregiver's face and nearby objects around 1 month.
- Recognizes caregiver's face and anticipates objects' appearance around 2 months.
- Visually searches for sources of sound around 3 months.
- Localizes sound sources; stares at place from which object was dropped around 4 months.
- Recognizes familiar objects; explores objects through mouthing and touching around 5 months.
- Enjoys dropping and picking up objects; shakes toys to make noise around 6 months.
- Imitates complex behaviors already achieved when able to view own performance around 7 months.
- Prefers novel and relatively complex toys; unwraps wrapped objects around 8 months.
- Uncovers hidden object if observes act of hiding; imitates familiar actions around 9 months.
- Points to body parts on request; attains goal with trial-and-error approach around 10 months.
- Recognizes own name when called; imitates increasingly around 11 months.
- Uses common objects appropriately; imitates movements not already in repertoire around 12 months.

Social Developments

Social development is evidenced in increasingly sophisticated interactions with others. Infants become increasingly attached to their caregivers and

eventually more responsive. The following developments throughout an infant's first year contribute to this process:

- Quiets to soft, high-pitched voices; smiles reflexively following birth.
- Establishes eye contact with caregiver; quiets to gentle touching, holding, rocking around 1 month.
- Excites when sees people; exhibits unselective spontaneous smile around 2 months.
- Visually discriminates different people and things; exhibits selective "social" smile around 3 months.
- Prefers smiling face versus angry face; anticipates being lifted around 4 months.
- Distinguishes family members from strangers; reacts differently to smiling and scolding around 5 months.
- Prefers people games ("peek-a-boo"); focuses on speaker's mouth more than speaker's eyes around 6 months.
- Enjoys bath time as play time; exhibits "teasing" as beginning of humor around 7 months.
- Cries for mother out of attachment; reaches for and touches other babies around 8 months.
- Shouts for attention; "performs" for family around 9 months.
- Indicates wants by gesturing; gives toy on request around 10 months.
- Seeks approval; attempts modifying caregiver's goal around 11 months.
- Expresses people preferences; exhibits different emotions (e.g., jealousy, affections, sympathy) around 12 months.

Language Expectations

During infants' first year, a number of foundational behaviors will emerge. Initially, these behaviors are primarily physiological in nature. That is, they are "built in" through the infants' reflexive capabilities for reacting to stimuli. Later in this period, the elements in these behaviors come under increasing voluntary control—reflexive behaviors are inhibited and their voluntary counterparts are gradually exhibited in more selective and socialized contexts. The following overview is intended to provide an initial picture of the overall developments expected during this period:

- Infants will produce a variety of unintentional, undifferentiated motor and vocal behaviors that reflect the reflexive responses of an immature nervous system.
- Infants will localize, attend to, and eventually respond to familiar sounds in their environment (e.g., voices, household sounds, pet sounds).

- Infants will produce sounds that are initially undifferentiated and unrecognizable and will increasingly become recognizable as approximations of fully developed speech sounds.
- Infants will produce gestures and accompanying speech sounds that become increasingly intentional as part of turn-taking and game-playing interactions with caregivers.
- Specific words spoken by others, especially names, will become signals for infants to localize and search for familiar people, pets, toys, and so on.
- Consistent gestures and stereotypical vocalizations will come to be used as “tools” to obtain objects, attention, and interaction.
- Infants will become familiar with books as objects of exploration and interaction displayed to them by their caregivers.

The Prelinguistic Foundations for Language

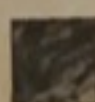
Infants eventually recognize much of what they hear and gain more control over their speech structures. Even though they may be alert to hearing a familiar word or produce a string of sounds that are almost recognizable, these abilities are still prelinguistic; that is, they precede true language. Nonetheless, they represent the seeds of conventional language behaviors.

Researchers have attempted to describe and understand the capacities available to infants long before their first word will occur. This includes their ability to hear differences among speech sounds and to produce sounds that appear to lead to speech.

Infant Speech Perception

Researchers have been interested in infants' readiness to attend to, select, store, and recognize the significant sounds they hear in the speech stream. Researchers have developed several innovative procedures to investigate infants' ability to distinguish among the sounds present in speech. The issue that has intrigued researchers is whether infants are able from birth to discriminate the important differences that contrast classes of speech sounds (voicing, place, manner of production) or whether this ability requires experience.

The two most commonly reported procedures differ in their response modes. One uses infants' sucking response and the second utilizes infants' visual behavior. The first method, *nonnutritive sucking* (NNS), is also called the *high-amplitude suck* (HAS) paradigm. This technique is used frequently with younger infants, although it has not proven reliable with infants younger than 1 month old. In this procedure, infants suck on a pacifier-type nipple connected by tubing to a device that measures the fluctuations in air pressure caused by their sucking. In this way, the frequency and strength of infants' sucking can be recorded.

 It does not take a rocket scientist to see that, beyond scholarly curiosity, the classic “nature versus nurture” controversy was driving much of this research. ■

It has been found that infants will learn to suck the nonnutritive nipple when it is followed by a novel auditory stimulus (e.g., the syllable /da/). When this stimulus is no longer novel, infants' sucking is no longer reinforced by it and the sucking response diminishes. When the rate of sucking slows to a criterion level, the stimulus is changed (e.g., to the syllable /ta/). If infants are capable of discriminating the difference, the new stimulus is again novel and reinforcing, resulting in increased sucking.

The other procedure, *visually reinforced infant speech discrimination* (VRISD), relies on conditioning infants to anticipate a change in their visual field when they perceive a similar change in the sound stimulus (e.g., from /da/ to /ta/). First, a sound stimulus is repeated while toys are visible in front of the infant. When the sound stimulus is changed, a visually reinforcing toy (e.g., a drum-playing bear) appears to one side. This eventually conditions the infant to anticipate the visually reinforcing toy when a change in sounds is detected. The infant's discrimination of contrasting sounds is inferred from the occurrence of searching responses following sound changes.

Through these and similar procedures, newborns have demonstrated remarkable auditory abilities. Infants just 16 hours old have evidenced a quieting response in preference to recordings of their own cry (to which they obviously have had limited exposure) versus those of other infants (Martin & Clark, 1982). One-day-old infants have learned to suck at rates to "select" recordings of their mother's voice as opposed to that of another adult female. Of course, here again they have had very limited time to hear their mother's voice following birth. Although in some studies infants have not demonstrated a preference for their own cry, it has been found that within hours of birth, infants exhibit vocal suppression or a quieting response when exposed to cry stimuli (Riccillo and Watterson, 1984). This response has implications for infants' attending behaviors and their ability to interact with their environment. As your third-grade teacher probably told you, "You can't listen if you're talking"—or in this case, crying.

Responses that indicate preference for their mother's voice could reflect both prenatal and postnatal auditory learning, because the mother's voice has been internally transmitted to the fetus prior to birth. In fact, in early sessions of this research infants preferred a version of their mother's voice that had been filtered to sound much like it would have in the womb. In later sessions, infants preferred their mother's voice in its normal state, reflecting their most recent experience of it (DeCasper & Fifer, 1980).

Researchers have also found that infants' impressive auditory abilities extend beyond recognizing the broader acoustic characteristics of cries and voices. Infants within the first few months following birth are capable of discriminating a number of consonant pair contrasts (e.g., /ma/ from /pa/, /pa/ from /ba/, and /ba/ from /ga/), vowel pairs (e.g., /a/ from /i/, /i/ from /u/), and changes in intonation and stress across bisyllables (e.g., ['baba] versus [ba'ba]) (Jusczyk, 1992). These contrasts represent differences that are not only acoustically subtle, but also linguistically significant; that is, they contrast different words and meanings.

Our understanding of *categorical perception*, the ability to hear groups of sounds based on very fine differences, had been established with adult listeners. Researchers have shown that mature speakers do not detect small changes *within* a consonant category. For example, in listening to the syllable */ba/*, in spite of small differences in the delay of voicing for the vowel following */b/* ("voice onset time"), we hear the various productions all as */b/*. However, at some point, the delay crosses a perceptual boundary and results in the perception of another category of sounds, for example */p/*.

Because adults would have had extensive experience responding to such contrasts (*/p/* versus */b/*), these findings were illuminating, but not necessarily surprising. However, the presence of these abilities in young infants, with seemingly limited experience, certainly seemed remarkable. This, in fact, caused some researchers to propose that human infants are born with specialized neural structures, making them innately prewired for detecting the acoustic boundaries between different speech categories (Eimas, 1974).

With further research, however, a number of other findings emerged that qualified speculations about infants' specialized perceptual readiness. Although the abilities that had been demonstrated were impressive, the contrasts tested represented only a small sample of the contrasts and syllabic contexts that are possible, given the number of available variables (i.e., different consonants, vowels, syllable positions, etc.).

Eventually, research revealed that infants are not initially capable of detecting a number of other contrasting consonants such as */sa/* from */za/*, and */fa/* from */ta/* (Eilers & Minifie, 1975), or syllable sequences (Trehub, 1973). Discrimination for some contrasts does not emerge until the second half of the first year. Furthermore, given what is known about the fetal acoustic environment, it may be that the fetus may have been exposed to speech and its intonational variations. Finally, researchers have found that rhesus monkeys (Morse & Snowden, 1975; Waters & Wilson, 1976) and chinchillas (Kuhl & Miller, 1975) are also capable of discriminating the voiced-voiceless contrast in speech sounds.

Locke (1993) discussed many of the issues that must be resolved before a final model of infant speech perception emerges. It must be recognized that if there are any specialized neural structures, they may receive more prenatal experience than we have previously appreciated. Furthermore, it appears that such auditory abilities may not be unique to humans (Kuhl, 1989); they may be present in a broad range of mammals. Initially, the contrasts that are most efficiently detected by these structures may have been merely acoustic, and only later were they adapted by humans to signaling linguistic contrasts, that is, different words.

In view of these considerations, Locke (1993) and others have suggested that it may be valid to reverse the innateness reasoning. Perhaps these acoustic contrasts only became relevant or useful in human speech because humans (like other primates or mammals) evolved with the biological capacities to detect them. Certain contrasts became functional in speech

Eimas (1974)

proposed innate

Linguistic Feature

Detectors, analogous to

Chomsky's LAD, to

account for this phonetic
ability. ■

only because they were perceptible to us and affected communication. In fact, there are contrasts that infants are capable of detecting that will not be significant to them as adult speakers (Trehub, 1976). If certain contrasts are not present in the language environment, communicating effectively does not rely on responding differently to them. The capability to perceive them will diminish whereas others are maintained. This selection process reflects the influence of the interaction of our biological capacity with the language environment and the practical value in responding effectively to the language spoken to us (Kuhl, 1991).

■ Summary

- Researchers have developed experimental procedures to study infants' **speech discrimination** abilities.
- Newborn infants can recognize their own cry, their mother's voice, and they can perceive a number of significant speech sound categories.
- Adults' categorization of sounds that differ equally along some dimension is called categorical perception.
- Infants' ability to detect phoneme categories does not extend to all speech sound contrasts and similar abilities are exhibited in several other mammals.
- The extent to which infants' speech perception abilities are innate or require experience with speech sounds is not clear at this time.

speech discrimination

The ability to distinguish meaningful differences between speech sounds.

