

# On the linguistic implications of context-bound adult-infant interactions

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## Abstract

This poster presents a study of the linguistic information potentially available in adult speech directed to 3-month-old infants. The repetitive nature of the speech directed to young infants and the ecological context of the adult-infant natural interaction setting are analyzed in the light of the “Ecological theory of language acquisition” proposed by Lacerda et al. (2004, this volume).

The analysis of transcripts of adult-infant interaction sessions suggests that enough information to derive general noun associations may be available as a consequence of the particular context of the adult-infant interactions during the early stages of the language acquisition process.

## 1. Introduction

In a natural face-to-face speech communication situation, competent speakers and listeners typically adjust to each other's communication needs, rapidly achieving an effective level of information exchange. This mutual adjustment is extremely flexible and encompassing possible idiosyncrasies on either the speaker's or the listener's side. For example, a speaker tends to raise spontaneously the intensity of the voice or hyper-articulate the speech sounds when talking to a hearing-impaired listener; a listener attending to a speaker that is perceived to have speech articulation problems automatically adopts top-down listening strategies to compensate for the speaker's production deficits. Similar adjustments are made by listeners and speakers communicating in other adverse conditions, like in noisy environments. An important aspect of this type of speech communication situations is that both the listener and the speaker perceive put their efforts on the exchange of information *per se*. Because both the speaker and the listener assume that they have common cognitive grounds on which to anchor the specific theme for that particular speech communication setting, there is a tendency to use a rich and varying linguistic repertoire. Finding alternative ways of conveying the essentials of the message may be an effective strategy under these circumstances. This is typically the case for adult speakers

but it is in sharp contrast with what can be assumed when the listener is an infant of about 3-months of age.

The speech communication situation in which an adult interacts with a young infant is radically different from the adult-to-adult communication because the adult does not assume that the infant has enough linguistic competence to understand the content of the spoken message. Indeed, infant-directed speech does present a situation that is nearly the opposite of that described for the adult-to-adult speech. In the case of infant-directed speech, the focus is mainly on the melody (Fernald, 1989) rather than on the linguistic content and the adult's main goal is to maintain the communication link *per se*, instead of attempting to convey an embedded linguistic message to the infant. And since the infant tends to show interest for the *form* of the message, the adult tends to respond with fairly repetitive patterns of speech that would hardly be used to communicate with an adult listener, even if the adult listener did not at all master the speaker's language.

To address the potential significance that the repetitive structure of the infant-directed speech may have for early language acquisition and to study how this may support the Ecological Theory of Language Acquisition (see also Lacerda et al. 2003), an analysis of the speech produced by Swedish mothers speaking to their young infants is in progress and will be illustrated in this poster with the results from one of the mothers.

## 2. Method

A Swedish mother was recorded in five sessions where she spontaneously interacted with her young infant. The audio recordings were segmented, labelled and transcribed orthographically.

### 1.1 Subject

The subject was a male infant (from 10 to 21 weeks old) and his mother. The infant has two older siblings.

### 1.2 Recording sessions

The mother was given a selection of toys whose names were non-sense words that had initially been defined by the experimenter. The mother was asked to introduce the

toys to her young infant, as spontaneously as possible. In the first two sessions the toys were dolls that were given the names “Kocka” [kʊka] and “Dappa” [dap:a]. In the third session new dolls were used and were now named Guffa [gʊfa] and Cyba [sy:ba]. In the last two sessions the mother was asked to show the infant how to solve a simple jigsaw puzzle. In the end of each session one of the experimenters entered the recording studio and a conversation with the mother about the toys that she had just used in the session.

### 1.3 Procedure

Two video cameras focused on the infant and on his mother were used. The images from the cameras were fed to a video mixer and combined in an image-on-image screen, where the image of the mother occupied most of the screen and that of the infant was placed on the upper left corner. The resulting image was recorded in a DVD recorder along with two audio signals picked up by a close-up microphone mounted on a head-set used by the mother, and by a microphone mounted on a tripod picking up the sound in the infant’s immediate neighbourhood.

