

ADULT JUDGEMENTS OF INFANT VOCALISATIONS

Francisco Lacerda¹ and Tamiko Ichijima²¹Institute of Linguistics, Stockholm University, S-106 91 Stockholm, Sweden²Sofia University, Tokyo, Japan

ABSTRACT

In normal adult-infant interaction, adult listeners make spontaneous on-line judgements of the infants' vocalisations, providing the infant with immediate feedback. Thus, the adults' spontaneous judgements may influence the adult-infant communication because, if consistent, they implicitly assign "meaning" to the infants' vocalisations.

Although normal interaction is a two-way procedure — infant and the adult influence each other — the goal of this study was to assess how adults interpret infant vocalizations, *per se*. Adult listeners were requested to judge vocalizations that had been produced by infants living in the same or in a foreign ambient language. The results suggest that opening degree is the most consistent phonetic dimension conveyed by infant babbling.

INTRODUCTION

Adults do not expect pre-linguistic infants to produce accurate and intentional speech sounds. However, as the infant babbles, adults tend to provide interpretations for the vocalisations produced by the infant. This behaviour may generate a mutual feedback process that, in addition to contributing to the development of bounding between infant and adult, can provide relevant phonetic information to the infant. Since the infant's attention is directed to the adult's utterances, this adult-infant interaction offers potentially optimal conditions for the emergence of a communication code. To the extent that the adult is capable of providing a consistent labelling of the infant vocalisations, even a quasi-random vocalisation pattern will be suitable for the establishment of a vocalisation-based communicative code [1].

The issue of the adult's interpretation of infant vocalisations is not new. A number of phonetic studies have addressed this question, providing detailed phonetic descriptions of the early

stages of infant speech development [2-4]. From our point of view, however, accuracy in phonetic transcription is typically associated with a loss in the adults' response spontaneity. Phonetic transcriptions of babbling are difficult to achieve and usually demand repeated listening of recorded utterances along with strict inter-transcriber reliability criteria. Thus, to investigate the nature of the spontaneous feedback that the infant receives from the adult, we assessed the adult speakers' notion of the infant's articulatory vocalisation gesture. In this paper we report the main aspects of that study.¹

METHOD

To assess adult-infant interaction under controlled conditions, we extracted infant vocalisations from natural mother-infant interaction situations and presented them for spontaneous adult judgements. We assume that adult judgements produced in a speeded response paradigm are close to the immediate interpretation of infant vocalisations that the adult would provide normal interactive setting.

The study was designed to investigate possible cross-linguistic differences in the adults' perception of babbling. We do not expect infants to produce language-specific vocalisations during the early stages of babbling. At later stages the infant's vocalisations will eventually converge towards the sounds that are used in the ambient language. Thus, our prediction is that the adults' judgements of vocalisations produced during the first stages of babbling will tend to reflect the adults' native language. For vocalisations during later babbling stages we expect more consistent adult classifications.

¹ A paper with a complete procedural description and extensive discussion of the results is currently being prepared for publication.

Subjects

A group of 12 Swedish and 11 Japanese subjects participated in the experiments. The subjects were students of phonetics who had attended an elementary course in phonetics. Although these subjects are regarded as "non-expert", some degree of phonetic awareness was necessary to be able to estimate the tongue position on the arbitrary "frontness x heightness" space.

Stimuli

The infant vocalisations were extracted digitally from recordings of babbling made at the homes of two Japanese² and one Swedish infant. The recordings cover an age range from 17 to 78 weeks.

The stimuli for the perception test were randomly sampled among all the vocalisations that were free from noise or the mother's speech.

Procedure

Two sets of stimuli were created: a set of 107 vowel-like utterances that had been produced by the Japanese infant and a set of 150 utterances produced by the Swedish infant.

The stimuli were presented via AKG K135 headphones. To familiarise the subjects with the task, a training session was run before the test proper. The stimuli were presented in random order, in blocks of 5 stimuli and an ISI of 3.5 s.

The subjects estimated the infant's tongue position for each vocalisation. To reduce biasing with phonetic or orthographic symbols, the responses were marks of tongue position on an idealised 5x5 grid of heightness and frontness.

RESULTS

Japanese infants

Swedish listeners

The judgements of vowel height and frontness produced by Swedish adults when listening to Japanese infants are displayed as contours in figures 1a and 1b. The contours define regions of the hypothetical vowel space within which the subjects agreed in their judgements. The contours enclose areas of the vowel

space where the agreement among the adult subjects increases in 5% steps.

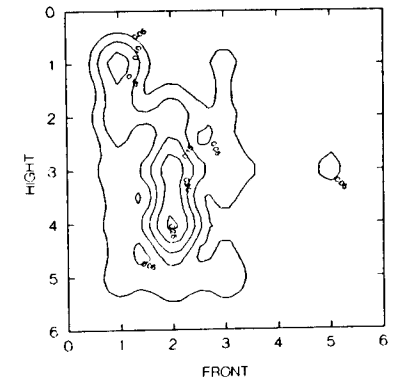


Figure 1a. Swedish listeners' judgements of tongue position. Japanese infant 4-8 months old.

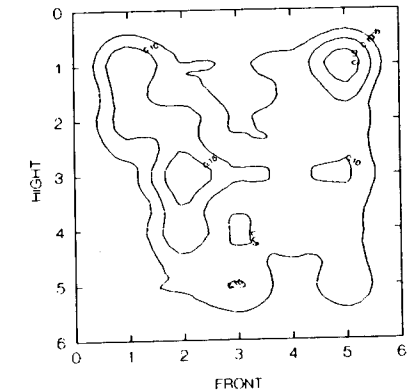


Figure 1 b. Same as fig.1a but for babbling produced at 19 months of age.

