

How Infants Learn

Infant-directed speech teaches more than just words—it helps babies learn from statistical distribution and patterns of their surrounding environment.

By Ellen A. Rhoades,
Ed.S., LSLC Cert. AVT



Statistical learning is a foundational ability to detect regularities in the natural world. It means developing a sensitivity to distributional and statistical regularities in the environment. Newborns are known to be statistical learners in that they can decipher and recognize patterns from information presented to them (Bulf, Johnson & Valenza, 2011). Statistical learning is an innate and essential learning mechanism needed for the processing, acquisition and evolution of language, as well as cognition. Because language is a rule-based system that maintains certain regularities within its structure, babies are primed to learn any language (Saffran & Kirkham, 2018).

Hearing loss during the early language learning years, regardless of severity, can negatively impact young children's statistical learning capacities, simply because they receive degraded or insufficient spoken language input (Studer-Eichenberger & Koenig, 2016). On a more promising note, children with hearing loss, whose hearing devices later provide them with sufficient hearing, are sensitive to the statistical characteristics of spoken language (Guo, McGregor & Spencer, 2015).

Therefore, it is important to understand the outcomes of many studies on infant-directed speech (IDS), particularly those that focus on:

1. The spoken language input typically received by normally hearing babies and toddlers;
2. Those factors or obstacles that seem to compromise IDS;
3. How parents and practitioners might minimize those adverse issues. As a two-part article, this first part focuses on understanding IDS.

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Infant-Directed Speech: What is it?

Ever since a landmark study by Catherine Snow in 1972, there has been considerable research on maternal language during preverbal and verbal infancy. Infancy is the period between birth and 24 months of age. IDS refers to the non-standard form of speech that is typically used when talking to babies and toddlers.

The term “maternal linguistic input” evolved to include such descriptors as baby talk or baby register, “motherese,” “parentese” or “caregiverese,” and parental linguistic input, as well as the more recent “serve and return.” However, researchers tend to refer to this “parent talk” as either IDS or child-directed speech (CDS). The term “caregiver” evolved to include mothers, fathers and other adults caring for the infant. Although older siblings usually employ IDS with infants, children lack the skills needed to adapt their speech to infants’ needs.

The Importance of IDS

Many studies show that we talk differently to babies, sometimes unintentionally so, because we want them to pay attention to what we’re saying and to learn our language. Intuitively, we know their language comprehension skills are limited, so IDS serves a didactic function.

Beyond our desire to teach babies and toddlers, researchers uncovered many purposes for IDS, such as:

1. It enhances statistical learning in that infants engage in pattern recognition. Infants are involved in meaning-making, trying to figure out word regularities.
2. It encourages focused, sustained attention and auditory memory. Both are critical core cognitive capacities needed for learning, and babies are known to attend more to IDS than adult-directed speech.
3. It enables word segmentation in that boundaries (pauses) between words are more noticeable. What sounds like an endless stream of sound becomes more meaningful chunks of information.
4. It nurtures emotional bonding and interactional synchrony between caregivers and infants. Both are qualities integral to parent-child attachment, which is necessary for healthy child development.
5. It develops word recognition, rhythmic structure or stress patterns, and speech perception. All these qualities provide the essential foundation to acquire the child’s primary language.



SAMPLE OF IDS: *Varying caregiver sentences with exaggerated prosody while focusing on the same thought.*

Where's the baby? **Is the baby here?** No, I **don't** see the baby. **Where** is he? **Is the baby over there?** **Let's look.** **Do you see the baby?** **Yes! Now** I see the baby! **That's it! That's** the baby! **I love** that baby! **Rock the baby!** **Back 'n forth, back 'n forth.** **Make nice** to the baby. **Rub** his back. **Oooooo**, that feels good! The baby is **so-o-o** soft. <<Sniff sniff>> Oh **yes**, he **smells** good too! **We love** the baby!

Briefly restated, IDS promotes learning and, in particular, language acquisition. Accumulated research findings from the past half century demonstrated how IDS is markedly different from adult-directed speech. While we do not yet fully understand all its learnability properties and implications for young children's language growth, it is important to recognize its characteristics.

IDS Quality

On a qualitative level, IDS seems to reflect a universal phenomenon. Caregivers tend to intuitively understand that babies are slower to process or understand speech, which is why most parents are motivated to ensure that what they say is understood. IDS seems to facilitate speech perception in whichever language is spoken by the child's caregivers. For the most part, researchers who examined the characteristics of IDS focused on the mother-child relationship, although a few included fathers.

In general, those qualitative characteristics defining IDS are grouped into four categories:

1. **Social Characteristics:** This category includes attention-getting differences in social cues that enhance emotional bonding and the learning process. IDS typically involves face-to-face interactions where the caregiver and infant are within two feet of each other. In addition to this close proximity, such interactions include exaggerated facial

expressions; gazing into each other's eyes; and gestures, such as pointing. Caregiver responsiveness to the infant's movements and expressions is known as "interactional synchrony" or rhythmic "conversational duets." The importance of caregiver sensitivity to infants and mutual responsiveness cannot be overstated, partly because they increase the frequency of infant vocalizations.

