

PERCEPTION OF FOCUS IN STRESS ACCENT LANGUAGE (GERMAN) AND NON-STRESS ACCENT LANGUAGE (JAPANESE)

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ABSTRACT

Japanese is a language with lexical 'pitch accent,' and German with a 'stress accent.' The present study investigated the characteristics of production and perception of stress patterns in German SVO sentences by Japanese learners.

In the 'object-focused' utterance produced by German subjects, the pitch level of the object noun was found to be generally higher than that of the subject noun. Japanese subjects also emphasized the object, but the pitch level of the object was still lower than that of the subject.

However, in the perceptual experiment, Japanese gave higher rates of correct responses to the 'object-focused' utterance than native speakers.

These results suggest that Japanese learners of German produce the focus in German sentences with pitch cues which are sufficiently high for Japanese speakers but not for native speakers of German.

INTRODUCTION

The fundamental frequency (Fo) is an important acoustic correlate of word accent in many languages, especially in Japanese, which has lexical 'pitch accent.' There are several studies which claim that Fo contour plays the most important role in realizing word accent even in 'stress accent languages' including German [1]. It is also believed that each language has a language-specific Fo realization. In fact, when native speakers of Japanese learn 'stress accent languages' such as English

and German, they frequently have trouble producing the focus in a sentence. Their utterance sound monotonous, and the focus in sentences is not produced with clear prominence.

To understand the differential role of pitch pattern in the realization of focus in German and Japanese, the production and perception of German utterances were compared between native and non-native speakers of German.

ANALYSIS OF PITCH PATTERN

Before conducting a perceptual experiment, a preliminary acoustic analysis of the pitch patterns produced by 6 German subjects and 11 Japanese subjects was performed.

Fig. 1 shows the utterances produced by a native male speaker of German. He produced 'neutral' utterances without any marked local pitch peak representing a word accent. When the focus was introduced, the highest pitch peak in each sentence coincided with the stressed syllable of the focused word. These characteristics were obtained in all series of utterances produced by native speakers.

In contrast, all the Japanese subjects produced neutral utterances with local pitch peaks which were similar to that of focused words produced by German subjects. The pitch peak for the object noun was generally lower than that for the subject. When the focus was put on the subject, the pitch peak for the subject word was the highest in the entire

utterance. On the other hand, if the focus was put on the object, the pitch peak for the object noun was enhanced but was still lower than that for the subject. Thus, in these cases, the highest pitch peak in the utterance did not coincide with the position of focus. Fig. 1 shows an example of the utterances produced by a male Japanese subject as well.

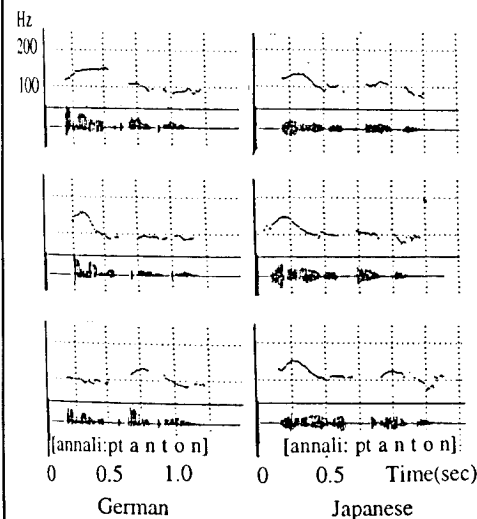


Fig. 1 Example of F₀ contour for the utterances of "Anna liebt Anton." produced by a German male subject, and a Japanese male subject. Top row, 'the neutral utterance'; middle row, focus on the subject noun; bottom row, focus on the object noun.

PERCEPTUAL EXPERIMENT

A perceptual experiment on the identification of focused words was performed, with test stimuli with different pitch patterns constructed by editing natural speech.

Speech samples

The speech samples used were simple SVO sentences: "Anna liebt Anton." and

"Anton liebt Anna." with seven different pitch patterns. Test stimuli were constructed by editing natural speech using a High-Speed Speech Analysis System on a personal computer [2].

Natural SVO utterances with differing positions of focus (the 'neutral' utterance, focus on the subject word, and focus on the object) were produced by a male and a female native speakers of 'standard German.' The utterances were divided between SV and O. These SV and O sequences from different utterances were combined to construct seven speech samples; Stimulus (S) 1 to stimulus 7 (S1 to S7), in which the relative levels of pitch in the SV and O sequences were varied. (Fig. 2)

Subjects

There were two groups of German subjects and two of Japanese: 7 native speakers of German and 30 Japanese university students who were learning German. Three of the native speakers were German teachers, and four were German university students living in Japan who did not major in linguistics. Eight of the Japanese subjects were advanced learners of German. They were graduate students, who had studied in Germany for more than one year, and therefore had many chances to speak German. The remaining twenty-two were undergraduate students who had learned German as a second foreign language for one or two years and considered as beginners in German.

