IDENTIFYING FOREIGN LANGUAGES

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ABSTRACT

This experiment examined listener abilities to identify the language in which a message is spoken. Short samples in five languages were presented to listeners for identification. All groups of listeners identified the samples at better than chance levels. The respective native languages and English received the highest identification. Confusions among samples varied according to native language.

1. INTRODUCTION

People who work in environments where they commonly hear foreign languages claim that they develop the ability to identify languages without understanding any of them. Surprisingly, whether people indeed have this ability has never been investigated in spite of the fact that anecdotal accounts are common and claim considerable sophistication.

House and Neuburg [7] examined the possibility of identifying languages from a statistical distribution of segment types. This work dealt with feasibility rather than human performance.

The vast literature comparing the phonetic structures of languages has dealt with similarities and differences rather than with information which identifies a particular language. The consonant and vowel inventories have been investigated from the point of view of interference with language learning [5]. Languages have been compared according to their phonetic implementation of a linguistic process [4], the relative timing of syllables [3] or their overall use of fundamental frequency [1,6]. Considerable effort has been devoted defining the rhythmic patterns of various languages, [2]. Although some of these differences are undoubtedly responsible, none of the work directly addresses the question of how listeners use phonetic properties to identify languages.

The purpose of this experiment was to determine how well listeners of various language backgrounds are able to identify spoken samples of languages which they do not speak.

2. METHOD

2.1.Materials.

Two native speakers of Chinese, Japanese, Spanish, Arabic and English recorded short paragraphs taken from newspapers. These are languages commonly spoken by students at Ohio University.

All the listeners would have had some exposure to them.

To prepare samples for presentation, the speech was digitized and four two-second samples per speaker were excerpted. The samples were fluent without hesitations or long pauses. After normalization to the same peak amplitudes, two samples for each speaker were digitally mixed with noise at a S/N ratio of 3 dB. The noise condition was included to examine the contribution of vowel and particularly consonant inventories to the identification of the languages.

The samples were recorded in random order for a listening test consisting of 40 test items (5 languages, 2 speakers of each, 2 speech samples from each speaker, 2 listening conditions).

2.2 Subjects.

Seven groups of listeners were tested. First, 14 native English speakers, undergraduate students at Ohio University, limited in experience with foreign languages. Second, 13 native English instructors in the Ohio Intensive English Program. These listeners are very familiar with speakers of other languages and each had spent at least one year in a non-English speaking environment. Third, ten native speakers of each of the other languages used in the test: Arabic, Chinese, Japanese, and Spanish. Finally, ten native speakers of languages other than the sample languages, that is, Korean (6), Bahasa Malaysia (3), and Bukusu, a Bantu language of Kenya (1). For these listeners, all the sample languages are foreign, though they know English well.

2.3.Procedure.

The listeners were tested in a quiet room, in small groups. They were a asked to identify the languages in a forced choice format.

3. RESULTS

3.1. Identification.

The percent correct identifications of the all four samples of the language are given in Fig. 1. The data are combined for all listeners. All listeners identified English samples at very nearly 100% in quiet. Arabic, Chinese, and Spanish were identified at slightly lower rates, while Japanese was identified least accurately. The pattern of correct identification in noise corresponded exactly to the pattern obtained in quiet, simply with more errors present.

3.2. Language background.

The identification scores of each listener group are given in Fig. 2. As might be expected, the teachers experienced with languages had the highest scores, in quiet. The Japanese listeners performed best in noise while the Spanish listeners had the lowest scores. Overall, all language groups identified the languages at above chance rates. This was most clearly true when the samples were presented in quiet.

Table 1. gives identification scores for all five languages and all listener groups. Each group identified its respective native language and English at very high rates. In the noise condition, scores for all groups and languages were depressed.

The ranges of scores were relatively consistent for listeners from different backgrounds. In all groups, some listeners made perfect,

or nearly perfect, scores in quiet. In all groups, other listeners made relatively low scores. The lowest individual score was made by a Spanish listener, 8 out of 20 items correct in quiet. The ranges of scores in noise were depressed for all groups of listeners.

Table 1. Percent correct identifications of languages by listeners from different backgrounds. The top row gives identification scores in quiet, the bottom row gives scores in noise.

	EN	AR	CH	JP	SP
EN(s)	100	88	91	78	73
	79	59	34	31	46
EN(t)	100	92	79	69	88
	73	58	56	33	56
AR	98	98	65	50	93
	58	90	43	25	53
CH	100	65	100	85	65
	68	53	93	48	53
JP	93	73	98	85	73
	80	50	78	90	58
SP	88	63	45	45	95
	50	38	20	10	63
OTHR	95	78	90	80	58
	68	64	78	63	40

3.3. Confusion patterns.

The most obvious confusion pattern affected Chinese and Japanese. Listeners who were not Asians tended to confuse these two languages, as if they were operating with a broad category Oriental Language. Asian listeners, including those from Korea and Malaysia, seldom confused the two. The Spanish listeners in particular, had difficulty identifying these two languages. The Asian listeners, in turn, tended to confuse Spanish and Arabic.

4. DISCUSSION

4.1. Limitations.

There are two limitations of the experiment. The first is a lack of control of the amount of experience the different listener groups have had with languages. The language backgrounds of the listeners are confounded with experience hearing various languages. At this time, we do not know how much and what kind of exposure to languages allows listeners to identify them.

The second problem concerns confounding of the language samples with speaker characteristics. Each language was represented by only two speakers. Although all the samples used were different, it is possible that listeners relied on speaker characteristics in making language identifications. A listener may have adopted a strategy of identifying, for example, a relatively high pitched voice as a Chinese speaker or a fast rate of speech as Japanese.

4.2. Conclusion.

The conclusion is that listeners are able to identify languages which they do not know. Since noise decreased the identification scores rather than altering the patterns, it is possible to infer that listeners are relying on suprasegmental properties of languages as much as, or more than, consonant and vowel inventories.

Listener experience with various foreign languages was a major factor in their ability to identify languages. Asian listeners with experience with Asian languages identified Chinese and Japanese accurately. Arabs and Spanish listeners from South America have had little experience with Asian languages and tended to confuse them.

Some listeners from each group were very good at the task while others made many misidentifications. Whether the differences in scores are a result of individual talent or experience is, at this time, unknown.

How do listeners identify a language? They may proceed by a process of elimination: 'I don't understand it, so it's neither English nor my native language. It must be _____.' Alternatively, they may have developed prototypical auditory patterns which characterize languages.

5. REFERENCES

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Fig. 1. Identification of languages by all listeners.

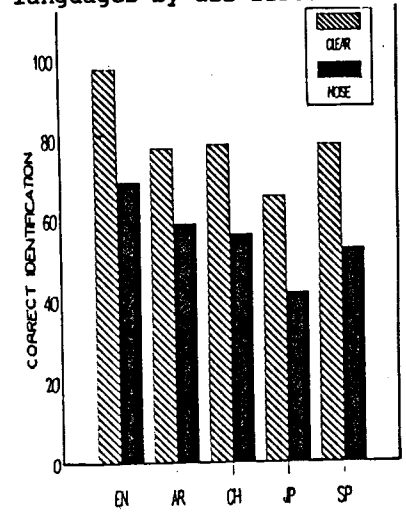

Fig. 2. Identification scores of listener groups.