Nonverbal attachment and dynamic reciprocity, typically established within the first few weeks after birth, involve active turn-taking behaviors. As a social feedback loop, a contingent response from one part of the dyad begets a positive response from the other, leading to increasingly higher-quality verbal communication. Babies and toddlers are not passive receivers of IDS. It is noteworthy that IDS has not been found to reap benefits for infants who watch it on pre-recorded videos. IDS serves as a carrier of social information, reflecting caregiver attunement to infant attention and actions that are directed to the speech stream.

2. **Prosodic Characteristics:** Phonologic differences also characterize IDS, primarily in that vowels are emphasized. Vowels tend to be louder, longer in duration, higher and greater in pitch range (i.e., exaggerated intonation and greater acoustic clarity). Additionally, the /s/ phoneme is often stressed and assigned greater perceptual salience. Due to the insertion of longer pauses, IDS also rhythmically stresses words and phrases, which provides infants with

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acoustical boundaries and fewer dysfluencies. This initially “cooing” pattern with glissando variations has sometimes been referred to as “happy talk.” In reality, the melodic and emotionally charged language input results in clarity of speech input, resulting in better speech discrimination. Of particular interest is the fact that caregivers usually adapt their prosodic features to the acoustic preferences and emotional needs of the child they are addressing.

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3. **Structural Characteristics:** Linguistic differences include short utterances and partial repetitions of simplified and well-formed language patterns, particularly with the use of restricted vocabulary, phrases and simplified grammar that later leads to more complex sentence structures. Familiar or new words are placed within simple sentence structures. Along with lower utterance mean length, the vocabulary or lexicon is more restricted and concrete than adult-directed speech. Moreover, IDS involves greater use of questions.
4. **Content Characteristics:** Contextualized talk focuses on what the young child is experiencing in the moment. Context-dependent features are based on the child’s activities and interests in the “*here-and-now*” (i.e., what is seen, felt, tasted, heard). Because the subject matter tends to revolve around object play and routines, IDS is highly predictable. Such constant and obligatory events permit infants to infer word meaning. However, over time, the contextual-boundedness of IDS decreases in prevalence. This means caregiver language input becomes more sophisticated, expanding to narratives. As infants’ language processing skills improve, caregiver language input becomes more flexible and complex. Ultimately, IDS extends to the past and future (i.e., more abstract and remote discourse that is sometimes referred to as the “*there-and-then*”).

IDS Quantity

On a quantitative level, studies show that babies and toddlers seem to hear more spoken language as they age. It is important to understand that frequent exposure to any word results in a stronger representation of that word in a child’s lexical memory. Young language learners typically require fewer exposures to a word in order to understand it but more exposures in order to produce it.

The quantity of IDS varies, depending on multiple factors. For example, within contemporary westernized middle-income families, many infants tend to get greater exposure





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to language during book sharing and grooming (dressing, washing) activities than during object play, outdoor play, feeding and household cleaning. Caregivers differ in talkativeness across activities. Regardless, IDS during the first year of infancy tends to be organized around everyday activities.

Primary caregivers in such households devote more one-on-one time with their children than the previous five decades, with an average of approximately one-and-a-half hours daily for mothers and approximately one hour daily for fathers (Dotti Sani & Treas, 2016). While this quantity of daily caregiver-child time may be unexpected, it is encouraging to note that father-child time increased—particularly since paternal involvement may promote children’s cognitive functioning (Cano & Baxter, 2019).


Age-related IDS

Some studies show that IDS is an age-related phenomenon that transitions from the simple and familiar to novel and more complex levels, at least structurally and contextually. Moreover, its prosodic characteristics tend to peak shortly after the middle of the first year of infancy (6-9 months of age), decreasing later on. In general, caregivers stop using IDS when children are between 2 and 3 years of age. With maturation, infants’ preference for IDS often decreases and their processing speed increases. Because children’s language needs change, caregivers typically decrease the acoustic prominences in their speech while increasing their lexicon (i.e., word diversity). Caregiver sensitivity tends to guide their modifications; hence their intuitive decrease in tone and emotional content over time. This is important because the quantity of IDS is related to the children’s verbal abilities as they mature into adolescents.

To view and listen to an example of IDS during early infancy, go to bit.ly/IDSinfancy.

Depending on the accuracy of caregiver perceptions, keep in mind that IDS provides essential “acoustic landmarks” for the very young language learner. In the next issue of *Volta Voices*, the second part of this article will detail:

1. a checklist of IDS characteristics
2. factors that impact the effectiveness of deliberate dyadic verbal interactions, known as IDS;
3. a discussion about research findings on IDS when a child with hearing loss is part of the dyad; and
4. suggested ways to minimize the impact of an infant’s hearing loss relating to IDS.

Some of these issues will be discussed at AG Bell’s upcoming Global Listening and Spoken Language Symposium in Baltimore, particularly in the mini-workshop titled “Adapting LSL Principles to Serve Diverse Families” (Rhoades, Daniel and Eatmon), and in the 30-minute session titled “Informational Counseling: What, Why, When?” (Rhoades and Glade). We hope you will join us! For more information and to register, visit www.agbellsymposium.com. 

Ellen A. Rhoades, Ed.S., LSL Cert. AVT, is an international consultant, mentor, researcher, and practitioner with 50 years of experience who has founded and/or established four auditory-verbal programs. Ms. Rhoades has co-authored/edited several books and has contributed to many book chapters and articles. She currently serves on review committees for six professional journals.