

## A Study on Production and Perception of Focus in German by Japanese Learners

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### Introduction

The fundamental frequency (Fo) is the important acoustic correlate of word accent in many languages such as, for example, 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 (Isacenko & Schädlich, 1966). However, 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 utterances sound monotonous, and the focus in sentences is not produced with clear prominence.

To understand the 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 were compared.

### Analysis of Pitch Pattern

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

Fig. 1 shows 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.

The second subject had a smaller pitch inflection range. But the highest pitch peak in each sentence coincided with the stressed syllable of the focused word. The third had a great range of pitch inflection. He showed a local pitch peak representing word accent even in neutral utterances. When the focus was put on a word, the pitch peak on the focus was enhanced and the local pitch peak for unfocused words was suppressed. For this subject also, the highest pitch peak in each sentence coincided with the stressed syllable of the focused word.

In contrast, all three Japanese subjects produced neutral utterances with local pitch peaks corresponding to word accent. The pitch peak for the object noun was generally lower than that for the subject noun due to declination and/or downstep. When the focus was put on the subject, the pitch peak for the subject word was the highest in the entire utterance. However, when the focus was put on the object, the pitch peak for the object word was enhanced but was still lower than that for the subject word. 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.

## Perceptual Experiment

### 1. Speech samples

The speech samples used were simple SVO sentences: "Anna liebt Anton" and "Anton liebt Anna" with 6 different pitch patterns. Test stimuli were constructed by editing natural speech using a High-Speed Speech Analysis System on a personal computer (Imagawa 1989).

Natural SVO utterances with differing positions of focus were produced by a female native speaker of German, who spoke 'standard German' ('Hochdeutsch'). The utterances were divided between the V and the O. These SV and O sequences from different utterances were combined to construct a set of speech samples in which the relative levels of pitch in the SV and O sequences were varied. (Fig.2)

### 2. Subjects

The subjects were three native speakers of German (D1-D3) and 12 Japanese college students (J1-J12) who were learning German as a first or second foreign language. Three of the Japanese students (J1-J3) were graduate students, who had studied in Germany for more than one year. They usually had a lot of chances to speak German. Four (J4-J7) were also graduate school students majoring in German literature or linguistics, but who had never been to a German-speaking countries. The remaining five (J8-12) were undergraduate students who had been learning German as a second foreign language for one or two years.

### 3. Method

Each subject received a series of five trials. In each series, 12 stimuli (6 types of stimuli: S1-S6) were presented in random order. Thus, each subject was presented 60 stimuli in total. They 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.

### 4. Results

As can be seen in Fig. 2, the relative pitch level of the object becomes higher in the order of the stimulus 1 to 6 (S1 to S6). Fig. 3 confirms that the number of 'object-focused' judgments increased in this order both for the German and the Japanese subjects.

In the case of the German subjects, the 'subject-focused' and 'object-focused' judgments were nearly the same at stimulus 4 (S4), the natural neutral utterance. Namely, their judgments showed a chance level at S4. In contrast, the beginners (J8-J12) and intermediate learners among the Japanese subjects (J4-J7) responded more sensitively than the German subjects to the rise in the pitch level in the O. (There was no significant difference between the group J4-7 and group J8-12.) In other words, when the stimulus was varied from S1 to S6, the judgements of the Japanese as 'subject-focused' decreased more rapidly than for the German subjects. Consequently, for stimulus 4, the 'subject-focused' judgments were less than 50 %.

Another point to be noted from Fig. 4 is that in the case of advanced learners, it was around S5 or S6 that the number of 'subject-focused' judgments and 'object-focused' judgments were nearly equal. This phenomenon may be interpreted as showing an overreaction response.

## Discussion

In the present study, it was found that in utterances of the Japanese subjects, the highest pitch peak in a whole sentence does not coincide with the position of focus when the object word is focused. It was also found that in the perceptual experiment that Japanese subjects, except for advanced learners, tend to give a 'object-focused judgment', even if the relative pitch level of the object word is lower than that of the subject word.

These results suggest that Japanese learners of German produce focus in German sentences with pitch cues which are sufficiently high for Japanese speakers but not for native speakers of German. Such utterances could cause confusion for German speakers in the perception of the position of focus. These phenomena can be considered as originating from the basic differences in the pattern of the realization of word accent between 'stress accent languages' and 'pitch accent languages'.

