

Acoustic characteristics of onomatopoetic expressions in child-directed speech

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Abstract

The purpose of this study was to identify preliminary acoustic and phonological characteristics of onomatopoetic expressions (OE) in Swedish child-directed speech. The materials on one mother interacting with her 4-year-old child were transcribed and used for pitch contour measurements on OE. Measurements were also made on some non-onomatopoetic expressions to be used as controls. The results showed that OE were often composed of CV or CVC syllables, as well as that the syllables or words of the expressions were usually reduplicated. Also, the mother's voice was often modified when OE were used. It was common that the quality of the voice was creaky or that the mother whispered these expressions. There were also changes in intonation and some of the expressions had higher fundamental frequency (f_0) as compared to non-onomatopoetic expressions. In several ways then, OE can be seen as highly modified child-directed speech.

Introduction

The video materials analyzed in the current study were collected within a Swedish-Japanese research project: A cross language study of onomatopoetics in infant- and child-directed speech (initiated 2002 by Dr Y. Shimura, Saitama Univ., Japan & Dr U. Sundberg, Stockholm Univ., Sweden). The aim of the project is to analyze characteristics of onomatopoetic expressions (OE) in speech production of Swedish and Japanese 2-year-old and 4-to 5-year-old children, as well as in the child-directed speech (CDS) of their mothers.

The aim of the current study is to explore preliminary acoustic and phonological characteristics of OE in Swedish CDS. Therefore an analysis of pitch contours, and syllable structure in OE of a mother talking to her 4-year-old child was carried out. Japanese is a language with a rich repertoire of OE in CDS, as well as in adult-directed speech (ADS). The characteristics and functions of OE in Japanese are rather well investigated. The current study aims to somewhat fill in that gap in Swedish IDS.

Background

Onomatopoetic expressions (OE) may be defined as a word or a combination of words that imitate or suggest the source of the sound they are describing. Common occurrences include expressions for actions, such as the sound of something falling into water: *splash* or a characteristic sound of an object/animal, such as *oink*. In general, the relation between a word-form and the meaning of the word is arbitrary. OEs are different: a connection between how the word sounds and the object/action exists.

OE are rather few in human languages. In some languages, such as Japanese, OE are though frequent and of great significance (Yule, 2006). In Japanese there are more than 2000 onomatopoetic words (Noma, 1998). These words may be divided in categories, such as "Giseigo" – expressions sounds made by people/animals (e.g. *kyaakyaa* 'a laughing or screaming female voice with high f_0 '), "Giongo" – expressions imitating inanimate objects in the nature (e.g. *zaazaa* 'a shower/lots of raining water pouring down'), and "Gitagio" – expressions for tactile/visual impressions we cannot perceive auditorily (e.g. *niyaniaya* 'an ironic smile'). Furthermore, plenty of these words are lexicalized in Japanese (Hamano, 1998). Therefore, non-native speakers of Japanese often find it difficult to learn onomatopoetic words. The unique characteristics of onomatopoetic words are also dependent on specific use within diverse subcultures (Ivanova, 2006).

Method

Video/audio recordings of mother-child dyads were collected. The mothers were interacting with their children by using Swedish/Japanese fairy tale-books as inspiration of topics possibly generating use of OE. The mothers were thus instructed not to read aloud the text, but to discuss objects/actions illustrated in the books.

Materials

The materials were two video/sound recordings of one mother interacting with her 4-year-old

child. The first recording (app. 4 min.) was based on engagement in two Japanese books and the other recording (app. 4 min.) was based on engagement in Pippi Longstocking. The mother uttered 65 OE within these recordings.

Analysis

The speech materials were transcribed with notations of stress and f_0 along a time scale of 10 sec. intervals. Pitch contour analysis of OE (such as *voff* 'bark'), and non-onomatopoeic words corresponding to the object/action (such as *hund* 'dog') was performed in Wavesurfer.

Results

The results showed that the mother's voice quality was more modified, using creaky/pressed voice, whispering and highly varying pitch as compared to non-onomatopoeic words in CDS. The creaky voice was manifested by low frequencies with identifiable pulses.

OE such as *nöff* 'oink', *voff* 'bark', *kvack* 'ribbit' and *mjau* 'meow' were often reduplicated. Further, the OE were frequently composed of CVC/CVCV syllables. If the syllable structure was CCV or CCVC, the second C was realized as an approximant/part of a diphthong, as in /kwak:/ or /mjau/. Every other consonant, every other vowel (e.g. *vovve*) was typical.

The non-onomatopoeic words chosen for analysis had f_0 range 80-274Hz, while the OE had f_0 range 0-355Hz. OE thus showed a wider f_0 range than non-onomatopoeic words.

The interaction of the mother and the child was characterized by the mother making OE and asking the child: *How does a...sound like?* The child answered if she knew the expression. If the child did not know any expression – such as when the mother asked: *How does it sound when the sun warms nicely?* – she simply made a gesture (in this case a circle in the air) and looked at the mother. In the second recording the mother also asked questions on what somebody was doing. For example, several questions on Pippi did not directly concern OE, but were of the kind: *What do you think ... is doing?*

Concluding remarks

Presumably due to the fact that Swedish does not have any particular OE for e.g. how a turtle sounds, the mother made up her own expressions. She asked her child how the animal might sound, made a sound, and added *maybe* to express her own uncertainty. Sometimes

when the lack of OE was apparent, such as in the case of a sun, the mother rather described how it feels when the sun warms, *haaaa*. Alternatively, the mother used several expressions to refer to the same animal, such as *kvack* and *ribbit* 'ribbit' for the frog, or *nöff* 'oink' and a voiceless imitation of the sound of the pig.

Among some of the voiced OE a very high f_0 was found, e.g. over 200 Hz for *pippi*. But since plenty of the expressions were voiceless, general conclusions on pitch contour characteristics are hard to make.

The OE uttered with creaky voice had a low f_0 between 112-195Hz. Substantially more of the OE were uttered with creaky voice as compared to non-onomatopoeic words in CDS.

The OE used by the mother were more or less word-like: *nöff* 'oink' is a word-like expression, while the voiceless imitation of the sound of a pig is not.

All the OE had a tendency to be reduplicated. Some were more reduplicated than others, such as *pipipi*, reflecting how one wants to describe the animal, as well as that *pi* is a short syllable easy and quick to reduplicate. Similarly, reduplicated *voff* 'bark' was used to refer to a small/intense dog, rather than to a big one.

In summary, OE contain all of the characteristics of CDS – but more of everything. Variations in intonation are large; the voice quality is highly modulated. Words are reduplicated, stressed and stretched or produced very quickly. OE are often iconic and therefore easy to understand – they explain the objects via sound illustrations by adding contents into the concepts. It can be speculated that OE contribute to maintain interaction by – likely for the child appealing – clear articulatory and acoustic contrasts.

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References

- Hamano, S. (1998) The sound-symbolic system of Japanese. CSLI Publications.
- Ivanova, G. (2006) Sound symbolic approach to Japanese mimetic words. Toronto Working Papers in Linguistics 26, 103.
- Noma, H. (1998) Languages richest in onomatopoeic words. Language Monthly 27, 30-34.
- Yule, G. (2006) The study of language, Cambridge University Press, New York.