Prelinguistic Development of Speech

Regardless of the underlying auditory capabilities possessed by infants, their development of speech sounds has been well documented. A number of researchers have carefully observed and classified the sounds produced by infants at their various stages of development.

Traditionally, infants' development toward speech and language was viewed simply as progression toward the proverbial "first word." Because the traditional view emphasized that these behaviors preceded true language, they are considered to be *prelinguistic*.

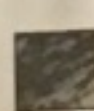
Developmental Milestones in Infant Speech

Certain behaviors have been traditionally associated with the time lines in which their development would be expected. These time lines, called "milestones," gauge infants' progress during that first year along the road to language. Table 5-1 presents the traditional milestones of prelinguistic development. The behaviors included as milestones for prelinguistic development focus on the various sounds produced by infants, based on the notion that this is a period of practicing sounds prior to "real speech."

Table 5-1. Traditional milestones in infant prelinguistic development.

Age Range (Approx.)	Prelinguistic Behaviors
0-1 mo.	Birth cry, vegetative sounds
1-4 mos.	Cooing
4-6 mos.	Marginal babbling
6-8 mos.	Vocal play, reduplicated, and nonreduplicated babbling
8-12 mos.	Echolalia
9-12 mos.	Jargon

Several disclaimers regarding the milestones are in order. First, the behaviors included are labeled with terms that are familiar to most; however, some unintended connotations carried by these traditional terms may be misleading. Second, the ages noted for each period are fairly conventional, but sources may vary somewhat. Finally, as with any outline of developmental progression, the ages are approximate; individual infants can vary substantially in their rate of development and there will most likely be an overlapping of periods.

 More information about the significance of infant cries is presented later in this chapter. ■

vegetative sounds

Infant oral sounds (e.g., clicks, burps) associated with feeding and digestion.

quasi-resonant nuclei

Early infant oral sounds that are not as resonant as mature vowel sounds.

cooing Infant sound productions in the first few months that are vowel-like and associated with comfortable states.

marginal babbling

Infant sound productions with a variety of vowels and consonant-like productions that approximate syllables.

Birth to 4 Weeks: Crying/Vegetative Sounds. The first sounds noted during the period immediately following birth are cries, vegetative sounds, and early pleasure sounds. The reflexive cry is assumed to be physiologically based starting with the first breath and later in reaction to internal stimuli such as pain and hunger. Oral **vegetative sounds** (lip and tongue clicks, burps, coughs) are associated with feeding and digesting. Finally, noncrying sounds occur when infants are in a pleasurable state. Some of these sighlike sounds, called **quasi-resonant nuclei (QRN)**, are almost vowel like (hence, the prefix *quasi-*) but are not as fully resonant as vowel sounds will be eventually (Oller, 1978).

One to Four Months: Cooing. The second milestone behavior, cooing, is thought to appear around 4 weeks of age. **Cooing** is described as sound productions that are more vowel like in nature, typically with an /u/ — /oo/ quality. As the name of this vocal behavior suggests, this vocalic sound may be preceded by velar or uvular sounds that are almost a /k/ or /g/ in their consonantal quality. Traditionally, it has been believed that infants are most likely to emit these sounds in comfortable, pleasurable states. This often occurs in face-to-face interactions with their caregivers.

Four to Six Months: Marginal Babbling. This period has been portrayed as containing perhaps the most significant developments for later speech. During this time, infants begin to exhibit **marginal babbling**,

described as the production of a variety of vowel-like sounds with occasional vocal tract closure, which together approximate simple consonant-vowel (CV) syllables, as in /ba/, or vowel-consonant (VC) syllables, as in /ab/ (Oller, 1978). In addition to including sounds that approach consonants, infants' vowels resonate more fully. These resulting tones are referred to as **fully resonant nuclei (FRN)**. The pitch and duration of these vowel sounds can be quite variable.

Initially, there are fewer consonants produced in this period. In shifting from the back sounds associated with cooing, the early consonants of babbling tend to be front and middle sounds, including the labial (/p/, /b/) and alveolar sounds (/t/, /d/). With developing motor control in the front structures of the mouth, labial sounds become most prevalent by the end of this period.

There is generally an expansion in the variety of consonants, vowels, and their combinations as time goes on. Infants' earlier sounds also tend to be predominately stop-plosives; the all-or-none production of stop-plosives (e.g., /p, b, t, d, k, g/) is considered physically simpler than the fine control required to form and maintain the smaller apertures or openings for fricatives (e.g., /f/, /ð/), affricates (e.g., /tʃ/, /dʒ/), and sibilants (e.g., /s/, /z/, /ʃ/).

Six to Eight Months: Vocal Play. As infants gradually exhibit a greater variety of sounds, it has been traditionally suggested that infants are "playfully" experimenting with different combinations. Whether infants are consciously experimenting or the sounds are randomly produced as they attempt to control the vocal tract is not entirely clear, but the repertoire of infants' sounds expands conspicuously from 6 to 8 months.

The traditional term for this period, **vocal play**, refers to the longer strings of syllables that expand out of marginal babbling as infants continue to "play" with sounds. In total, there are three phases of babbling. In the previous period, marginal babbling, infants were producing single CV or VC syllables. During the present period, vocal play, their babbling passes through two more phases—reduplicated and nonreduplicated babbling.

In **reduplicated babbling**, the syllable is duplicated in strings of repetitive syllables. For example, where /da/ might have occurred in marginal babbling, this syllable would be repeated as /da-da-da-da/ in reduplicated babbling.

During the final phase of babbling, called **nonreduplicated babbling** or **variegated babbling**, the strings of syllables are more varied. The consonants and vowels may change from one syllable to the next within the same string, as in /gabida/. Often the effect for the listener is even closer approximations to the character of true words—a greater mix of consonants in multisyllabic forms.

Eight to Twelve Months: Echolalia. By the time infants are 8 months old much has changed. A maturing neurological system and a wealth of experience listening to and producing sounds have brought infants ever closer

fully resonant nuclei
Infant sound productions that more closely approximate mature vowels.

 The debate over the relationship of babbling to later speech is covered later. ■

vocal play Infant sound productions exhibiting longer strings of varied syllables.

reduplicated babbling
Babbling in which a syllable is repeated in strings, as in *dadada*.

nonreduplicated babbling (also **variegated babbling**)
Babbling that consists of strings of varied syllables.

 The *echoic* described by Skinner may have its roots in the babbling period, but it becomes especially recognizable at this stage. ■

echolalia Infants' sound production that appears to immediately imitate the speech around them.

jargon Infant sound production consisting of syllable strings produced with adultlike intonation.

 Skinner (1957) suggested that intonation may be a fundamental form of autoclitic behavior. The intonational contour superimposed on the utterance "comments" on the relationships in the utterance. ■

to true speech. The term for the behavior that emerges in this period, **echolalia**, refers to infants' relatively immediate reproduction (i.e., imitation) of speech heard in the immediate environment.

The derivations of the word echolalia describe this behavior quite aptly: *echo*, meaning to reverberate, and *lalia*, referring to speech. Although infants may not be imitating in a meaningful way, the phonemic sequence, syllable structure, and intonational contours in the speech of those nearby are reproduced accurately enough to give one that impression.

Nine to Twelve Months: Jargon. The final phase of the prelinguistic stage may actually overlap with and extend into the onset of true language—the first meaningful words. **Jargon** consists of strings of syllables produced with stress and intonation that mimic real speech. Infants' vocalizations may sound much like an adult's statement, command, or question. Nakazima (1962) found that infants as young as 8 months appear to imitate the intonation of adult utterances.

Several researchers have suggested that infants are using intonation to signal diverse meanings or functions such as commanding, stating, requesting, and protesting (Sachs, 1985). Those who have spent any time with infants in this period have found themselves stopping to think, "Did you really say something?" Jargon appears to be a natural final step in the progression from crying to cooing to babbling to speech.

■ Summary

- Speech sounds produced by infants are considered prelinguistic because they precede true language.
- Infants' sound productions develop at relatively predictable times called milestones.
- Infants' earlier sound productions appear to be reflexive or vegetative, with reflexive crying and cooing reflecting their state of discomfort or comfort.
- Later sound productions, such as babbling and vocal play, appear to result from infants' experimentation with greater control over the oral structures.
- As the end of the first year nears, infants exhibit echolalia, in which their sound productions appear to reproduce segments from the speech of those around them.
- As the first year ends, infants produce jargon, which approximates the intonational contours of mature phrasing.

 An interesting analogy is seen in the adult use of the term *jargon*. Those who have immersed themselves in an entirely new area of study, whether it was computers, genealogy, electronics, or macramé, have experienced jargon. Confronted with an entirely new set of terms and phrases peculiar to the new topic, it might seem that the instructor is somehow speaking a foreign language that just *sounds* like English!

The Phonological Nature of Babbling

As nonsensical as the term *babbling* might sound, it has been a source of scientific curiosity and controversy for some time. Anyone who seriously contemplates the roots of human speech and language must consider the intriguing similarities and differences between babbling and later speech.

Some have judged that the two phenomena are distinctly different and unrelated. Others claim that the seeds of later speech sounds are found in infants' earlier vocalizations. As a result of this controversy and our natural curiosity, a number of researchers have explored the nature of babbling.

 Most instructors realize they have had students who would offer them as evidence of the direct link between babbling and speech. ■

Babbling: Composition and Characteristics

In evaluating the composition of babbling it should be recognized that the task of identifying highly variable sounds produced by infants with no identifiable context is an especially difficult one (Stockman, Woods, & Tishman, 1981; Winitz, 1969). Frequently sounds may only approximate adult phoneme categories, perhaps falling somewhere between several. This is compounded by the fact that infants' sound productions are not attempts at naming any specific referent, which might otherwise provide a clue as to which phoneme had occurred. Finally, these difficulties are compounded by the fact that infants develop rapidly and variably.

Given these qualifications, it is still possible to characterize the composition of infants' babbling, at least, as a group. An early study by Irwin (1947) had suggested that with regard to *place of production* the first sounds in babbling tended to be back sounds (e.g., /k, g, h/). More recently, however, researchers have tended to identify front (/b/ and /p/) and middle (e.g., /t, d, θ, n, s, z/) sounds as the most prevalent (Kent & Bauer, 1985; Locke, 1983; Oller, Wieman, Doyle, & Ross, 1976).

This discrepancy may result from the difficulty in transcribing the phonemic categories reliably. Another possible source of variation is in the broad chronological boundaries of babbling. For example, Oller et al. (1976) studied infants 6 months and older. Kent and Bauer (1985) studied the sound inventory of infants 1 year of age. In contrast, Irwin's infants were studied from birth to 2½ years of age. The age group Irwin designated as representative of the onset of babbling was 5 to 6 months old. The back sounds present in Irwin's younger infants may have been remnants of the cooing stage which just preceded. Nonetheless, it is generally reported that the sounds most characteristic of the entire period of babbling are predominately front and middle sounds.



As described by Winitz (1969), interest in infant sounds probably has a long history. In 1877, Darwin published one of the earliest studies of infant vocalizations. However, the true trailblazer was Orvis C. Irwin. During the 1940s, without the benefit of sound recording equipment (not to mention video-recording), Irwin led a landmark research project to study infant vocalizations. Irwin and his associates transcribed and analyzed samples of speech sound productions of 95 infants during their first 2 1/2 years of life.