## References

- Altmann, H. (1988b) *Intonationsforschungen*, Max Niemeyer, Tübingen  
 Isacenko, A.V. & H.J. Schädlich (1966) *Untersuchungen über die deutsche Satzintonation*, Studia Grammatica 7

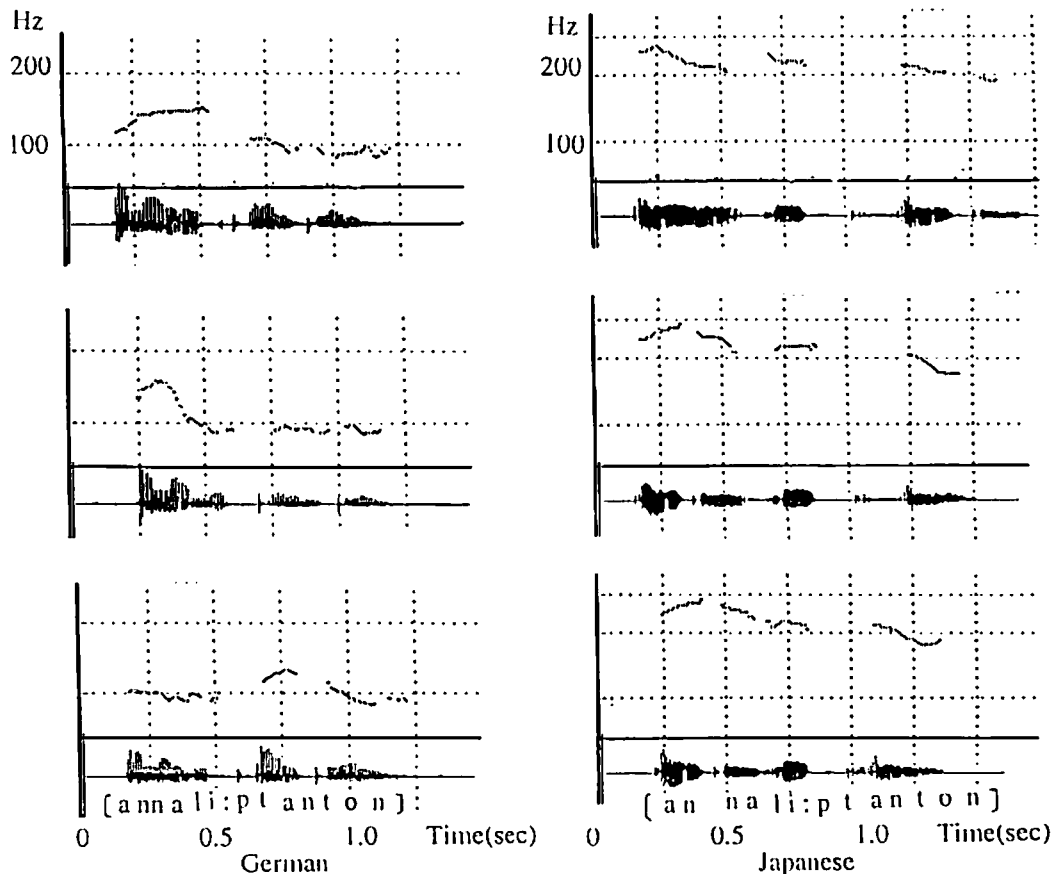


Fig. 1 Examples of F<sub>0</sub> contour for the utterances of "Anna liebt Anton" produced by a German (male) and a Japanese (female).

