

On Linguistic and Interactive Aspects of Infant-Adult Communication in a Pathological Perspective

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Abstract

This is a preliminary report of a study of some linguistic and interactive aspects available in a adult-child dyad where the child is partially hearing impaired, during the ages 8 - 20 months. The investigation involves a male child, born with Hemifacial Microsomia. Audio and video recordings are used to collect data on child vocalization and parent-child interaction. Eye-tracking is used to measure eye movements when presented with audio-visual stimuli. SECDI forms are applied to observe the development of the child's lexical production. Preliminary analyses indicate increased overall parental interactive behaviour. As babbling is somewhat delayed due to physical limitations, signed supported Swedish is used to facilitate communication and language development. Further collection and analysis of data is in progress in search of valuable information of the linguistic development from a pathological perspective of language acquisition.

Introduction

The typical linguistic development during infancy can be regarded as the result of the interaction between biological and environmental factors that leads to the child's language converts to the surrounding language. According to the Ecological Theory of Language Acquisition (Lacerda et al., 2004a), early language acquisition is an emergent consequence of multi-sensorial embodiment of the information available in ecological adult-infant interaction settings. In agreement with this theory, the basic linguistic referential function emerges from at least two of the sensory dimensions available in the speech interaction scene (Lacerda, 2003; Lacerda, Gustavsson & Svärd, 2003). If there are restraining biological conditions or a lack of adequate interaction with the environment, the child's linguistic development generally will deviate from the expected age dependent competence of communication. During typical circumstances, a one-year old child starts to use adult-like word forms. By two years of age, the

child has developed a larger vocabulary and starts to use two-word sentences or more in communication with its environment. If the auditory channel of information is disturbed, the means of integration of stimuli input is disturbed which can result in a linguistic disturbance, which also can affect the ability to produce comprehensible speech (Öster, 2002).

Humans seem to have a propensity to integrate the synchronic audio-visual stimuli that is accessible in a communicative situation (Bahrick, 2004). For example, when adults are speaking to infants, they tend to repeat representations of target words as denomination of whatever object the child is focusing on at the moment. Characteristic for this kind of interaction is that the adult pronounces several sentences containing the target word, often in final position, while following the infant's gaze. Target words that are pronounced isolated in a repetitive way has a significant positive effect on the first stages of the development of vocabulary (Brent & Siskind, 2001). In a perspective of language development, adults' behaviour can be regarded as an efficient way of producing a correlation between the words and sentences and the object on which the infant is focusing. An implicit meaning for the target word may arise as a result of automatic association between the sensory representations that show highest correlation (Lacerda, 2003). The learning mechanism that builds on associations of different sensory impressions is most relevant for learning of the first words, at the early stages of linguistic development.

In a natural speech communication situation, competent speakers and listeners rapidly achieve an effective level of information exchange by adjusting to each others communication needs (Lacerda et al., 2004b). Infants generally learn to use babbling in a communicative way very early in life. When the communication channels are defect in some way, the manner of communication change by force of nature. As the ambient language of infants very commonly is dominated by IDS, Infant Directed Speech (Fernald et al. 1989), this is one of the means of communication the parents of a

child with a congenital perception and/or production handicap has to adjust in order to enhance the child's linguistic development.

This study aims at examining the parent-child interaction when the child has some perception and production disabilities. How does the parent modulate their own and the child's behaviour to enhance interaction and the child's linguistic development? In order to investigate how representations of early words may develop in the disabled human infant, analyses will be made on the mothers' linguistic structure, timing and turn-taking, her repetitions and strategy in adjusting to the infant's focus of attention. The infants' vocal productions will be studied in order to observe the progress of the child's verbal development.

Method

A Swedish mother is recorded monthly while spontaneously interacting with her child. On two occasions the father has participated during the recording substituting the mother.

Subject

The subject is a Swedish, male infant from the age of 8 months to 20 months with his mother and father. The child was born with *Hemifacial Microsomia*, i.e. was born without left outer and middle ear, no zygomatic or mandible bone structure on the left side of the face. He has also a slightly cleft soft palate and a split uvula. The child was fed by sub-glottal probe until seven weeks of age and by nasal probe up to 8 months of age. The boy has one older sister.