From the standpoint of *manner of production*, babbling consists primarily of plosive sounds (e.g., /b, p, t, d/) in the initial and medial positions of syllables and fricatives (e.g., /s, z, θ/) in the final position. In terms of *syllable position*, most early consonants occur in medial position (VCV), as in /aba/. However, initial position (CV) consonants, as in /ba/, eventually increase to achieve a balance between the positions. The less frequent final position (VC) consonants, as in /ap/, are most often voiceless in nature.

The range and variety of sounds produced in babbling appear to increase steadily, although different rates have been observed. Infants of parents with higher levels of education demonstrate a greater variety of phoneme types, beginning at approximately 7 or 8 months of age (Irwin, 1948). In contrast, no significant differences have been found between male and female infants or infants from different racial groups (Irwin, 1952). By 1 year of age, a core group of sounds (/h, d, b, m, t, g, w, n, k/) comprise over 80% of the consonants present in the babbling of infants from homes in which American English is spoken.

Babbling: Discontinuity versus Continuity

discontinuity hypothesis

The phonological theory that the sounds in babbling and eventual speech are unrelated.

As noted before, the relationship between babbling and later speech has been a source of controversy. Some have held that babbling bears no direct relationship to speech, a theory referred to as the **discontinuity hypothesis** (Jakobson, 1941/1968). It was inferred that the two may be distinct because babbling is "playful" and speech is "purposeful." Those who subscribed to the discontinuity hypothesis also asserted that after infants produce a wide range of sounds in babbling, there is a brief period of decreased babbling before true speech begins abruptly with a limited number of sounds. Finally, the discontinuity perspective asserted a biological foundation to babbling. According to this view, regardless of their language environment, infants generally exhibit the same sounds in babbling, in what could be called *universal babbling*, because they are human (Lane & Molyneaux, 1992).

continuity hypothesis

The phonological theory that the sounds of babbling evolve into the sounds of speech.

In contrast, the opposing view, the **continuity hypothesis** holds that babbling gradually approximates the language in infants' environments. This continuity position proposes that each infant's repertoire of sounds is gradually shaped toward the surrounding language. Sounds that infants experience in their surrounding language persist and are produced in greater proportion. Conversely, sounds that do not occur in the surrounding language will gradually diminish in frequency. The effect of this process, in which infants sound increasingly like the speakers around them, has been referred to as *phonetic drift*.

Although the actual state of affairs may include aspects of both perspectives, the overall results most strongly support the continuity hypothesis. As the discontinuity hypothesis suggests, researchers have found the early sounds in marginal babbling are relatively uniform (i.e., universal) across languages. That is, regardless of their language environment, infants initially have the physical capacity to produce sounds from any of the

human languages; obviously, not every infant will produce every sound. This capability to produce a range of speech sounds reflects the biological early influence of maturing articulatory and neural structures. The universal nature of this early vocal behavior is illustrated by the finding that adult speakers from different language backgrounds have difficulty identifying the native language environments of younger infants based on their early babbling. However, adults are more successful identifying the native language of older infants as their babbling approximates the sound sequences and intonational contours of their language environment (deBoysson-Bardies, Sagart, & Durand, 1984).

It has been found that infants' babbling eventually includes proportionately more sounds related to the language to which they are exposed (Crutenden, 1970). Furthermore, the order in which later speech sounds are mastered is reflected in their relative frequency in earlier babbling (Menyuk, 1977; Oller & Eilers, 1982). Some have also observed that the reduplicated syllables of babbling may emerge as early words for infants (Oller et al., 1976). Overall, it appears that younger infants display a generic sampling of those sounds their immature vocal apparatus is capable of producing. With further maturation of their articulatory and auditory capacities, the influence of the surrounding language becomes increasingly apparent.

The influence of experience is further illustrated in the babbling of deaf infants compared to hearing infants. Although some early differences have been noted, the importance of experiencing speech sounds, produced by others and themselves, becomes especially apparent during the second half of the first year. While the hearing infant's overall vocalizations continue to increase, the deaf infant's begin to decrease. Whereas the normal infant's repertoire of consonants increases with age, the range of babbled consonants decreases with age in deaf children (Oller, Eilers, Bull, & Carney, 1985; Stoel-Gammon & Otomo, 1986).

These differences support the view that the ability to produce sounds from the surrounding language requires experience using the articulators *combined* with auditory feedback. But the question remained, what causes infants who hear normally to integrate these capabilities as they sound more and more like those around them?

One early attempt to explain the continuity observed in phonetic drift was proposed by Mowrer (1952). Briefly, Mowrer's hypothesis, called the Autism Theory, proposed that infant sound productions are essentially operant behavior, capable of being influenced by their consequences. This hypothesis suggests that the caregiver's vocalizations become secondary reinforcers for infants as a result of being associated with primary reinforcement during feedings and other caregiving interactions. The more infants' sounds approximate their caregiver's sounds, the more infants' sounds become self-reinforcing through this association. This manner of reinforcement, therefore, is both automatic and selective—those sounds produced by infants that more closely resemble their mother's instantly reinforce infants' production of them.

 The nature of reinforcement in child behavior is introduced in Chapter 3. ■

It should be noted that the mechanism for selective reinforcement in Mowrer's formulation has been frequently misunderstood. Contrary to what some have suggested, the caregiver is *not* consciously attempting to selectively reinforce specific sounds. Caregivers generally have more to worry about than determining whether a given sound is in their language and then attempting to promptly reinforce it. In fact, in this formulation the caregiver is not reinforcing infant sounds at all, except indirectly. The potential for self-reinforcement occurs through the natural association of the tender, loving care (primary reinforcers) caregivers provide with the concurrent speech sounds they produce (which become a secondary reinforcer). As infants' sounds more closely approximate their caregiver's, the more likely it is that those sounds will be self-reinforcing.

Operant influence of infant vocalizations has been demonstrated in a number of studies. Researchers have generally used social reinforcers in the form of adult attention (a smile, a touch, and "tsk-tsk-tsk" sounds). Presenting this social stimulus immediately following infant vocalizations has increased their frequency (Rheingold, Gewirtz, & Ross, 1959; Todd & Palmer, 1968; Wahler, 1969; Weisberg, 1963). As limitations, these studies utilized younger infants and did not address their ability to differentiate vocalizations (which they were probably not yet biologically capable of anyway).

Vocal response differentiation in infants has been demonstrated (Routh, 1969). Three groups of infants received selective reinforcement following production of consonant-like sounds in one group, vowel-like sounds in the second, or for any vocalization in the third group. Each group exhibited a significant increase in the response category reinforced in that group.

As our understanding of babbling has progressed, it has become increasingly apparent that babbling does bear a significant relationship to speech. The influence of biological maturation is self-evident in infants' developing control of oral and vocal structures. However, it is also obvious that infants' vocal behavior is strongly influenced by their language environment. From crying to cooing to babbling, infants' vocal behavior is intertwined with caregivers' responses. Only recently has the extent of social interaction prompted by infants' vocalizations been fully recognized. Furthermore, the coupling of infants' developing vocal behavior, cognitive understanding, and social interaction carries the partnership between infants and caregivers closer to true communication (Stark, Bernstein, & Demorest, 1993).

■ Summary

- Place of production in infant babbling has been found to be predominately front and middle sounds.
- In terms of manner of production, plosive sounds are most prevalent in infants' babbling.

- Most consonants in babbling occur in medial position (VCV) productions earlier, but shift to initial position (CV) consonants.
- Those who view infant sound productions as being unrelated to later speech subscribe to the discontinuity hypothesis.
- Those who subscribe to the continuity hypothesis hold that with experience, infant sound productions gradually approximate and eventually become part of mature speech.
- Research has illustrated the influence of the language environment as infants' sound productions mature, strongly supporting the continuity hypothesis.

Infant and Caregiver Communication

The interaction between infants and their caregivers lays so many foundations for later learning. Infants' most basic social, emotional, and cognitive development arises out of the earliest experiences with their caregiver.

The transactions between infants and their caregivers consist of more than caregiving. Caregivers negotiate through the hundreds of daily caregiving activities every day. Caregiver responses to infant behaviors and infants' reactions to them form the origins of communication.

Investigating Infant Communication

Researchers have increasingly recognized the communicative significance of interactions between the infant and caregiver. In contrast to the traditional view that infants are merely "practicing" making sounds, waiting passively for their first word so language could begin, researchers now recognize the different levels of communication occurring throughout infants' first year of life.

The increased attention to communication in the first year of life and its role in laying the foundation for language resulted in a flurry of related research activity over the last several decades. To fully appreciate the fruits of this work, however, it is important to recall the goals of such research, the nature of the phenomenon being studied, and the methods that are available.

The goals of this research include attempts at describing: (a) the significance of infant and caregiver behaviors in natural communication at each level of prelinguistic development; (b) the mutual influence of infant and caregiver behaviors on later development of mature language; and (c) the extent to which infant behaviors of interest appear to be based on biological structures and experience.

The phenomenon itself—infant behavior—is elusive, transitory, and variable. Infants are notoriously unpredictable in their sleeping patterns, alertness, responsiveness, temperament, and so on. They are easily influenced by the most subtle stimuli affecting the familiarity of the setting and

participants. A behavior of interest may be exhibited consistently or infrequently due to some mysterious cue. This leaves the researcher attempting to differentiate between behaviors that may be an important skill or an irrelevant fluke.

Beyond these concerns, researchers must make a number of practical considerations concerning the methods applied in their investigations. Researchers must decide whether the data will be collected in naturalistic observations or through more structured experimental manipulations. Naturalistic observations may provide a broader range of behaviors that are more ecologically valid, meaning that they occur naturally in the infant's daily interactions. In contrast, experimental procedures may allow the experimenter to evoke behaviors that infants are capable of, but might not otherwise exhibit in their normal daily routines.

Another consideration is the means for recording observations. With the increased appreciation of the role of context, it has become critical to record the setting and events that accompany significant behaviors. In the past, researchers could rely on the time-honored method of taking written notes to preserve the contextual information that seemed relevant to each behavior. However, more recently, electronic video recording equipment has become widely available and increasingly affordable.

Researchers must also make basic, practical decisions regarding the number of infants to be studied and the time span of the observations. Studying fewer infants may permit a more intensive, detailed analysis of their development, but the ability to generalize any findings may be limited. On the other hand, observing similar behaviors in a greater number of infants would increase the overall significance of that behavior as a research finding.

In a related decision, the researcher must also consider the advantages and disadvantages of longitudinal as opposed to cross-sectional studies. A study using a **longitudinal research design** would observe the same infants over an extended period of time. This perhaps provides better insight into the continuity of infants' overall development, but runs the risk that some infants will drop out of the study due to illness or family relocation.

Research based on a **cross-sectional research design** collects data simultaneously from separate groups of infants who represent the different developmental ages of interest. The obvious advantage is time efficiency; that is, the researcher does not need to wait for the infants to mature. However, the continuity in observing the overall development of individual infants is lost.