Method

The subjects received two series of the stimulus sounds; one series from a male speaker, and another from a female speaker. Each series was composed of five trials. In each trial, 14 stimuli were presented in random order (seven types of stimuli: S1-S7 for each of the two sentences, "Anna liebt Anton." and "Anton

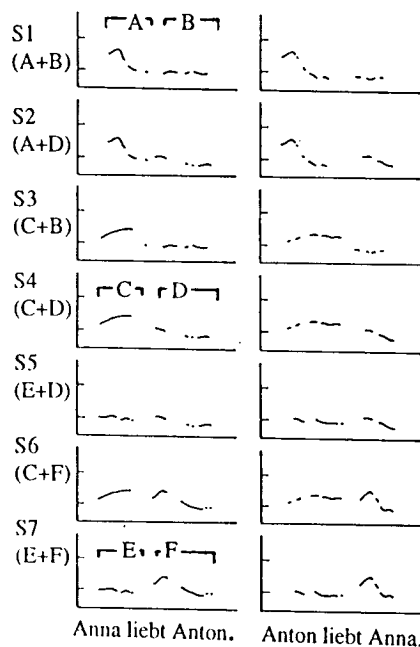


Fig. 2 Stimuli for the perceptual experiment. S1, S4, and S7 were the natural utterances. S2, S3, S5, and S6 were the cross-spliced speech samples as indicated above.

liebt Anna."). Thus, the subjects were presented with 70 stimuli in total for a series of stimuli produced by one native speaker. The subjects were instructed to mark on an answer sheet whether 'Anna' or 'Anton' sounded like the focus of the sentence. They were told to mark as quickly as possible after hearing a stimulus, even if they could not be certain of the position of focus.

RESULTS

Fig. 3 shows the result of the perceptual experiment. There was no significant difference in the responses regardless of the sentences used or the stimuli produced by a male or a female speaker.

As shown in Fig. 2, the relative pitch

level of the object became higher in the order of the seven stimuli: S1 - S7. Fig. 3 confirms that the rate of 'object-focused' judgments tend to increase in this order both for the German and the Japanese subjects.

The German teachers responded almost perfectly to the natural utterances. The rate of correct response to S1 (the 'subject-focused' natural utterance) and S7 (the 'object-focused' natural utterance), was 100% and 95%, respectively.

Compared with the German teachers, German students showed lower rates of correct responses to S1 and S7, namely 81% and 70%, respectively. Naive subjects did not always perfectly judge the position of focus in the natural sentences, even though they were native speakers.

In the case of Japanese subjects, the rate of correct response to S1 by the beginners was 79%, which was similar to that of German students. Unexpectedly, the rate of 'object-focused' judgement to S7 was as high as 94%, which was higher than that of German students.

The advanced learners gave differential responses relative to the beginners. The rates of correct responses were 91% for S1, and 95% for S7, which were nearly the same as those obtained in the German teachers. Language learning might be responsible for the higher rates of correct responses by the advanced learners than those of beginners.

In addition, the rate of 'subject-focused' judgement by the advanced learners for S4, the neutral utterance, was 87%, and this was also higher than that of beginners. For S4, the rate of 'subject-focused' judgements by German teachers was 66%. The rate of 'subject-focused' judgements by advanced learners was higher than that by German subjects.

DISCUSSION

In the present study, Japanese subjects were found to produce un-focused words

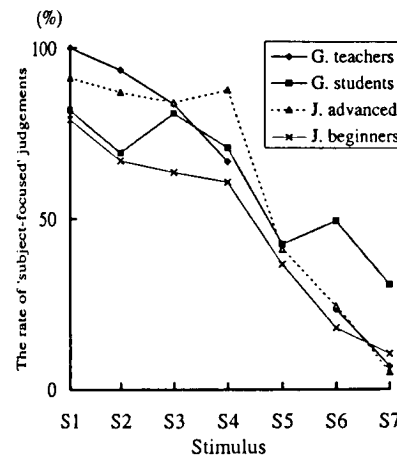


Fig. 3 Judgements of the position of focus. Each value shows the mean percentage of 'subject-focused' judgements by each subject group. (S5 was not included in the experiment for German teachers)

with local pitch peaks in such a way as German subjects pronounced focused words. At the same time, in the object-focused utterance, the highest pitch peak in a whole sentence did not coincide with the position of focus.

These characteristics were in agreement with those of Japanese prosody. In Japanese sentences, all content words show the pitch peak representing the word accent nuclei, and the pitch peak of the first content word is considerably higher than that of the second. When the focus is put on the second content word, enhancement of the local pitch peak and suppression of the pitch level in the rest part of the sentence are not so large as that in German. Consequently the pitch level of the second content word is not always the highest in the sentence.

It was also found that in the perceptual experiment, Japanese subjects had a tendency to show a higher rate of 'object-focused' judgements for S6 and S7 than the naive native speakers, in which the

relative pitch level of the object word was higher than that of the subject. It appears that Japanese subjects tend to recognize the object word as 'marked', if the relative pitch level of the object word becomes a little higher, and they identify it correctly. This can be also explained by the characteristics of Japanese utterance with regard to small pitch change accompanying the focus.

Another point to be noted was that the rate of the 'subject-focused' judgment for S4 by advanced learners was much higher than that of German subjects. This phenomenon might be interpreted as an over-generalization response in the process of learning that the pitch level of the subject noun relative to the object in S1 was signaling the position of focus.

It seems that the inability of Japanese subjects to produce sufficient prominence for focus in German is not because they cannot perceive the German stress. Rather, these results suggest that Japanese learners of German produce focus in German sentences with pitch cues that are sufficiently high for Japanese speakers but not for native speakers of German.

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