

The Influence of Acoustic Factors on the Communication of ‘Importance’ in Speech

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Abstract – The present study investigated how the manipulation of pauses, as well as the manipulation of the intensity level across sentences influence the listeners’ understanding of the intended message in their native language. Longer pauses (especially preceding pauses) result in a change in the perception of emphasized speech, and are thus an important cue for detecting ‘importance’. Further, louder speech is perceived as more important. These results indicate that the manipulation of acoustical cues has a significant role in the communication of importance.

Keywords: pause duration, intensity level, communication of ‘importance’

1. Introduction

It is often assumed that the main predictor for focus in speech is the change in the pitch accents. However, perception experiments with manipulated speech (Streefkerk *et al.*, 1997) that investigated the effect of the acoustic correlates on the perception of emphasis, report that even when the pitch was manipulated and kept monotone across the sentences, listeners were still able to mark consistently some of the emphasized words. In light of this, it is of high interest to investigate which acoustic cues are responsible for the detection of importance. We assumed that pauses (especially in Japanese, where pauses (Ma) have a special cultural value) and also the intensity level have a considerable influence on the perception of emphasis, and therefore we proposed a perception experiment that manipulated only the duration of the pauses, or the intensity level, in order to investigate how the manipulation of vocal cues influences the listener’s understanding of the intended message.

2. Method

2.1 Stimuli

The material used as stimuli consisted of a text structured into an introductory sentence and five

Table 1. Text

Introductory Text	面接を受ける時に、重要な事柄がいくつかあります。思いつくままにいますと次のような項目をあげることができます。	Order	Order
Sentence 1	適切な服装をすること。	1	3
Sentence 2	丁寧な話し方をすること。	2	4
Sentence 3	質問の意味を十分に理解すること。	3	1
Sentence 4	よく考えて答えること。	4	2
Sentence 5	身振りやリアクションに注意すること。	5	5

sentences presented in varied order. The material was presented in Japanese (Table 1). The speeches were delivered by one speaker selected for the clarity of her pronunciation (the speaker was relatively trained in speech delivery. Each stimulus was about 15-20 seconds long.

2.2 Subjects

95 undergraduate students (16 females, 79 males) of Osaka University participated in the experiment to fulfil a requirement in an introductory course in Psychology. The participants were all Japanese native speakers with a mean age of 19 years.

2.3 Procedure

The experiment consisted of 14 conditions, corresponding to the various manipulations of the duration of pauses between sentences and of the intensity level across sentences. Initially, all the pauses between sentences were made equal in duration (1.1sec.), and the intensity level across each sentence constant (76dB(A)) – ‘equal pauses, equal level’. Further, the preceding pause of one sentence in the text was lengthened by 0.44sec. while the other acoustic factors were kept constant (the amount of increase was based on previous speech delivery experiments which showed that the pauses before and after the most

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important sentence are 1.4 times longer than the pauses preceding and following unimportant sentences) – ‘pre-pause+’. Similarly, the pause following a sentence was lengthened by 0.44sec, while the other factors were kept constant - ‘post-pause+’, then the pauses preceding and following one sentence were increased in duration by 0.44sec. – ‘pre-pause+, post-pause+’; further, the intensity level (L_{Aeq}) across one sentence was increased with 3.8dB(A) while the duration of the pauses was kept constant – ‘level+’. The 14 experimental conditions consisted of 2 ‘equal pauses, equal level’ speeches, 3 ‘pre-pause +’ speeches, 3 ‘post-pause +’ speeches, 3 ‘pre-pause +, post-pause +’ speeches, and 3 ‘level +’ speeches. The material was created using a Professional Digital Audio Editor (Sound Forge 5.0), and played back using a Toshiba Dynabook E7/518CME computer and loudspeakers. The level of the stimuli was set so that the peak level in the center of the room (measured with a RION Sound Level Meter NA-20) would reach 70dB(A). The subjects were instructed to listen to the speeches and judge which was the sentence that the speaker emphasized as the most important, and to assess on a 7-point scale how natural the speech sounded.

3. Results and Discussion

The results indicated that the manipulation of pause durations and intensity level within speech have a significant effect on the subjects’ perception of emphasis. This effect was assessed comparing the percentage of the subjects that chose the manipulated sentence as the most important with that of the subjects that chose the respective sentence as emphasized when these acoustic factors were kept constant (Table2).

Table 2 Choices for the ‘Important’ Sentence (%)

	Equal pause	Pauses	Difference(%)
Pre-pause+	27.368	29.912	2.543
Post-pause+	24.385	26.578	2.192
Pre-pause+,post-pause+	25.614	27.368	1.754
Level+	25.61	71.57	45.96

As predicted, the manipulation of pauses represent a cue for the listener that the respective sentence is important, the preceding pauses being particularly considered (Fig.1, Fig.2, Fig.3). However, other factors such as the subjects’ personal opinion regarding the importance of the contents of the sentences, as well as how natural the speeches sounded, may also influence the perception of ‘importance’. Further, the significant increase in the subjects’ choice for the louder sentence as the most important shows that the intensity level of a sentence

represents a salient cue for the detection of important messages (Fig.4).

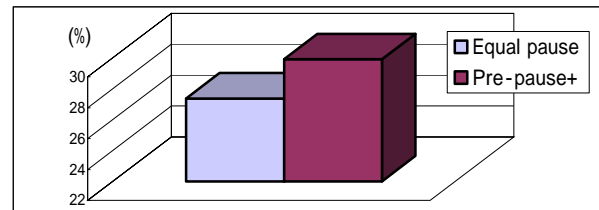


Fig. 1 Changes in the subjects’ choices for the ‘important’ sentence when the preceding pauses were manipulated.

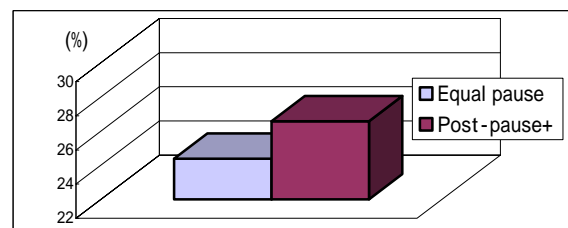


Fig.2 Changes in the subjects’ choices for the ‘important’ sentence when the following pauses were manipulated.

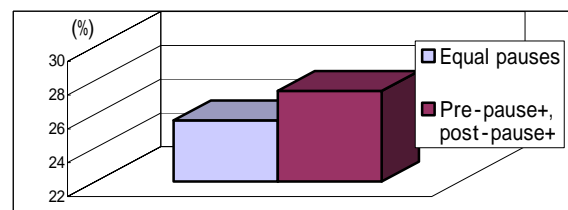


Fig. 3 Changes in the subjects’ choices for the ‘important’ sentence when the preceding and following pauses were manipulated.

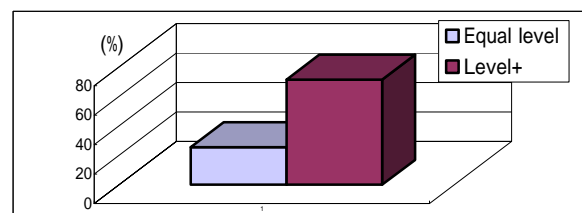


Fig. 4 Changes in the subjects’ choices for the ‘important’ sentence when the intensity level was manipulated.

These results indicate that the manipulation of the preceding and/or following pauses, as well as the manipulation of the intensity level, plays a significant role in the communication and perception of importance in speech.

References

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