

INTERACTION BETWEEN VOWELS AND CONSONANTS

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In carrying out Computer-Assisted Pronunciation-Hearing Tests* the evaluators have observed that there are some significant interrelationships between vowels and consonants in sequence. The present Test System, however, treats initial and final clusters (C_i , C_f) and vowels (V) in monosyllabic words as independent factors which contribute to the difficulty of a word. That is, it prepares test items without taking into consideration the interactions between C_i / C_f and V and it provides no information about such interaction in test results.

In March and April this year, we carried out an exploratory experiment with six junior high school students in order to find some effective principles for preparing proper training programs based on the results of the present Test System. First, we conducted the regular tests using the present Test System with six subjects (First Test) and then followed up with a process we will call Re-test Training.

This second process was carried out as follows. On the basis of the test, "suspicious segments" (i. e. segments hypothesized to be the cause of difficulty for each student) were selected. The students were re-tested and trained on all "problematic WF's" which incorporated in some way the respective suspicious segments. Material words containing each problematic WF were listed, one word for each existing combination of that WF and each vowel. The judgments OK or NO, were assigned to each material word upon testing by an experienced evaluator while at the same time special attention was given to the problematic WF's. This process of Re-test Training was

* See K. Ito Harada, "Experiments on the T-T System," in this issue; D. L. Smith et al., "The Pronunciation-Hearing Test Using A Hybrid Magnetic Tape System," Annual Bulletin (Research Institute of Logopedics and Phoniatics, University of Tokyo) No. 4, 111-113 (1970), and O. Fujimura, "Technological Developments for Language Learning," Annual Bulletin (Research Institute of Logopedics and Phoniatics, University of Tokyo) No. 3, 81-110 (1969).

recorded on magnetic tape for later detailed analyses.

We shall here report on some findings about the consonant-vowel interactions. (A detailed analysis of the Re-test Training process and the results are described elsewhere*.) For each student those WF's which were found to be difficult when combined with certain vowels have been selected out and listed. Such $C_i V$ or $V C_f$ combinations which were consistently difficult for at least 3 subjects are tabulated in the leftmost column in Table 1. In this table, the second column shows the number of students who failed on the respective WF's and the following columns indicate the sum values of the scores of the students** for each $C_i V$ or $V C_f$ combination. When the absolute values are more than half the number in the second column, the values are underlined.

From those results, it is seen that while -R was difficult when combined with the back vowels OA or UU, it was easy for 3 subjects when combined with the front vowels I or E and that Z- was difficult when combined with the high vowels UW or I, but it was easy with the low vowels OW or EJ. To apply these results to training, the easy combinations would better be used first, and then, the more difficult combinations should follow. If such an investigation of the relative difficulties for the consonantal WF's with different vowel contexts is carried out further, it is hoped that some new principles for training will emerge.

The results obtained in Table 1 were interpreted from the standpoint of examining how the relative difficulty of consonantal WF's is affected by certain vowels. In the Re-test Training process, the following was also observed. When all the vowels were examined in combination with the easy consonants, almost all the vowels were judged to be OK for almost all of the subjects tested here. In the re-testing of the material words, a considerable number of vowels in some material words were pointed out to be wrong. This fact suggests that not only are consonants affected by vowels, but vowels are subject to the influence of consonants, in respect to their difficulty levels. The present Test System does not provide any means for

* Chizuko Sato, M. A. Thesis, entitled "A Computer-Assisted Experiment of Pronunciation Test-Training," submitted to International Christian University, in June 1971.

** OK for one student is calculated as +1, NO as -1, respectively.

Table 1.

Difficulties that are dependent on the vowel contexts

		I	E	AE	A	OA	UU	UA	IJ	EJ	AJ	AW	OJ	OW	UW	UR
L-	3	<u>-2</u>	0	-1	0	-1	0	-1	-1	<u>-2</u>	-1	0	-1	-1	+1	+1
SL-	3	-1	-1	+1	+1	<u>-2</u>		+1	+1	-1	0	0	-1	+1	<u>-2</u>	0
SJR-	3	0	+1	+1				<u>+3</u>	+1	-1	<u>+3</u>	-1		<u>+2</u>	<u>+2</u>	
-R	3	<u>+3</u>	<u>+3</u>	-1	+1	<u>-2</u>	<u>-3</u>	+1	+1	+1	0	-1	+1	0	0	-
V-	3	+1	<u>-2</u>	+1		+1			0	<u>+2</u>	+1	<u>-2</u>	+1	+1		+1
Z-	4	-1	+1	0	0				0	<u>+2</u>	0	0	+1	<u>+2</u>	<u>-4</u>	<u>-2</u>
-Z	5	0	+1	-2		<u>-4</u>		<u>-4</u>	-2	-2	0	+2	-2	-2	<u>-3</u>	<u>-3</u>
-RZ	3	+1	+1		0	0	0				<u>+2</u>			0	<u>-2</u>	
-LD	4	<u>+2</u>	<u>+3</u>	<u>+2</u>	+1	0	+1	+1	<u>+2</u>	<u>+2</u>	<u>+3</u>	+1	0	+1	<u>+4</u>	<u>-2</u>
-N	3	0	+2	+3	+1	+2		+2	+2	+2	+1	-2	+1	+2	+1	+2
PR-	3	<u>+3</u>	+1	0	+1	0			<u>+3</u>	0	<u>+3</u>	0		+1	+1	
SKR-	3	<u>+2</u>		<u>+3</u>	+1	0		+1	+1	+1	<u>+2</u>	+1		<u>+2</u>	-1	
-LTHS	4	-1	-2													
-RBZ	4				0	-1										
-DHZ	4				+1	+1			<u>-2</u>	<u>-4</u>	<u>-2</u>	0		0	<u>-2</u>	
-TH	4	+1	0	0	<u>+2</u>	<u>+2</u>			0	<u>-2</u>		<u>+2</u>		<u>+3</u>	<u>+2</u>	<u>+2</u>
TH-	3	<u>+3</u>	<u>+3</u>	<u>+2</u>		<u>+3</u>		+1	+1	<u>+2</u>	-1	+1		-1		<u>+3</u>

treating this interaction between C_i or C_f and V. The use of a fourth Word Feature for handling these transitory characteristics, as was proposed by Fujimura in the original design of the test (Fujimura 1969, and Smith 1970) is now clearly desirable for certain C_iV and VC_f combinations. We cannot conclude which combinations must be considered, however, before carrying out further analyses of the data obtained and to be obtained with the present testing procedures.