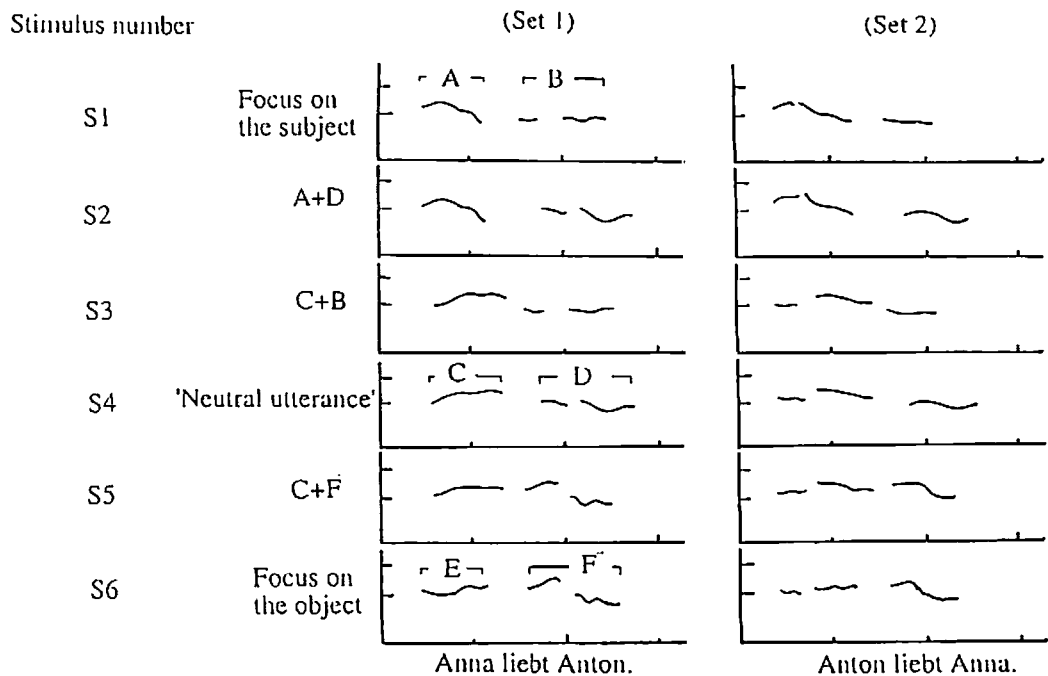
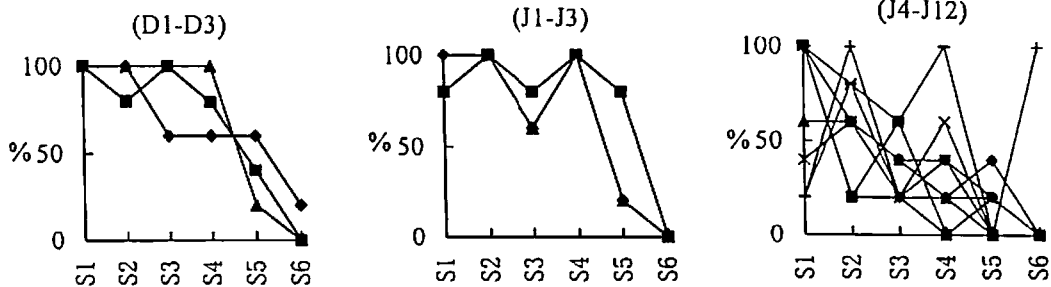


Fig.2 Stimuli for the perceptual experiment. S1, S4, S6 were the natural utterances. S2, S3, S5 were the cross-spliced speech samples as explained in the figure.

Set 1: Anna liebt Anton.



Set 2: Anton liebt Anna.

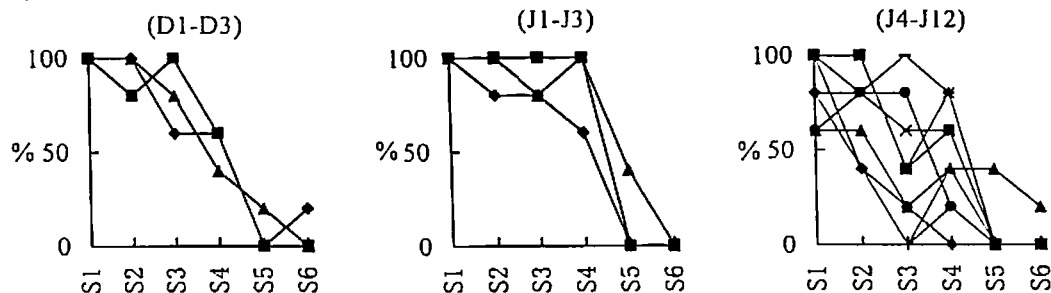


Fig.3 Results of the perceptual test. The ordinate shows the percentage of 'subject-focused' judgments.