

Prosody in Infant and Child-Directed Speech

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Technical Terms

1. **Child-Directed Speech" (CDS):** The way adults speak to children
2. **Mean fundamental frequency (mean f0):** refers to the average rate at which the vocal cords vibrate when producing sound. It's measured in Hertz (Hz) and determines the pitch of the voice. A higher mean fundamental frequency means a higher pitch, and a lower mean fundamental frequency means a lower pitch. In child-directed speech, adults typically use a higher mean fundamental frequency to engage and communicate more effectively with children.
3. **Intonation contours:** meaningful pitch patterns distributed over utterances (e.g. 't Hart, Collier & Cohen, 1990). For example, changing the intonation contour of an utterance can change a statement into a question. Intonation contours can also provide pragmatic information.

Technical Terms

4. **Stress-timed Languages:** Stress-timing is strongly related to vowel reduction processes. English, Thai, Lao, German, Russian, Danish, Swedish, Norwegian, Faroese, Dutch, European Portuguese, and Iranian Persian are typical stress-timed languages.

5. **Syllable-timed Languages:** tend to give syllables approximately equal prominence and generally lack reduced vowels. French, Italian, Spanish, Romanian, Brazilian Portuguese, Icelandic, Singlish, Cantonese, Mandarin Chinese, Armenian, Turkish and Korean are commonly examples of syllable-timed languages.

6. **Mora-timed/Pitch-accent language:** Some languages like Japanese, Gilbertese, Slovak and Ganda have regular pacing but are mora-timed, rather than syllable-timed. In Japanese, a V or CV syllable takes up one timing unit. Japanese does not have diphthongs but double vowels, so CVV takes roughly twice the time as CV.

Adults talk to children differently than they talk to other adults. This happens in many cultures and languages (Casagrande 1948; Ferguson 1964; Bynon 1968).

"Child-Directed Speech" (CDS):

- The way adults speak to children.
- It involves various changes in tone, word choice, sentence structure, and pronunciation compared to how adults speak to other adults (Soderstrom 2007).



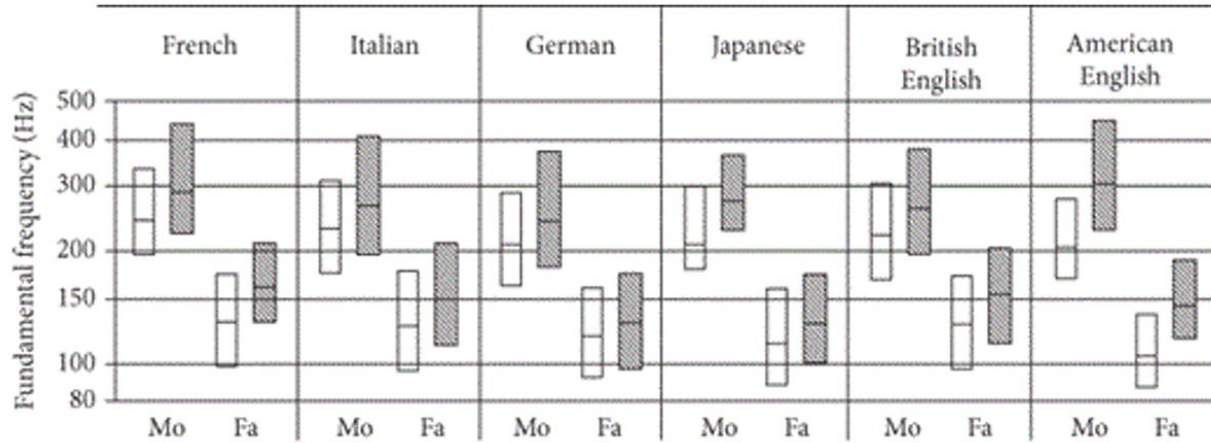
Primary prosodic characteristics of infant- and child-directed speech

Features of child-directed speech (CDS):

- Higher mean fundamental frequency (f_0) (Fernald and Simon 1984 Fernald et al. 1989).
- Variation in pitch (pitch contours, increased pitch range (Fernald and Simon 1984), or overall variability (Fernald et al. 1989))

Pitch features help infants prefer CDS, especially in early infancy (Fernald and Kuhl 1987).





An example of mean f_0 and f_0 variability in CDS compared with ADS across six languages for both fathers (Fa) and mothers (Mo).

(Reprinted with permission from Fernald et al. 1989)

Child-Directed Speech (CDS) VS Adult-Directed Speech (ADS)



CDS has shorter sentences, is spoken more slowly, includes longer pauses, and features more pronounced stress and lengthening of syllables (e.g., Fernald et al. 1989; Soderstrom et al. 2008).

Mothers speaking to 6- and 8-month-old infants tend to lengthen the **ends** of **sentences** and the **words** more in CDS than in adult-directed speech (ADS), regardless of whether the syllables are stressed or not (Albin and Echols, 1996).

Sentence-final lengthening is a significant factor in the differences between CDS and ADS.



CDS



ADS

Sentence-final lengthening is a significant factor

Understanding lengthening effects in CDS is complex

- Mothers often place **new words** at the **ends of sentences** and use **exaggerated pitch peaks** when talking to their infants. This is not consistently observed in speech directed at adults (Fernald and Mazzie 1991).
- Mothers use **stress** differently when speaking to infants than adults. They may **stress** words **repeatedly** or **highlight specific words** to **capture** the infant's attention (Fisher and Tokura 1995; Bortfeld and Morgan 2010).

Because of these differences in **word placement** and **stress usage**, it's challenging to determine whether the observed lengthening effects in CDS are due to the position of the words (e.g., at the end of a sentence) or the stress placed on them to highlight their importance.

*It should be mentioned that these studies were done in English.