Still other researchers may elect to focus on certain behaviors by using individual infants in experimental designs. Interest in how infant behaviors might be influenced by certain factors have been addressed through **single-subject experimental designs**. For example, as noted before, a number of researchers have investigated whether the frequency of certain infant vocalizations or sounds can be increased by the events that follow their production. Using individual infants, researchers establish a baseline, or the usual frequency of a randomly produced sound. Then, an additional factor, such

longitudinal research

design Research design that follows the continuous development of its subjects.

cross-sectional research

design Research design in which groups of subjects at different ages are used to simulate changes related to chronological development.

single-subject

experimental designs

Research design in which an individual subject serves as his or her own control.

as reinforcement (a taped sample of the caregiver's voice), is presented following productions of that sound during one interval and not presented during the next interval. Any changes in the frequency of that sound is monitored. Such research designs allow researchers to change the frequency of specific behaviors and isolate factors that might influence them. However, until such experiments are repeated, the limited number of subjects involved limits how much the researcher can conclude about all infants.

Certainly, studying the development of infants would seem to be a fascinating and appealing assignment with plenty of pleasant and entertaining moments. On the other hand, it also demands a great deal of planning, discipline, objectivity, and flexibility.

■ Summary

- Interest in pragmatic aspects of communication has prompted research into infant-caregiver interactions.
- Researchers have attempted to identify the infant and caregiver behaviors that contribute to development of communication.
- Research with infants is especially difficult due to their rapidly changing physical and emotional state and rapid overall development.
- Researchers can study overall development from a long-term perspective in longitudinal designs, from a broader perspective in cross-sectional designs, or by focusing on specific behaviors in individual infants in single-subject experimental designs.

Prelinguistic Communication

Even before the production of the first word, communication between infants and caregivers is occurring—at some level. Although infants have not yet produced their first words, the evolution of communication throughout infants' first 12 months has been correlated with the pragmatic elements of speech acts outlined by Searle and Austin (Bates, 1976). Accordingly, the three stages are referred to as the perlocutionary, illocutionary, and locutionary stages.

These pragmatic elements are present in an individual instance of a mature speech act. The speaker first has an intention (illocution) that is expressed in an utterance (locution) and subsequently interpreted by a listener (perlocution). However, the sequence of these elements is somewhat altered in the phases of communication development during infancy.

The first half of an infant's first year is considered the **perlocutionary stage**, a phase in which communication is based primarily on caregivers' interpretation of infants' behaviors. It is assumed that infants lack conscious, goal-directed intentions in these earliest interactions. The **illocutionary stage**, in which intentions are signaled, emerges during the second half of the first year. By 8 or 9 months, infants begin to indicate identifiable intentions

 The three dimensions of a speech act—perlocutionary, illocutionary, and locutionary—are discussed in Chapter 4. ■

perlocutionary stage

The stage of communication development from birth to approximately 6 months in which caregivers infer intentions on the part of infants.

illocutionary stage The stage in communication development beginning at approximately 6 months when the infant begins to signal intentions through gesture and vocalization.

locutionary stage The stage in communication development beginning when the first words are used to convey intentions.

with apparent awareness of achieving their goals through the caregiver's behavior. However, this is still accomplished primarily through gestures and vocalizations, leaving the **locutionary stage**, the use of words to express intentions, to emerge around the first birthday.

It should be recognized that the three stages are cumulative and overlapping, as illustrated in Figure 5-1. That is, the first stage continues as the second stage emerges and complements it. These first two stages, again, continue developing as the third stage evolves. Throughout the first year, the infant and caregiver both display behaviors that contribute to this evolution. Although the participants may be more or less conscious of their specific behaviors, researchers have noted their apparent significance in contributing to the development of communication.

■ Summary

- Infant communication has been characterized as passing through three cumulative stages that are analogous to the elements of a speech act.
- The perlocutionary period, during approximately the first 6 months, depends on the caregiver's interpretation of infant behaviors as signals.
- The illocutionary period occurs in the second half of the first year as infants develop behaviors to convey their intentions to caregivers.
- The final period of development, the locutionary period, arrives with the ability to produce words and phrases.

The Perlocutionary Stage of Communication

The first period, the perlocutionary stage, is essentially present from birth. The perlocutionary aspect of speech acts refers to the listener's interpretation of the speaker's message. Of course, infants do not truly represent "speakers" at the outset; after all, they are by definition "without speech."

It is also assumed that infants do not exhibit "intentions," as they are incapable of conceiving of cause-effect or means-end relationships. That is,

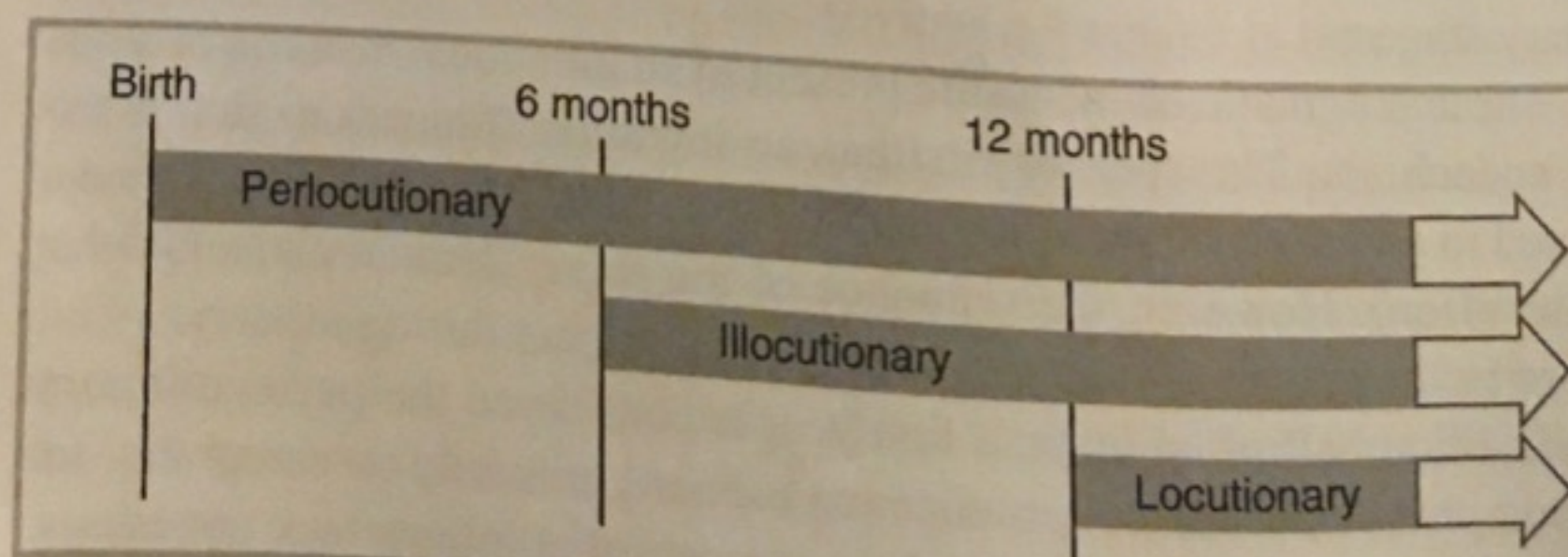


Figure 5-1. Development of pragmatic elements of speech acts.

infants would have no understanding of being able to achieve a specific result from their behavior. This leaves only the perlocutionary element of communication. Caregivers *infer* messages, imposing communicative significance on infants' nonverbal behaviors—cries, smiles, and vocal sounds. Communication at this point is a one-sided affair, based primarily on caregivers' willingness and ability to interpret their infant's behavior as signals. There are certainly moments when caregivers interpret signals that simply are not being sent. For example, caregivers might respond to gurgles and coos with *You like that, do you?* to fussing with *Oh my, you want me to fix that, don't you?* and to burps with *That feels better, doesn't it?*

It should be remembered that even for mature adult speakers, communication is a precarious enterprise. The effects our words have on a listener do not always reflect our intentions. Without the assistance of words from infants, caregivers' inferences are even more questionable. However, most caregivers make a gallant effort at discovering, even inventing, their infant's underlying message.

With some regrets, the following account does some violence to the fragile nature of the phenomenon it describes. The infant-caregiver dyad is so intricately and intimately intertwined that it should not be pried apart. However, to do so helps study the important elements more carefully. As the elements of this interaction become clear, it should be eventually possible to envision the infant and caregiver interacting in their natural state.

Infant Contributions to Communication

Infancy represents a period of communication that is nonverbal. At first glance, it may seem paradoxical to use “nonverbal” to describe “communication.” However, we should be reminded that much of human communication is nonverbal. This includes extralinguistic aspects such as the paralinguistic and nonlinguistic cues.

Effective communicators use various cues (intonational contours, facial expressions, gestures, proxemics, etc.) that typically accompany and supplement their spoken words to make sense of the verbal or linguistic message. Infant behaviors generally include many of these aspects, although they occur unintentionally, often in reflexive response to the infant's physiological state (e.g., hunger).

Even the earliest interactions between caregivers and their infants can be viewed as the foundation of social communication. Social because the behavior of one influences the behavior of the other. Communication because regardless of its source and form, there is a message transmitted by a sender to a receiver. Although this period precedes formal language, there still is communication between the infant and caregiver.

Infants become increasingly effective in engaging their partners in various interactions; caregivers continually adjust and expand the nature of their contributions to their infants' development. In the beginning, however, the two participants contribute to the interaction in ways that are quite

 Paralinguistic and nonlinguistic cues are discussed in Chapter 1. ■

Recall that Chapter 2 noted preliminary evidence that the fetus is capable of hearing and responding to external sounds. Whether this constitutes communication is an interesting question to ponder. ■

different. Caregivers may behave verbally with conscious intent, but the messages are less linguistic than social in nature. By talking in soothing or happy tones, caregivers intend to communicate emotionally, not verbally. On the other side, infants' behavior is neither intentional nor symbolic. Instead, it represents an outward manifestation of infants' inner sensations, whether that is hunger, pain, or pleasure.

Although inadvertent in nature, the first lessons learned through this partnership may be the most important foundation for all language learning. When infants act on a responsive environment, in some way they implicitly learn that those around them will respond in some way in turn.

Cry Behavior. Infants' cries have inspired almost as much research on the part of scientists as they have aroused concern on the part of caregivers. Due to the heart-rending nature of infants' cries and their potential relationship to language, they have been the source of intrigue and inquiry for centuries.

To the inexperienced ear, all infants' cries might sound the same, just as some might think the cry of an individual infant is generally consistent. However, this is not the case. Some individual mothers can discriminate their infant's cry from those of other infants, suggesting that each cry possesses distinctive acoustic characteristics (Formby, 1967).

On another level, analysis of acoustic features such as intensity and pitch changes in the cries of normal and abnormal infants suggests that they may contain characteristics predictive of infants who are at risk for normal development (Zeskind & Lester, 1978). Finally, acoustic analysis has distinguished four types of infant cries: (a) a birth cry; (b) a hunger cry; (c) a pain cry; and (d) an angry cry (Lieberman, 1967; Wolff, 1969). However, in terms of communication, can caregivers differentiate among their infant's different cries?

According to Reich's (1986) discussion of this literature, the initial indications were negative. Early studies, using rudimentary procedures, indicated listeners could not perform much better than chance at discerning whether a given cry resulted from stimuli such as pain, startle, or hunger. Later, using more advanced procedures to control the amplitude and duration of each cry stimulus, researchers found this was still the case. One study (Petrovich-Bartell, Cowan, & Morse, 1982) has suggested mothers can interpret the degree of distress in their baby's cries, ranking them on a fuss-cry continuum.

