Development of tone perception and tone production in Cantonese-learning children aged 2 to 5 years

Valter Ciocca 1, Vivian W.-K. Ip 2

1 School of Audiology and Speech Sciences, University of British Columbia, Vancouver, Canada
2 Department of Speech & Hearing Sciences, University of Hong Kong, Hong Kong

vciocca@audiospeech.ubc.ca, vetir@yahoo.co.uk

Abstract

The development of lexical tone perception and production was investigated in sixty normally developing Cantonese-speaking children (aged 2 to 5 years). Overall, the accuracy of tone identification improved from 2 to 5 years of age. Children’s production of lexical tones was measured through phonetic transcriptions. A particular tone was judged to have been acquired when transcription accuracy was 90% or better. On the basis of this criterion, the acquisition of tone production was completed by 4 years of age.

Index Terms: tone perception, tone production, development

1. Introduction

Previous studies had mapped the development of tone perception in Cantonese at 3, 4 and 6 years of age [1],[2]. The first goal of the present study was to extend these findings by focusing on tone perception during the preschool years (between 2 and 5 years of age). The second goal was to study the development of tone production within the same age range, and to test previous claims about the early acquisition of the Cantonese tonal system [3].

2. Method and Results

2.1. Method

Sixty normally developing children took part in the study; they belonged to one of four age groups (2;0-2;11, 3;0-3;11, 4;0-4;11 and 5;0-5;11). All children took part in a tone identification and a tone production task. The same visual stimuli (sixteen pictures of concrete objects) and the corresponding monosyllabic target words, including the six contrastive tones used in the Cantonese spoken in Hong Kong (High-Level, HL; Mid-Level, ML; Low-Level, LL; High-Rising, HR; Low-Rising, LR; Low-Falling, LF), were used in both tasks. The tone production task was carried out prior to the tone perception task to ensure the children were familiar with the target words and their corresponding pictures.

2.1.1. Tone identification task

Following a familiarization session, children were asked to name the words corresponding to each picture (presented in random order). A total of 32 target words (two productions of each target word) were recorded on a minidisk for each child. Two expert judges transcribed the utterances produced by 28 children. Point-to-point inter-rater reliability was 88%.

2.1.2. Tone identification task

This task was identical to the one used by [1] and [2]. In each block, children were asked to select one out of two pictures presented on a computer screen after listening to one target word within a carrier phrase. Picture pairs represented eight minimal-pair tonal contrasts. No feedback was given after a response. A male native speaker of Cantonese produced the target words.

2.2. Results

Identification performance was above chance level for all tone contrasts for the 4 and 5 years old groups. At 2 years of age, performance was at chance level for all but three contrasts (HL-ML, HL-LH, HL-HR) tone. Three years old children identified two contrasts (HR-LR and LR-LL) at chance level. By age 4, all contrasts were identified above chance but performance improving between ages 4 and 5 (contrasts HL-ML, LF-LR, and HL-HR).

For the tone production task, a tone was considered to be acquired if perceptual accuracy was 90% or above for a given age group. Based on this criterion, tones HL and ML were acquired by age 2; tone LL was acquired at 3 years of age. All tones were produced with 90% or better accuracy at age 4.

3. Conclusions

The pattern of tone identification results was consistent with previous findings [1],[2]. The results support the idea that tone perception develops throughout childhood, and that the rate of acquisition is inversely related to the similarity in the fundamental frequency patterns between tones (slower acquisition for more similar tones).

Tone production findings showed that tone production ability improved from 2 to 4 years of age. These results are in contrast with previous reports that the Cantonese tonal system is fully acquired by age 2.

4. Acknowledgements

Research conducted in partial fulfillment of the second author’s requirements for the BSc Speech & Hear. Sc., University of Hong Kong. We would like to thank the children who participated in the study, their families and their kindergarten principals and teachers for their support. Financial support provided by the R.G.C. of the Hong Kong S.A.R., grant no. HKU 7224/03H.

5. References