The study by Ko and Soderstrom (2013):

This study aimed to **separate the effects of position and stress** by using controlled speech samples and varying the speech register (CDS vs. ADS), and sentence type (question vs. declarative).

They found that **lengthening** occurred **throughout the sentence** and **not just at the end.**

However, because the study used highly controlled conditions, the results might not fully represent natural CDS.

CDS communicates not just through the words and their meanings but also through various non-verbal cues, known as paralinguistic features.

These paralinguistic elements play a crucial role in how parents communicate with their children (Papoušek et al. (1991) and Katz et al. (1996)).

Infants and their caregivers use specific intonational patterns that are important for conversational interaction and turn-taking.

Caregivers often use:

- Questions with rising intonation, (e.g., Newport et al. 1977; Soderstrom et al. 2008),
- Rising intonation to encourage responses or actions from their infants (Stern et al. 1982; Ferrier 1985; Papoušek et al. 1991)
- Bell-shaped intonation contours to maintain the infant's gaze (Stern et al. 1982).

When a parent talks to their baby, they use special tones and patterns in their voice.



Approval



Questions



Prohibition

Approval: If the baby does something good, the parent might say, "Good job!" with a **high, happy tone**. This helps the baby understand that they did something right.

Questions: When asking a question, like "Do you want some milk?", the parent uses a **rising tone at the end**. This rising intonation is common in questions and helps the baby recognize it's a question.

Prohibition: If the baby is about to do something unsafe, the parent might say, "No, don't touch that!" with a **firm, lower tone**, signaling disapproval.

- Babies are very sensitive to these **vocal cues**.
- They prefer listening to approving tones and questions.
- When you remove the emotional tones from speech, babies can't tell much difference between how parents talk to them and how adults talk to each other.
- The **emotional tone** is a key feature of how parents communicate with their babies.

Cross-cultural similarities and differences

Adults naturally modify their speech when talking to children. Ferguson (1964, 1977) found that these changes, which he called 'speech register,' occur consistently across **15 languages** and **23 cultures**, indicating this behavior is common worldwide.

Fernald et al. (1989) compared CDS in German, British English, American English (stress-timed languages), French, Italian (syllable-timed languages), and Japanese (a mora-timed/pitch-accented language).

CDS generally had **higher pitch** (mean f_0) and **greater pitch range** than ADS in all languages except Japanese.

In Mandarin Chinese, another tonal language, CDS pitch characteristics were less exaggerated than in American English.

Other sources of variation

CDS isn't the same for all kids or all situations. It changes based on things like the **child's age**, the **language spoken**, and the **context**.

CDS is not one fixed style but changes depending on the child's age and other factors.

When babies are born, adults talk to them in a special way with exaggerated tones. But as babies grow older, this special way of speaking changes.

Parents speaking Japanese speak differently to newborns compared to when their kids are older.

How parents talk to babies in Australia and Thailand also changes as the babies grow.

There are unique ways of speaking to newborns, like using whispered speech or longer sentences that sound like self-talk.

Other sources of variation

Gender plays a significant role in the variation of **CDS**.

Mothers' pitch patterns changed differently when speaking to male versus female infants, but this pattern varied between Thai and Australian English speakers.

However, both Thai and Australian English mothers tended to have a **wider pitch range** when speaking to **girls** compared to boys. (Kitamura et al. (2001))

Both parents use the same kind of tone and rhythm when talking to children.

But some studies say there's no difference between how men and women talk to kids, while others show that it changes depending on the **child's age**.

For example, some dads might raise their voice more when talking to older kids, while others might not change much.

It's not just about the way they talk; even the normal way adults talk (not just to kids) can be different between men and women.

And cultural expectations play a big role too, which can vary depending on where you are and how society sees things.



Function of prosodic characteristics

- CDS engages and maintains attention.
- It communicates affect and facilitates social interaction.
- It facilitates language.

Attention is crucial for learning, and different types of speech vary in how well they capture infants' attention.

'Happy talk' (CDS) is particularly effective at drawing infants' attention positively, leading caregivers to modify their voices to elicit this response.

Adults find infants' reactions to CDS more appealing than their reactions to adult-directed speech (ADS).

A study by Roberts et al. (2013) found that the use of CDS at 6 months old predicts better joint attention skills in infants at 12 months.

Intonational modifications in CDS make the speech more noticeable and engaging for infants.

Positive speech is very important for infants' social and language development.

Too much negative or neutral speech can harm their early development.

For example, infants as young as 3 months old can sense if their mothers are depressed.

Babies of depressed mothers often have problems with social, emotional, and cognitive skills, as well as with learning connections needed for language development.

One reason for this is that depressed mothers may not interact as much with their babies.

CDS has **exaggerated intonation**, helping babies understand and remember language structure better.

Babies can use various strategies to identify individual words within speech, such as relying on prior knowledge of high-frequency words like their own name combined with CDS.

CDS provides clear **boundaries** within continuous speech, allowing infants to break it down further as they continue to hear **familiar patterns**.

Infants prefer **pauses** at **grammatical boundaries** in CDS, can segment speech with CDS characteristics better than in ADS, and CDS contributes to lexical learning.

Linguistic features of CDS, like asking lots of questions, may also help highlight these language patterns and chunks.

CDS has a long history, but recent advances in two areas are particularly noteworthy for future exploration:

- Firstly, while much of the existing data on CDS is behavioral, there's a growing interest in using **neurophysiological** methods to understand how infants process different types of CDS. This can provide insights into the role of CDS in early brain development.
- Secondly, there's a recent trend towards using **full-day recordings** to study infants' and young children's language experiences, offering valuable insights into how CDS varies across different cultures and in real-world settings.

CDS is crucial for babies' **early vocal development** and forms the basis for further progress in learning language.

Thank You
For Your Attention