But what about all the anecdotal evidence in which caregivers vow that they know the reasons for their baby's cry? The discrepancy may lie in the nature of the research (Reich, 1986). For purposes of control, experimental research generally presents isolated intervals of infant cries. Mothers are asked to respond to these brief samples. As natural occurrences, different cries may be preceded by distinctive periods of fussiness. Depending on their cause, different cries may vary in their intensity and duration, and the pauses between crying bursts may differ, too. Normally, all of this information is available to the caregiver as well as one other critical element—the

situation itself. As in communication at any level, knowledge of the context (e.g., the caregiver's proximity, the infant's movements, intervals since the last feeding, changing, etc.) may assist caregivers' interpretations as much as any other cue (Haynes, 1994a).

Infants cry approximately a total of 2 hours out of each day in their first 7 weeks of life. Of course, this crying is episodic, not continuous (something for which we can all be thankful). Caregivers generally attend to their crying infants within 3 to 4 minutes after a cry episode begins and ignore very few occurrences (Reich, 1986). In short, in the first few months of life infants cry frequently and their caregivers react reliably. This contingency represents the perlocutionary effect that crying has on caregivers. Caregivers feel needed and infants are provided with prompt feeding, changing, and cuddling. But what other experiences are provided for infants in these episodes?

At the level of linguistics and speech, crying provides infants with early *stimulation* of laryngeal and oral functions. Later, with maturation, reflex inhibition allows voluntary cessation of crying, which may be a forerunner to voluntary control for speech breathing. In terms of social interaction, crying *functions* to prompt caregivers to provide basic needs (food, warmth, comfort), which requires their presence (cuddling, facial expressions), supplementing infants' attachment to their caregivers. Cognitively, to the extent that such social transactions reliably follow episodes of crying, the seeds of understanding *cause-effect* and *means-end* relationships are potentially planted. Ultimately, over these repeated episodes, infants are learning *natural contingencies*—that their behaviors have reliable social consequences.

Gaze Patterns. Eye contact for infants and newborns in particular is a fleeting and transitory event—by nature. This is because they spend so much of their first few months sleeping. Even when awake, their head control and visual focus are quite limited. As a result, even at the end of the third month they only scan their visual field approximately one third of their waking hours. Their initial limited visual acuity causes them to be primarily interested in objects that exhibit motion and geometric shapes with sharp contrasts. A convenient example of such a stimulus is the human face, with its moving mouth, blinking eyes, and surrounding hairline.

In the development of infant-caregiver interactions, eye gaze will play a central role. From an emotional standpoint, mothers have reported that once their infants were able to return their gaze, establishing mutual eye contact, they felt a much closer attachment to the baby (Klaus & Kennell, 1976). By the end of the second month, infants are able to maintain eye contact with their caregivers. However, this usually occurs when caregivers are currently gazing at their infants. Improving motor control permits infants to eventually combine head movements with eye movements for establishing



This information on infant cries and caregiver responses should not be overgeneralized to all cultures. Infants in some primitive societies cry very little because they are constantly with the mother. Infant cries in some cultures are not responded to as promptly because they are not viewed as communicative. And, even in Western mainstream societies there are differences based on family beliefs regarding "spoiling" the child.



Cause-effect and mean-end relationships are discussed in Chapter 3. ■



Visual acuity and tracking are also discussed in Chapter 2. ■

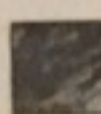


Infants' recognition of facial features and infant-caregiver attachment are discussed in Chapter 3. ■

or ending eye contact. These head positions are generally interpreted by caregivers as infants' signals of readiness to engage in eye contact.

Infants' ability to focus visually matures around 3 months and their visual behavior can more directly prompt interaction with the caregiver. Three basic patterns of infant visual behavior have been described: mutual gaze, gaze coupling, and deictic gaze.

Mutual gaze is intensified focus on the partner's eyes, what some might call "eye lock." The early occurrences often consist of prolonged eye contact. Later, eye contact evolves into an alternating, almost flirtatious pattern that has been referred to as **gaze coupling**. Gaze coupling is of interest in that it takes on the character of a conversation, with each partner alternately looking at the other, looking away, and looking back. **Deictic gaze** occurs when infants' eye gaze becomes fixated on some object, unintentionally "pointing" to it as an object of interest. The perlocutionary effect on caregivers is to interpret this as a signal, following their infants' "line of sight" to the object of apparent interest. Initially, infants are not *intending* to direct their caregivers' attention. Instead, infants merely react to an interesting visual stimulus and caregivers impose their interpretation that this is an invitation to interact. Research shows that caregivers pay close attention to their babies' eyes, reliably synchronizing their naming of an item during the brief time the infant is gazing at it (Collis & Schaffer, 1975).

 It is interesting to note that we can actually "hear" a smile on the telephone. Smiling while talking affects the acoustic signal in characteristic ways that can be detected. ■

Social Smiles. In spite of its place in a beloved, classic movie, most would disagree with the verse, "a smile is *just* a smile." (For that matter, how could a kiss ever be *just* a kiss?) The smile has a peculiar place in human behavior and an even more puzzling history. Does it occur in our species out of a history of intimidation behavior—exposing our teeth to ward off aggressors and establish territorial domination? Or does it subtly convey submissiveness?

Locke (1993) summarized a hypothesis by Ohala (1980), which suggested the latter of these two possibilities. The acoustic result of smiling while talking is to raise the perceived pitch of the speaker's voice. In non-human primates, exhibiting high-pitched vocalizations with lips retracted (smiling) tends to evoke sympathetic responses from peers. Historically, aggressors may have been sympathetically moved to withdraw, increasing the survival chances for those who "smiled" at them. However the human smile came to exist, it is considered by many to be the "universal language" and it appears very early in our development.

The first distinction that must be made is between infants' reflexive smiles and social smiles. **Reflexive smiles** are those that result from internal physiological stimuli. These occur in the first few weeks following birth primarily during sleep and are often associated with rapid eye movements that occur during dreaming (Wolff, 1966). Frequently, even awake infants smile for seemingly no apparent reason; many experienced caregivers have attributed some of these early smiles to "having a 'bubble' turned sideways in the tummy." Whatever the circumstances of each particular instance, it

reflexive smile Infant smile behavior that is in apparent response to internal physiologic stimuli.

appears that such early smiles are simply a reflexive response to some internal stimulus.

In a matter of a few more weeks, auditory and visual acuity improves, and caregivers' voices and faces are more easily recognized. Infants then begin to exhibit *social smiles* that occur in response to another's social presence. In its appearance, the social smile does not differ from the reflexive smile. Instead, it differs in its apparent source. The social smile occurs in response to the human face and voice, especially those voices exhibiting greater inflection. Infants may see a familiar face, make eye contact, or simply hear a familiar voice, and smile in response.

Infants' first smiles are merely reflexive, not communicative. Neither are the earliest social smiles intentional or goal directed; they are more reactions than messages. Nonetheless, their appearance prompts caregivers to *invent* communication that is not really there. Imposing their interpretation on these early smiles, caregivers bubble over with praise and affection.

Later, infants' social smiles will become more meaningful as signs of recognition and attachment. Furthermore, the more reliably they occur in response to caregivers, the more they serve to reinforce and engage caregivers' continued interaction.

The human face and voice appear to be inherently intertwined. From the beginning, recognizable facial expressions are associated with certain distinctive vocalizations. Cries, laughter, squeals, and happy sounds are each associated with characteristic facial expressions. In this same way, social smiles, too, are typically associated with some form of pleasant infant vocalization.

Vocal Behavior. In spite of the increased recognition that communication *at some level* does occur during the first year, the traditional vocal behaviors and their milestones have continued to serve as a measure of infant vocal development. Cooing, babbling, vocal play, jargon, and echolalia remain as reference points in infants' changing vocal repertoire. However, in the current view this repertoire is not simply a progression of isolated, one-sided behaviors. Although unintentional, these are important behaviors that evoke social interaction that evolves toward communication.

Again, it must be reemphasized that infants do not use early vocal behaviors to communicate with any intention. Early vocalizations are not goal directed, just as early crying, smiling, and gazing occur without any conscious intent. Nonetheless, infants' vocal behaviors do evoke their caregivers' attention. Cooing has a characteristic sound, often shaped by the smiles that accompany it. The perlocutionary effect on caregivers is to evoke attention, closeness, cuddling, and soft speech.

Impressively, it has been documented that infants' behavior frequently prompts vocal imitation within the infant-caregiver dyad (Locke, 1993). Given the occurrence of spontaneous infant vocalizations, caregivers then take the lead in the imitation game. In turn, infants frequently echo their caregivers' imitations, almost as though they were their own. Furthermore,

as the nature of infants' vocal behavior evolves toward more "speech-like" sounds, caregivers' responses increasingly reflect these changes. In other words, caregivers modify their reactions to their infants' vocalizations. These modifications cause further changes in the infants' vocalizations.

Two mutually stimulating dynamics appear to be at work. First, infants' sound repertoires expand to include more speechlike sounds. Second, as these changes reflect infants' growing capabilities, so do caregivers' expectations of their infants' abilities expand. And, so continues this marvelous partnership!

Caregiver Contributions to Communication

In this partnership, caregivers unknowingly play a most important role by providing the perlocutionary element. In responding to infants' behaviors, caregivers *act as though* real communication is occurring. Realistically, given infants' initial capabilities, caregivers can only expect that communication will *eventually* occur with their child. However, that expectation is seemingly enough to prompt anticipation on the part of caregivers. The nature of caregivers' behavior suggests that communicating with their infant is a desire, so much so that they are willing to invent communication where it probably does not exist.

Perhaps in this way human communication development is a prime example of "self-fulfilling prophecy." Caregivers' behavior illustrates a premature expectation. This, in turn, may create a related expectation on the part of infants—that someone will respond in some way when they act on their environment. Caregivers' behavior makes their speech salient, identifies topics of interest, and establishes the natural cycles of expectation and fulfillment, and the participating and pausing found in mature conversations.

Baby Talk. One of the most conspicuous ways in which the caregivers' behavior is made salient to infants is through their speech patterns. **Baby talk** (also *motherese* or **parentese**) refers to speech with several characteristic features directed at infants by adults and even older children. In using baby talk, caregivers make a number of modifications that appear to be instinctively related to the infant's current capabilities. Most adults would be at a loss to explain such behavior.

Over the years, researchers (Snow, 1977a; Stern, 1977) have documented what most have long recognized about baby talk from watching dotting uncles, aunts, and grandparents. Baby talk features a number of distinctive modifications in the syntactic structure, semantic content, paralinguistic features, and nonlinguistic devices used by caregivers. Table 5-2 lists some of the key features of baby talk.

Structurally, in apparent recognition of infants' limited capacities, most caregiver utterances are shorter in length, exhibiting simpler syntax and limited vocabulary. Semantically, successive utterances in baby talk frequently relate to the same context. The words and phrases are often redun-

 Some sources use *motherese* or *parentese* to refer to these early modifications in the caregiver's speech to infants. Others reserve these for speech directed to toddlers already exhibiting some language. ■

baby talk Characteristic speech patterns, including shorter phrases and exaggerated intonation, used when talking to infants.

parentese (also *motherese* or **child directed speech**) Gender neutral term for the distinctive style of speech exhibited by caregivers with their toddlers.

Table 5-2. The features of caregivers' baby talk to infants.