### 1.4 Analysis of the recorded material

The speech material was segmented, labelled and transcribed orthographically. The present text refers only to part of the orthographic transcription was used in the analysis reported on this extended abstract. An excerpt of the 169 utterances produced by the mother in a session where she was presenting “Kocka” and “Dappa” to her 3 month-old infant is shown in the box below. To simulate that words in spoken utterances are not separated by pauses, within utterance words are simply concatenated and the spaces represent pauses between utterances.

ja hej hej kommerduihågdomhär kocka kommerduihågekocka kommerduihågekocka kommerduihågekocka jaskadukänna skadukännalite ochtittalite jadetvarkocka ja jatitta javilldubekantadiglitemed kocka skadukänna skadukännalite jagördet ja taupparmendå åhej jaa åhe-ja tittahärdetvarmedöronenförragängenkundeviviftapådom kommerduihågdet åsenvare varedappa kommerduihågdappaockså kommerduihågdappaockså kommerduihågdappamedögonendär aa litepåsidsanså skadukräkas nådetårbaraprutt jaoj eruhelt koncentreradpådinmagenujaaja ja hej hej hejgubben hejgubben kommerduihågden villduhellretittapåden påkocka ja ja årkockaroligare ändappa ellervilldupratamedmig va ojviftvift viftvift javemskaduhadå ingenavdom hm skaduhälsapåkocka hejhej beribomberibomberibombip

The search for recurrent sequences was performed according to the following principles:

1. Store any string that is delimited by a pause (i.e. all the available sequences)
2. Check if some of the stored strings also is included in other, longer, stored strings
3. Assume as lexical candidates any recurrent strings found in 2
4. Remove the lexical candidates (including matching substrings) from the current pool of stored strings and repeat the procedure from step 1 until no new lexical candidates are found.

## 3. Results and discussion

The recursive procedure described above selected the 31 potential lexical candidates shown in the next textbox,

a aa adär ärdukoncentrerad åvom beribomberibomberibombip dappa dukänkänna hardusett hej hejgubben hejhej hm ja jaa kandudet kanmandraiden kännaså kännaså kocka kommerduihågdappaockså kommerduihågden kommerduihågekocka oj påkocka så skadukänna skadukännalite titta va viftvift

which include the original target words. This happens because the target words are uttered repeatedly, both in isolation and in short sentence contexts. Applying the same procedure to the transcripts of the 290 utterances from the session on “Guffa” and “Syba” produced similar results, although in this case none of the potential 60 lexical candidates contains the isolated target words.

In accordance with the predictions of the Ecological Theory, the number of potential lexical candidates de-

a aa aldelesröda åssä bimbimbim där därkomguffatillbaks deeguffa den denhär dufårkänna edetenkråka eh eller fårkännapåsyba goddagoddaa hardusett hardusethär härkommersyba heej hej hejdante hejsan ja jaa jadamvarjättefina jaha jahardusett japrecis jättefinaögon javadärdet känn kanske mm nådetårinteriktigtbra ochtittadär oj ojoj ojojjoj ojojjojtittahär ojvadduviftar peipickpickpickpick pick pickpickpick pickpickpick så såja skadukänna skavi sybaochguffa titta tittadär tittahär va vadå vaeredante vilkentyckteduvarbäst villdu villdusepåguffaigen villduståuppliteså

tested by this procedure drops dramatically as the speech materials become more information-oriented. A possible mechanism leading to the establishment of probable sound-object links is can be viewed as a stochastic model that capitalizes on the synchronic multi-sensory information that is available to the infant (Lacerda, 2003). While there is no guarantee against “spurious” sound-object links derived by such a model, such “errors” are likely to be corrected either because they become exposed by the spontaneous (and erroneous) actions that the system (the infant) adopts based on its spurious sound-object links or because the systematic pressure underlying occurrences of sound-object associations forces a revision of the established links. The model may also be applied to the acquisition of verb-like concepts and initial emergence of syntactic structure, if adequate input variance is available.

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