Japanese listeners

The judgements obtained from the Japanese listeners, when listening to the same babbling material are shown in figures 2a and 2b. The age groups are the same that were used in figures 1a and 1b.

² In the following we will not distinguish between the data from these two infants.

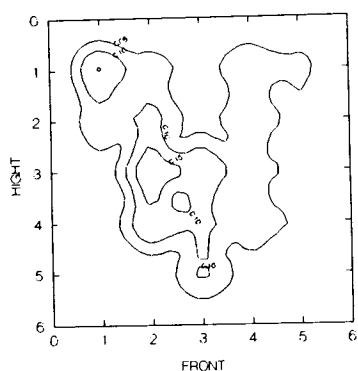


Figure 2a. Japanese listeners' judgements of tongue position. Japanese infant 4-8 months old.

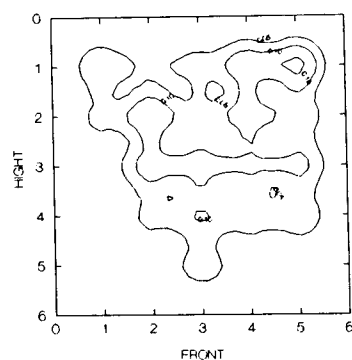


Figure 2b. Same as fig. 2a but for 19-months old Japanese infant.

Swedish infants Swedish listeners

The distribution of non-expert Swedish listeners' judgements of the babbling of a Swedish infant are displayed in figures 3a and 3b.

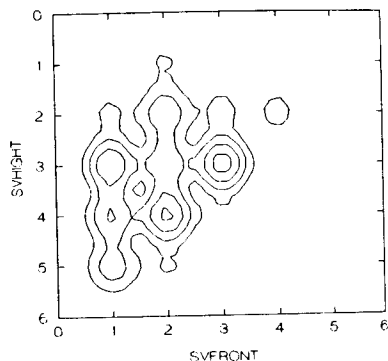


Figure 3a. Swedish listeners' judgements of tongue position. Swedish infant 4-8 months old.

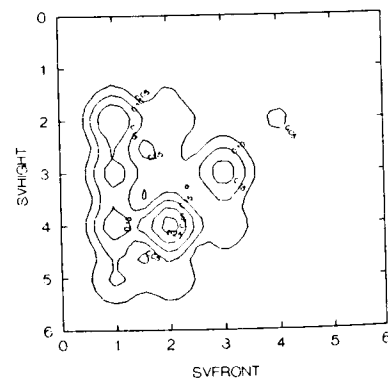


Figure 3b. Same as in figure 3a but for 9-18 months of age.

Japanese listeners

The distributions of the judgements of tongue height and frontness that were produced by the Japanese adults when listening to the babbling of the Swedish infant are shown in figures 4a and 4b. Also in this case the Japanese listeners judged the same stimuli that had been presented for the Swedish listeners.

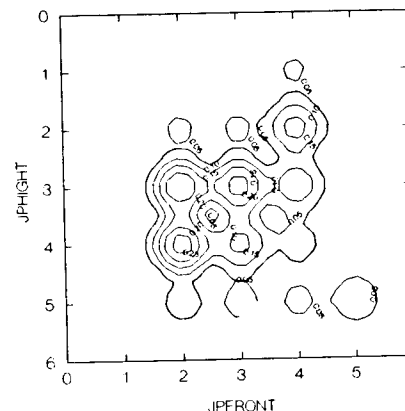


Figure 4a. Japanese listeners' judgements of tongue position. Swedish infant 4-8 months old.

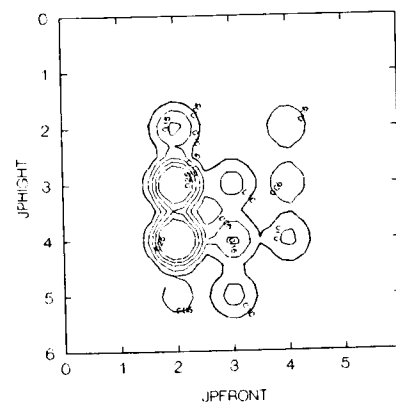


Figure 4b. Same as in figure 4a but for 9-18 months of age.

DISCUSSION

The results above are simply counts of the relative response frequency for each position on the frontness \times height chart. This statistic does not reveal response stability for specific infant utterances. Instead it provides a general indication of how consistent adults are. Vocalisations equally rated by the adult listeners increase response frequency at that location in the grid. Following this line of reasoning, the data suggests that adults tend to be more consistent in tongue

height judgements of early babbling and that consistency in frontness tends to appear only for later babbling, produced between 9 and 19 months.

The response pattern of the Japanese listeners tends to be more consistent than that of the Swedes in the use of frontness. This may be a reflection of the typological differences between the Japanese and the Swedish adult vowel systems.

Finally, there seems to be an indication of continuity in the judgements produced for babbling from the early and the later developmental stages. The islands of consistency observed up to 8 months tend to be still present in the later, in spite of its increased diversity.

CONCLUSIONS

This study suggests that adults may provide consistent feedback on degree of vowel opening for early babbling vocalisations. Consistency in degree of frontness appears only for later babbling.

ACKNOWLEDGEMENT

We would like to thank Lise-Lotte Roug-Hellichius and Ingrid Landberg for giving us access to the Swedish babbling data and to Christin Andersson for preparing the perception tests. We also would like to thank the students who participated in the perception tests.

Research supported by grant 90-0150 from The Bank of Sweden Tercentenary Foundation and by Fukutake Publisher.

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