Utterances are produced in closer proximity when infant is attending.

Utterances are produced at a higher pitch.

Utterances are produced with greater pitch fluctuations.

Utterances are produced at a slower rate.

Utterances are produced with more and longer pauses.

Utterances are simpler in construction.

Utterances are produced more fluently and clearly.

Utterances are based on a smaller, restricted set of words.

Words are frequently nouns for concrete objects.

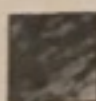
Words generally refer to objects or events in the here-and-now.

dant and overlapping, labeling the same referent with related words and phrases. Another property of baby talk is the extent to which the context is tied to the "here-and-now." Caregivers implicitly recognize that infants have little awareness of the world beyond the immediate present so most utterances relate to objects and actions that are within their view.

With regard to paralinguistic features, caregivers exhibit several behaviors that apparently draw and maintain infants' interest. Caregivers' speech exhibits a *higher overall pitch*, a *broad range of intonation and stress*, and *longer pauses* between segments. These aspects give baby talk its characteristic "sing-song" quality. Finally, several nonlinguistic devices are used by caregivers to engage infants. These include using *more gestures*, *more varied facial expressions*, and consistently *positioning their face within the infant's field of view*.

Use of higher overall pitch and greater prosodic variations in baby talk have been documented across a number of languages (Ferguson, 1964; Fernald et al., 1989). Why do caregivers use such distinctive voices when talking to infants? Babies apparently prefer voices in higher pitch ranges. They are also more likely to attend to *novelty*, that is, changes in stimuli in their environment.

Episodes of baby talk typically occur as series of utterances surrounding a specific event. Early episodes occur following any of a number of significant behaviors such as a yawn, a sneeze, a burp, or a coo-like sigh. Later episodes will frequently center around the caregiver's manipulation of some object, thereby establishing it as the topic. As a result, most episodes are characterized by naming the object, perhaps with redundant labels repeated with various phrasing. However, the utterances are more than a simple string of successive statements. Caregivers instead weave them together

 The development of joint attention, establishing a shared topic between caregivers and infants, is discussed later in this chapter. ■

with greetings and questions to impose a social framework in spite of their partners' communicative limitations. A typical episode might go as follows:

Hello sleepyhead! (caregiver approaches crib, pauses)

Not sleepy anymore? (brings face nearer, pauses)

Where's your bear? (raises open hands in gesture)

Here's baby's bear! (picks up, motions in baby's view)

Baby hug bear? Give big hug? Oh, nice hug! Nice bear!

Such an example illustrates object-centered naming, with repetitions and motions related to the topic. Unfortunately, it is not possible to illustrate the high-pitched, melodic character of caregivers' speech here. (Most of us have heard this sing-song speech and, embarrassingly, some of us have had our best baby talk caught on videotape!)

The overall effect in such episodes is to attract and hold infants' attention with eye-catching gestures and facial expressions, highlighted by sweeping vocal prosody. Then, while infants attend to a stable, available topic, caregivers present a series of overlapping comments related to it. Interestingly, each comment is followed by a brief pause that approximates the interval between turns taken in conversations between adults. Whether consciously or not, caregivers' pauses signal the expectation of a response from their infant.

Beyond embarrassment, what is in it for caregivers? It would appear that some desirable result comes from effecting these changes, even if caregivers are not conscious of making them. Perhaps engaging and continuing infants' attention, in the form of eye contact, social smiles, and vocalizations, reinforces caregivers for using baby talk.

On the other side, researchers have found that infants prefer the melodic character of motherese (Fernald, 1985). Furthermore, it may benefit infants' later language development. It has been found that caregivers' adjustments in length of utterance in speech to their infants is predictive of the infants' later language development (Murray, Johnson, & Peters, 1990).

Baby talk persists for some time and eventually evolves into a style characteristic of more mature verbal exchanges with older children (called motherese or parentese by some). The earliest episodes of baby talk are only suggestive of the conversations that these later exchanges will exhibit. However, there are other forms of interaction that, from the beginning, lay the foundation for later dialogue.

Joint Attention. Speakers do not communicate in a vacuum and as a result their speech necessarily *refers* to something in the environment. For communication to occur, however, their listeners must also select and attend to the topic of speakers' utterances. In interacting with their infants, caregivers exhibit a variety of behaviors to establish joint or shared attention with their infants. In *joint reference*, the shared attention and caregivers' utterances are focused on an object. In contrast, in *joint action*, it is

shared activity that provides the focus of attention and the topic of caregivers' utterances.

Joint reference involves speakers' identification of topics, objects, events, or relations about which they are talking. Such referencing helps the listener understand the speaker. Whether the referents for our speech are present, recalled from the past or anticipated in the future, located nearby or at a distance, mature speakers identify them for their listeners through various language behaviors. For example, a speaker might identify a remote object for discussion by saying something such as, *Remember on our vacation last summer how we admired that classic red Corvette in San Francisco? . . .* There is certainly communication value in being able to identify a topic to be shared (especially if one has an agenda related to the topic, as this spouse most likely does).

Although caregivers do not have a communication agenda beyond interacting socially and emotionally with their infants, their interaction generally has some focus. Much of the early interaction occurs when caregivers must handle their infants more frequently. As caregivers verbalize in these face-to-face interactions the content is more social and emotional in nature, such as *Hello pretty baby! Momma loves you!* and so on.

Later, as infants' motor control matures and their ability to scan and focus improves, caregivers can direct their attention to objects of interest. Caregivers' speech will shift to naming and labeling objects, sometimes repeatedly and redundantly (as was described in discussing baby talk). Eventually, as infants' awareness of the surroundings expands, their caregivers begin to elaborate with increasingly descriptive comments.

Caregivers are aware of their young partners' limited abilities. Accordingly, they direct their infants' focus to items of interest in very natural ways as they talk to them. Caregivers might select items themselves for various reasons. Frequently, they single out items the infant has grasped or gazed at simply by chance, interpreting such behavior as expressions of interest in that item.

Several researchers have classified caregivers' techniques for achieving joint attention with their infants (Bruner, 1977; Collis & Schaffer, 1975). The various classifications include such techniques as indicating, marking, deixis, and naming. On some occasions, caregivers take advantage of their infants' current interests. When something catches infants' attention, caregivers exhibit **indicating**, in which they follow their infants' line of sight to the object of their curiosity. On other occasions, caregivers introduce the objects of interest themselves. When caregivers select an object and strive to focus their infants' attention on it, they might use **marking**, in which they move or shake it conspicuously in their infants' field of view.

In utilizing **deixis**, caregivers use proximity as a way of channeling their infants' focus. Moving infants closer makes objects more prominent in their field of view. If the family cuckoo clock is to be the topic of discussion, moving in closer will help focus an infant's attention on it (since it is probably not possible to shake it).

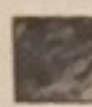
 The caregiver's indicating behavior is the "flip side" of the infant's deictic gaze. ■

indicating Caregivers' use of their infants' line of sight to locate the object of their current interest.

marking Caregivers' means of attracting attention to an object by moving or shaking it in their infants' field of view.

deixis The ability of words and gaze patterns to "point to" objects being referenced.

naming Caregivers' use of label to direct their infants' attention.

 Later, deixis will occur through verbal behaviors, such as using *this* versus *that* to indicate relative proximity. Development of this behavior is discussed in Chapter 7. ■

dialogue A series of related verbal exchanges between at least two persons.

 The word *dialogue* derives from the Greek *dia*, for "between or through," and *logos*, for speech. Therefore, dialogue is speech between people. ■

 Lund and Duchan (1993) remind us that later, in more formal contexts, turn taking is not always symmetrical. In formal settings, one might only get a turn when called on, as in a classroom setting. And, in a formal speech or sermon, the only turn is taken by one person.

Finally, with older infants beginning to recognize a few words, caregivers might use **naming** to prompt them to search for a familiar item or person before elaborating further. For example, once its name is associated with the characteristic sounds and actions, merely mentioning the word *cuckoo* will prompt the infant to look at it with anticipation.

Early referencing is, again, very much one sided throughout the perlocutionary period. Eventually, infants master their own devices for directing their caregivers' attention. In the meantime, caregivers are demonstrating to their infants that speech is intimately associated with the world that they are both experiencing and interacting with each day.

The other aspect of joint attention is joint action, shared participation in some activity that becomes the focus of caregiver-infant interactions. This occurs initially in the context of daily caregiving routines, bathing, feeding, dressing, and so forth. Later, joint action occurs in the context of games. In the earliest stages, infants are more passive partners. Most of us have put agreeable infants through the paces of "pat-a-cake" or "peek-a-boo" while they look on with idle curiosity. These early interactions are shared only because infants are usually compliant and captive partners. Infants soon begin to join in, throwing their arms up for "*So big!*" or squealing with excitement as our eyes reappear from behind our hands in *Peek-a-boo!* Eventually, infants signal their anticipation of these social games, clapping their hands together or covering their eyes to signal "let the games begin!"

Dialogues (Turn Taking). The term **dialogue** technically refers to speech exchanged between at least two persons. Although infants are without speech, one of the most fundamental characteristics of dialogue has great significance for their development of communication. *Turn taking*, the alternation of responses and pauses between participants in an activity, is a basic element of dialogue. Without it, communication suffers severely since, at least in spoken language, each message has only a fleeting presence. Few of us can simultaneously speak and listen to someone else effectively. If one partner or the other fails to take turns, information is lost as their talking overlaps and collides (Lund & Duchan, 1993).

Similarly, if infants were incapable of pausing in their own behavior to attend to those around them, their opportunities to learn would be greatly diminished. Almost from the beginning, caregivers pattern their behavior so as to create predictable sequences of turn taking that seem to become second nature to the infant. Caregivers unknowingly accomplish this through several different natural interactions, including feeding sessions, game playing, and ultimately, through dialogues.

Although some mature speakers may struggle yet with turn taking (sometimes called "rudeness," if they fail frequently), this is not for a lack of developmental opportunity. Dialogues of a nonverbal sort occur with infants from the earliest

moments. Researchers have found a primary biological basis for dialogue based on feeding behaviors of mothers and infants (Locke, 1993). Mothers quickly discover that their feeding babies suck in bursts followed by pauses. Most mothers attempt to adapt to this pattern by “jiggling” the baby or the nipple to restart the baby’s sucking. The jiggle actually suppresses sucking, which usually resumes once the jiggling has stopped. Nonetheless, a distinct pattern of turn taking evolves and, significantly, in the context of a very impressionable and reinforcing interaction.

Another early form of interaction that is imposed on infants by caregivers is game playing. The earliest games are social in nature, based primarily on patterned interactions between caregivers and infants. Each game is patterned to contain a very consistent, predictable sequence of cues provided by caregivers. After setting the stage through a series of verbal and gestural cues, caregivers pause strategically for their infants’ response.

Some typical games include *Gotcha*, *Pat-a-cake*, *So Big*, and the classic, *Peek-a-boo*! Each game presents a consistent sequence of gestural and verbal cues, making them very predictable for infants. This allows infants to eventually anticipate the course and outcome of each episode. Additionally, these may be incorporated into daily routines such as diapering, bathing, and dressing.