Recording sessions

Recording sessions take place in a laboratory at the Department of Linguistics, Stockholm University. The mother receives a selection of toys, with verbal instructions indicating the significance of using onomatopoeic sounds when appropriate.

Procedure

A digital video camera, Panasonic NV-DS11, focusing on the boy and his parent was used. Both parent and child were recorded by a Fostex CR200 Compact Disc Recorder, with wireless microphones, Sennheiser Microport Transmitters, attached to their clothes, connected to a Sennheiser Microport Receiver EMI1005. Audio-visual perception is studied by Tobii (www.tobii.com), an eye-tracking sys-

tem that measures the child's eye movements when presented with different auditory representations. Some stimuli are based on the Peabody Picture Vocabulary Test PPTV (Dunn & Dunn, 1981), adapted to the Tobii system. Detailed eye-tracking are used to evaluate the child's integration of audio-visual linguistic information. A SECDI form (Eriksson & Berglund, 1999), a Swedish version of CDI form (MacArthur Communicative Development Inventory, Fenson et al., 1993) will be administered every six months to observe the development of the child's lexical production in words and gestures.

The speech material will be segmented, labelled and transcribed orthographically in WaveSurfer (www.speech.kth.se/wavesurfer). The parent-child linguistic and gestured interaction will be annotated in Anvil (www.dfki.de/~kipp/anvil) for further analysis.

Result and Discussion

The data is currently being analyzed but there are preliminary indications of increased parental interactive behaviour. Initial analyses indicate that, as a consequence of the child's handicap, the mother seems to enhance her manner of communication in order to keep the interaction active. Mother-child eye contact is frequent and expanded and turn-taking is strongly encouraged by the mother in their interaction. The mother tends to repeatedly verbalize every representation of target word that currently is under attention of them both, by using the target words in different settings, combined with various physical actions. In interacting with a child, parents often make use of specific body language, with frequent and intense eye contact, exaggerated facial expressions, head nods and shakes, pointing and with concrete physical contact. All these varieties are used in her means of communication with her child.

The child has some difficulties in his verbal production. Before the feeding probe was removed and he could start eating proper food he just played with his voice with high vowel-like sounds, as reported by his parents. When the boy was eight months of age, the probe was taken out. Now general babbling started with CV productions. The consonantal sounds produced were, and still are, mostly uvular and velar, like /gV/.

Lack of supporting bone structure on the left side of the face affects the motor movements of the tongue and there seem to be a gen-

eral weakness in the mobility on the affected side of the face. The left side of the tongue tends to “slip down” into the cavity of the missing mandible bone structure. As a consequence of a soft palate cleft and split uvula, he has some problem controlling consonant sounds. In situations of imitative interaction with his mother, alveolar and bilabial speech sounds are produced more at random than by will.

Speech production is somewhat impaired by a short ligament of the tongue, that will be surgically corrected. This will hopefully help the child in his articulation of single words. At present, his tongue is comparatively immobile and he has difficulties forming any kind of consonantal speech sound, especially alveolar as he has trouble raising the tip of his tongue to the roof of his mouth. The only proper word he pronounces understandably at the age of 20 months is “*mamma*”, and articulation of the word “*pappa*” is not yet feasible.

As the boy grows his need of making himself understood increases. He makes use of prosodic cues in communicating with his family; by using intonation he tries to convey his intentions in his “utterances”, like when he is calling for his sister or protesting about something. As his verbal mean of communication is impaired and delayed, he often gets impatient and frustrated when failing to make himself understood. The parents has recently introduced sign supported Swedish which diminishes some of the boy’s frustration. With sign supported communication, speech is always used parallel with the signs, which facilitates comprehension of the message and promotes speech development. The boy can now make himself more readily understood, and is able to convey some of his basic needs to his parents.

Conclusion

As a consequence of the child’s congenital physical handicap, the mother’s interactive behavior seemed to increase. The child’s verbal production is impaired but steadily improving. Passive verbal language seems to be present, and an active form of verbal language with well articulated words will probably come in time as the physical impediments are attended to. Further collection and analysis of data will give hopefully valuable information of the linguistic development from a pathological perspective of language acquisition.

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