In the earliest sessions, caregivers must usually mold the response. For example, caregivers might have to initially guide infants’ hands to cover their eyes and then lift them to play “peek-a-boo.” Later, infants will anticipate the sequences in the game and contribute a motion or vocalization to signal its continuation. Eventually, infants may initiate the game by gesturing in distinctive ways (Ratner & Bruner, 1978; Sachs, 1985). Nonetheless, the overall structure of each series of turns is initially imposed by caregivers.

At the same time, caregivers also fine-tune their stimulation to maintain their infants’ interest without causing overexcitement. Using baby talk, affecting looks of mock surprise, and changing facial orientation keeps infants’ attention. When overstimulated, however, infants may strain to look away from their caregivers. Slowing the pace, softening the voice, reducing eye contact, and holding infants closer may calm the level of stimulation.

The length and sequence of games will vary between caregiver-infant pairs and also across different episodes. However, each session will characteristically involve predictable elements. Sessions begin with a *greeting* involving eye contact, smiles, and facial orientation. This is followed by *engagement*, or the game itself with its distinctive sequence of behaviors and pauses. Finally, there is a *pause* between game episodes. Infants suppress other behaviors during each pause in the game sequence and between game episodes in anticipation of their caregivers’ next moves. This suppression of activity in alternation with caregivers’ behavior is the essence of turn taking.



We should be careful not to assign too much significance to the games themselves.

While they may be one interaction that facilitates language learning, they do not appear to be a necessary condition. There are groups in American society and other cultures in which such games are not an especially common activity between caregivers and infants (Sachs, 1985).

The value of suppressing one's own vocal behavior to experience another's seems to make an early impression on infants. It has been found that young infants will cease vocalizing to better hear a caregiver's voice. Furthermore, they will do so to a greater extent if they have demonstrated a preference for the voice of that caregiver over other caregivers (Barret-Goldfarb & Whitehurst, 1973). The extent to which this preferred voice has been associated with reinforcing activities (such as feeding, cuddling, etc.) may play a significant role in its appeal.

Vocal turn taking in infants appears to a notable extent around 3 to 4 months and steadily increases beyond that time (Locke, 1993). Three-month-old infants are twice as likely to vocalize again, if their caregivers vocalize in response, as opposed to gesturing or smiling. In addition, as infants grow older, caregivers are more likely to imitate speech sounds, as opposed to nonspeech sounds.

Clearly, a basic picture of a dialogue emerges out of these exchanges. So much so that such extended reciprocal vocalizations have been referred to as **protoconversations**, the first or earliest conversations, especially when other elements such as mutual gaze and social smiles are integrated into the interaction (Bateson, 1975). Although infants may not be transmitting a great amount of linguistic information in these earliest dialogues, they are taking turns sharing a great deal of unspoken social and emotional information for the time being.

Overview of the Perlocutionary Stage

During the perlocutionary period, infants and caregivers share a partnership based on innocence and trust. Infants' contributions seem to arise out of innocence, stemming from causes that are beyond their control. Infants present behaviors that are reflexive, physiological, or simply random events, with no conscious intention or goal, and no ulterior motives, if you will.

On the other side, caregivers trust that these cries, burps, gazes, and smiles are significant beyond their face value. Caregivers implicitly believe that their infants are attempting communication at some level. Caregivers even invent communication wherever interpretation allows. This trust is reflected in the baby talk that caregivers intone to their infants amid the feedings, games, and dialogues that precede any meaningful speech from their usually compliant partner. Furthermore, caregivers trust that true communication with this new and very precious person will soon be possible. In all likelihood, it is caregivers' expectations that unwittingly plant the first seeds of communication.

■ Summary

- Although communication requires partners, in the perlocutionary period, caregivers assume the lead role by interpreting their infants' behaviors.

 In this context, the prefix *proto-* refers to the earliest form of a behavior, just as the word *prototype* might refer to the first model of a new jet. ■

protoconversations

Early interactions between caregivers and infants that include aspects such as turn taking.

- Infant behaviors that caregivers react to as signals for communication include various forms of crying, gazing, smiling, and vocal behaviors.
- Caregivers' behaviors reveal their expectation that their infant will communicate in some way.
- Caregivers use baby talk, which makes their speech more noticeable to their infant.
- Caregivers exhibit various means of establishing joint attention with their infants as they talk about them.
- The early interactions between infants and caregivers include many aspects of a dialogue and have been referred to as protoconversations.

The Illocutionary Stage of Communication

Throughout the first 6 months of life, during the perlocutionary stage, the responsibility for communication fell primarily on caregivers' shoulders. Infants were not yet capable of intending a specific goal or outcome and unknowingly relied on caregivers to infer or, just as often, invent them. As the next few months pass, this changes gradually, but significantly.

The illocutionary stage represents the emergence of intentionality on the part of infants. **Intentionality** means that infants' behavior is consciously directed toward influencing other persons to act on some object. For example, infants exhibit intentionality when they attempt to obtain a toy by directing their caregivers' attention to it. Between mature speakers, the most innocent utterances (*Do you have a watch?*) carry intentionality (the goal of finding out the time). However, infants are still making their way through the day without the advantage of words.

intentionality Behavior that exhibits the conscious attempt to achieve some goal through influencing others' behavior.

During the second half of the infant's first year, the caregiver-infant dyad gradually moves into a somewhat more symmetrical partnership. This is due in part to infants' developing cognitive and motor abilities. Cognitively, infants have begun to understand the concept of cause-effect and means-end relationships; changes have causes and other people can be the agents of change. Not only do infants become cognitively more aware of their goals (desired objects, actions, and events), but the motor abilities for signaling these to caregivers are evolving every day. Ultimately, as infants' use of gestures and vocalizations becomes more effective throughout this period, this success provides even greater motivation to communicate more effectively. By 8 or 9 months, infants are capable of signaling desired objects or actions, even if still without true words.

The Foundations of Intentionality

At a most fundamental level, infants' understanding of cause-effect and means-end relationships is a basic requirement to developing intentionality. Beyond this, caregivers exhibit certain behaviors that set the stage for infants to begin indicating their intentions. These include establishing joint

reference with infants and engaging them in joint action. Ultimately, infants mirror caregivers in acting to establish joint attention themselves.

Joint Reference and Joint Action. Influencing another's behavior is not very useful unless they are also attending to some object of interest. It serves caregivers little purpose to describe or name an object if their infants are focused elsewhere on the myriad of other available stimuli. Similarly, before infants can eventually signal their intentions—obtain an object through their caregivers, cause caregivers to act on it, or engage them in a shared activity—infants must be able to direct their caregivers' attention. A prerequisite to developing intentionality will be infants' ability to establish mutual focus with their caregivers. This shared focus with caregivers may be object oriented or action oriented.

The foundations of joint reference, the shared focus of individuals on an identified object, is established by caregivers during the perlocutionary period. As caregivers achieved shared attention during the first 6 months, they demonstrated the tools infants need to eventually turn the tables as their capacities mature.

Infants' early visual abilities permitted tracking their caregivers' face, gaze, and reaching movements. By 7 months, infants can visually search for items that have disappeared, perhaps as caregivers manipulate them.

Auditorily, infants can respond discriminatively to utterances directed at them by 4 months and by 7 months they are beginning to recognize a few words. These are most likely the familiar names of significant objects or people frequently labeled by caregivers. The improving visual and auditory abilities certainly prepare infants for following their caregivers' referencing behaviors.

In terms of motor control, infants progress from grasping items placed in their hands at 2 months to coordinating the movements to focus on, reach for, and grasp items smoothly. Such skills were probably cultivated by caregivers' tendency to hold out objects of interest for infants to inspect or grasp.

The motor control for reaching may be a particularly significant development as it appears to guide infants toward the ability to direct their caregivers' attention with the ever so useful "pointer" finger. Early attempts at reaching for and grasping an object may evolve into simulated reaches that merely signal interest. Infants may extend an arm and hand without visibly straining to reach the item. This behavior is frequently accompanied by glancing at the object and their caregiver alternately, after which caregivers may respond verbally. Eventually, infants' pointer fingers are extended at the end of this reach, perhaps being generalized from previous experiences in touching and exploring other items of interest with their finger tip. Finally, infants combine this gesture with vocalization to emphasize the need for attention, thereby establishing joint reference.

Joint action also evolves during the second half of infants' first year, having been demonstrated by caregivers during the perlocutionary stage. In a manner similar to joint reference, the caregiver takes the lead initially. In the first 6 months, the early routines, games, and dialogues are initiated

 Caregiver behaviors for establishing joint attention are described earlier in this chapter. ■

by caregivers. However, these activities are so structured and predictable (hence, the name *routine*) that infants are soon able to anticipate their beginning. At the appropriate times and in the appropriate settings infants may exhibit at least a partial response related to the interaction expected in that context. Whether this is truly conscious anticipation or just a response evoked through association is difficult to determine. Nonetheless, their behavior indicates recognition of a routinized series of behaviors that is intertwined with a given context.

Taking the interaction a step further, infants gradually learn their particular contributions at each step in the sequence. In contrast to the time when infants were simply compliant partners, maturation of cognitive and motor abilities permits them to take the lead in instigating the activity. The ability to recognize a familiar situation, initiate the routinized behaviors associated with it, and perform them sequentially in response to each cue is certainly suggestive of goal-oriented behavior.

Protodeclaratives and Protoimperatives. The earliest infant communicative behaviors that signal intentionality occur near the end of the first year. Bates (1976) characterized these early communicative signals as protoimperatives and protodeclaratives. **Protoimperatives** are infant gestures that seem to signal that caregivers should retrieve an object that is of interest. In effect, protoimperatives are requests, commands, or demands for *action*, just as the term *imperative* would imply. A characteristic gesture may signal caregivers to retrieve a favorite teddy bear or pillow at nap time.

In contrast, **protodeclaratives** are more “conversational” in nature, just as the term *declarative* would suggest. These gestures seem to signal that infants’ primary goal is to attain their caregivers’ *attention*—objects are only a tool in doing so. With attentive caregivers, pointing at the simplest things—a button, an earring, or a watch—evokes their attention and perhaps a narrative about that object.

Over the first year, infants accumulate a wealth of experience playing give-and-take (or “please-thank you”) games with objects. Eventually infants begin to anticipate these interactions, perhaps cued by the presence of some object. As the behaviors related to objects become more consistent and recognizable, infants’ gestures may become recognizable as preverbal communicative signals.

The usual form of these signals is a reaching gesture. The form may be more or less sophisticated. It may include an actual pointing of the index finger or just an open or grasping hand directed toward the object. Infants may initially assume their caregivers’ interest and later demand it more directly by looking back and forth between the object and their caregiver. Infants may eventually come to vocalize in unison with their characteristic gestures.

protoimperatives Early infant vocal and gestural behaviors that suggest commanding or requesting action on the part of the infant.

protodeclaratives Early infant vocal and gestural behaviors that appear to note an object for the purpose of gaining the caregiver’s attention.



A cautious reminder is in order here. As with any analysis of internal states, it is frequently difficult to confirm our impressions. Does the infant’s apparent satisfaction with obtaining the object confirm that the gesture was a protoimperative? Or could it simply mean that the infant was not up to throwing a tantrum and simply acquiesced? Mind reading is not a perfect science, even with the best-trained observers.

 This is a useful context to remind ourselves of the distinction between signals and symbols. Signals (or signs) usually involve some physical resemblance to what they stand for. An open-handed grasp at the end of an outstretched arm portrays its meaning pretty directly. ■

phonetically consistent form (PCF) Infant sound productions that are stable in form and seemingly refer to certain objects, but do not resemble conventional words for them.

Phonetically Consistent Forms (Vocables). The gestures used as protoimperatives and protodeclaratives may suffice to achieve infants' desired goals. However, for gestures to serve effectively, the intended audience—caregivers—must be watching. In many cases, caregivers are not; they are busily attending to other matters while their infants play contentedly. Given a long history of successfully attaining caregivers' attention through vocal behavior, it seems only logical that infants would add this element in these situations.

Whining, crying, and grunting may provide the occasional prompt needed to gain caregivers' attention. However, as an apparent outgrowth of babbling, infants have been observed to produce a certain type of characteristic vocalization in such circumstances. Once researchers recognized these vocalizations as an identifiable step in the developmental process, they were very intrigued by them.

Just prior to the occurrence of the first word, the number of longer sentence-like strings diminishes and units with more word-like structure become more frequent. Infants appear to recognize the connection between producing sounds to convey meaning. These vocalizations sound very much the same from occurrence to occurrence. They supplement the gestures that typically accompany them and seem to signal the same intention each time.

These vocalizations have been variously called *protowords*, *prelexical forms*, *sensorimotor morphemes*, and *vocables* (Haynes, 1994d). The term **phonetically consistent forms (PCF)**, provided by Dore, Franklin, Miller, and Ramer (1976), seems to be the most commonly used, perhaps because it is the most descriptive. Phonetically consistent forms have several common features. First, they appear to be "units," in that they have distinguishable utterance boundaries. Second, they can be recognized as reoccurring utterances. Third, they are reliably associated with certain situations or circumstances. And, finally, although they are not recognizable as attempts at true words, their phonetic composition is relatively constant. For example, an infant may produce "mabeebee" (/mabibi/) with a distinctive intonation and gesture every time more food is being requested.

Phonetically consistent forms do not appear to be attempts at real words. Their resemblance is rarely close enough to a real word that would be relevant. They do not appear to be attempts at more sophisticated babbling. Infants' PCFs are more phonetically stable and shorter than the jargon strings they produce otherwise. Instead, PCFs seem to be *quasi-symbolic* for infants. They signal that infants have begun to associate the connection between their vocal-verbal responses and the effects that follow in changing the behavior of those around them. Further, although PCFs are not symbols in the conventional sense of words, the caregiver frequently responds to them as though they are, reinforcing the infant's attempt to move ever closer to conventional communication.

The Communication of Intentions

Several researchers have recognized that a critical transition occurs in the evolution of communication toward the end of the first year. Intentional communication has evolved from infants' countless experiences in influencing the behavior of others through crying, gazing, vocalizing, and gesturing. Although still limited to relying primarily on gestures that are only amplified by their accompanying vocalizations, infants recognize the communication value of their behavior. Furthermore, as their motor and cognitive abilities mature, communicating their intentions will occur with increasing frequency.

Several different classifications of intentions have been published. Two commonly discussed classifications include Dore's Primitive Speech Acts and Halliday's Communicative Functions.

Dore's Primitive Speech Acts. Dore (1974) outlined a classification of intentions conveyed by infants. *Primitive speech acts* (PSAs) represent categories of infant intentions expressed through characteristic patterns of gestures and vocalizations. Early vocalizations consist of distinctive intonational patterns; later PSAs may include a recognizable word. Primitive speech acts appear to be predecessors of the intentions expressed in adult speech acts, but are likely to be accomplished in a primitive manner, that is, without the use of conventional words.

The early intentions communicated through PSAs come as no surprise when considering infants' perspectives and interests. Early PSAs may consist of *calling* or *greeting* the caregiver, *requesting action* from the caregiver, *protesting an action* proposed or initiated by the caregiver, or simply *repeating* or *practicing* a response. At this level of development, PSAs express only one intention per utterance. Although their form is primitive, the range of PSAs is similar to those that will be expressed during the second year of life when the child begins to use words and phrases.

Primitive speech acts begin first as highly discriminated behaviors, their occurrence being closely associated with particular contexts. With further experience, they begin to change subtly in form and occur in more varied situations. Later, with further cognitive development and the mastery of conventional language forms, the child's range of intentions will expand and the ability to express them more effectively will improve.

Halliday's Communicative Functions. Halliday (1975) followed the development of communication in his son, Nigel, from approximately 9 to

 These intentions also apply and are more easily illustrated in the single-word stage. Therefore, tables illustrating these classifications are found in Chapter 6. ■



The classifications provided by various theories correlate more or less well to PSAs or communicative functions. In the absence of words, there are no clearly related grammatical or semantic categories. On the other hand, because their function is defined by their contexts and consequences, these would correlate well with several of Skinner's verbal operants. Consider the parallels between PSAs and *mands*, *tacts*, and *echoics*.

communicative functions Halliday's classification of intentions exhibited by infants and toddlers.

24 months. Among other purposes, Halliday attempted to classify the **communicative functions**, or pragmatic uses of gestures and vocalizations that appeared as Nigel developed language. Being essentially analogous to primitive speech acts, communicative functions at this stage of development also consisted of gestures and vocalizations. Of central interest was the role that these communicative functions played as catalysts in Nigel's language development.

At 9 months of age, Halliday identified the first two functions in Nigel's behavior. The first of these, *interactional*, was essentially a "me and you" function in which the infant's behavior was directed toward establishing interactions with others. Of course, several behaviors quite early in the infant's development—crying, cooing, smiling—have this effect, but the conscious intent of engaging someone else's attention is probably absent. The second function classified by Halliday at this age was the *personal* function. In these behaviors, Nigel was expressing a sense of himself and his personal feelings such as pleasure, frustration, disgust, and so forth.

A month and a half later, Halliday recognized two more communicative functions in Nigel's behavior, the *instrumental* and *regulatory* functions. The instrumental function essentially consisted of obtaining objects through the help of those around him, as in gesturing and vocalizing to obtain an unreachable juice bottle. Caregivers' behaviors in this case are simply an instrument to serve their infants' needs. In contrast, caregivers' behaviors are the central concern of the regulatory function. Infants in this case attempt to regulate their caregivers' behaviors to achieve a particular interaction, such as the classic when infants reach and grunt, wanting to be carried.

At 10½ months, Nigel had demonstrated four separate purposes or communicative functions served by his behavior, which was still nonverbal and nonconventional. By the time he was 18 months, a total of six communicative functions had emerged. These serve a variety of intentions and by that time may be associated with certain key words or phrases.

Overview of the Illocutionary Stage

Intentionality, infants' recognition that they can influence others to do things for them, is the catalyst for communication development in the illocutionary stage. Infants' use of gestures and vocalizations to convey their intentions is an important functional development for communication. However, there is perhaps a broader implication in recognizing the emergence of the illocutionary stage in infancy. That infants develop the ability to signal their intentions prelinguistically underscores that communication begins before conventional language.

The illocutionary period culminates in behaviors that appear to serve as a transition into conventional language. As they approach their first birthday, infants begin to produce utterances, phonetically consistent forms, that approach the nature of true words. Finally, several classifications of pragmatic

functions describe the purposes intended by infants through their gestures, vocalizations, and eventually, their early words and phrases.

Emerging Literacy

Some years ago, it may have seemed premature to discuss “language development” in a chapter about infants. After all, for a number of years the prevailing view held that language did not begin until the first word appears. Similarly, it may seem odd to some to discuss “literacy” in a chapter about infants because reading and writing develop much later than even the first word. However, just as we now recognize that many of the foundational building blocks for language development are laid down during the first year, it appears that the seeds of literacy are sown much earlier than we once thought.

Planting the Seeds of Literacy

The seeds of literacy are sown during the first year in ways that many would not even suspect. After all, most of us have generally associated “learning to read” with the formal instruction that begins with elementary school. Yet, upon careful observation, it becomes apparent that some infant-caregiver interactions provide the basis for later development of some of the most basic literacy skills (Kamhi & Catts, 2005).

Earlier in this chapter, it was noted that in language development research a significant amount of attention has focused on the social interaction of infants and caregivers. This socialization is now viewed as providing one of the basic elements in infants’ motivation to communicate. Infants and caregivers engage in a variety of social transactions throughout their daily routines of dressing, feeding, and game playing. These transactions become the essence of their communication together. With regard to literacy, many caregivers engage in a similar process that has been called *literacy socialization* (Van Kleeck & Schuele, 1987). Van Kleeck and Schuele described three areas of literacy socialization: (1) literacy artifacts; (2) literacy events; and (3) the knowledge gained from literacy experiences.

Literacy artifacts. **Literacy artifacts** are items associated with print and text, such as nursery rhymes, story characters, alphabet designs, company logos, t-shirts and sweatshirts with slogans, and the ubiquitous team ballcap. These items are everywhere in society as it is. In addition, caregivers in most middle- and upper-class homes draw on literacy artifacts for decorating children’s rooms (Kamhi & Catts, 2005). Wall hangings, crib sheets, mobiles, and books surround infants with story characters, letters, names, and pictures. Infants may or may not appreciate the decorative flair, but at least in many homes they are exposed to literacy artifacts through such items.

literacy artifacts Items that commonly display stimuli associated with literacy, such as books, newspapers, nursery rhyme characters, t-shirts with slogan, logo adorned ball caps, and so forth.

literacy events

Interactions or behaviors related to literacy, including storytelling, book reading, letter writing, and so forth.

literacy knowledge

Familiarity with the various aspects of literacy, including print awareness, book orientation, typeface styles, genres and styles.

Literacy Events. The **literacy event** that is of central importance to infants is joint book reading. This is an especially important example of the joint actions that are described earlier in this chapter. The caregiver uses a book as the focus of attention to engage the infant in various interactions. This may begin as early as 5 or 6 months, often at the time infants begin to sit up and focus their attention. In the earliest interactions, infants may only respond with curiosity and delight with the special attention that seems to surround these books. With improving motor control, books and alphabet blocks and such become objects for exploration and manipulation. Infants may spend time examining the movement of a book's covers and pages or the different images on each side of an alphabet block.

Literacy Knowledge. Initially, the caregiver may simply display the book and label the objects, events, and characters illustrated in the pictures while pointing to each one. With time, caregivers will ask for actual evidence of comprehension, prompting their infants to point to or "find" the pictures that should be familiar from previous "readings." At this stage, the **literacy knowledge** gained by infants—the understanding that print exists in various forms, that it accompanies pictures, and that caregivers use both to engage their attention—is basic but important for future developments nonetheless.

■ Summary

- The illocutionary stage in communication development is the result of infants' emerging intentionality.
- Intentionality occurs as we recognize that our goals can be achieved by influencing others' behavior.
- Caregivers provide opportunities for infants to exhibit intentional behavior by establishing joint reference and joint actions.
- Infants' earliest intentions have been distinguished as protodeclaratives, gestures that merely direct caregivers' attention, and protoimperatives, those that direct caregivers' actions.
- Early intentions are expressed through gestures, vocalizations, and phonetically consistent forms, as the infant approximates the production of true words.
- The functions or purposes of behaviors used to achieve early intentions have been classified as primitive speech acts and communicative functions.
- The beginnings of literacy are introduced through literacy artifacts and literacy events, which begin to establish the foundations of literacy knowledge.