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ABSTRACT

This research investigated judgments of language samples produced by bilingual speakers. In the first study, listeners judged whether two language samples produced by bilingual speakers were spoken in the same language or in two different languages. Four bilingual African talkers recorded short passages in Swahili and in their home language (Akan, Haya, Kikuyu, and Luhya). Short sentences or phrases were excerpted from these recordings and assembled as a test recording. The recording contained 32 test items consisting of paired spoken language samples produced by the same talker. Half were same language pairs and half were different language pairs. In the different language pairs, Swahili was always one of the languages. Undergraduate students enrolled in an introduction to linguistics class with no previous experience with African languages served as listeners, judging each test item as containing a same language or different language pair. Overall, listeners made accurate judgments over 70 percent of the time. In the second experiment, listeners made similarity judgments about the same paired language samples. Listeners' evaluations indicated that same language pairs seemed much more similar to them than different language pairs. (Contains 21 references.) (SM)

SAME TALKER, DIFFERENT LANGUAGE: A REPLICATION

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INTRODUCTION

Infants [1, 2] young children [3] and adults [4, 5] are able to discriminate between spoken samples of foreign languages which they do not speak or understand. The research with infants in particular has suggested that they base discrimination judgments on prosodic patterns, such as the rhythmic structures [6] and pitch characteristics [7] of languages. Children and adults also employ prosodic information in discriminating between languages [8]. Listener judgments are also influenced by talker voice [9] and affect [10]. In fact, Esling and Wong [11] suggest that talkers show speech characteristics associated with geographic areas.

In some studies of language discrimination, different language samples have been provided by different talkers, confusing the contributions of talker-specific characteristics with language characteristics. In some cases, listeners are able to separate talker voice characteristics from language characteristics. In a previous study, we obtained better than chance discrimination of language pairs produced by bilingual talkers [12]. Listeners were presented paired language samples produced by four bilingual male talkers and four bilingual female talkers. Listeners could not discriminate all of the language pairs with equal facility. For male talkers, the listeners discriminated between Arabic and French, Hebrew and German, Akan and Swahili, and Latvian and Russian. For female talkers, the listeners discriminated only between Korean and Japanese and Mbawa and French. Their ability to discriminate between Russian and Latvian was marginal and they could not discriminate between Ilocano and Tagalog at all.

Some of the languages presented for discrimination are better known than others. Listeners may have been using previous knowledge of the 'sound' or 'acoustic signature' of some languages. French and German are commonly studied in high schools. Hebrew, Russian and Japanese are also somewhat familiar to American listeners.

The objective of the current studies is to investigate judgments of language samples produced by bilingual talkers which are unfamiliar to American listeners. In addition, the languages come from the same geographic area.

In the first experiment, listeners were asked to judge whether two language samples produced by a bilingual talker were spoken in the same language or in two different languages. In the second experiment, listeners were asked to make similarity judgments about the same paired language samples.

EXPERIMENT 1

In the first experiment, listeners provided a same-language, different-language judgment to paired spoken language samples.

METHOD

Materials

Four bilingual talkers recorded short passages in Swahili and in their home language. The languages and countries of origin of the talkers are given in Table 1. Swahili is a Bantu language spoken in East Africa. It was formerly used as a trade language between Africans and Arabs, is now widely spoken as a second language, and often used in primary education. Kikuyu (5.3 million speakers), Luhya (3.6 million speakers) and Haya (1.2 million speakers) are Bantu languages spoken in East Africa. Akan (7 million speakers) is one of the major languages of West Africa. It is classified within the same Niger-Kordofanian language family but is distantly related to the Bantu languages of East Africa.

Phonology

The prosodic properties of the test languages are very similar. All employ syllable rhythm and all but Swahili employ lexical tone. The languages differ in vowel inventories. The Bantu languages have either a 5- or a 7- vowel system, whereas Akan employs 8 oral vowels and 7 nasalized vowels. The consonant inventories of the languages are relatively similar [13, 14, 15].

Language Pairs	Country
Akan-Swahili	Ghana
Haya-Swahili	Tanzania
Kikuyu-Swahili	Kenya
Luhya–Swahili	Kenya

Table 1: Country of origin and languages produced by four bilingual talkers.

Test Recording

Short sentences or phrases, 5 seconds in duration, were excerpted from read passages and assembled as a test recording. The recording containing 32 test items, consisting of paired spoken language samples produced by the same talker. Half were same-language pairs, half were different-language pairs. In the different-language pairs, Swahili was always one of the languages. The test also contained three practice items employing language samples produced

by a Hebrew-German bilingual talker. Each test item consisted of: Item number + Language sample 1 + tone + Language Sample 2.

Listeners

Twenty-five undergraduate students enrolled in an introduction to linguistics class with no previous experience with African languages served as listeners. All listeners reported normal speech and hearing.

Procedure

After training with practice items, the listeners judged each test item as containing a same-language pair or a different-language pair.

RESULTS

Overall, listeners performed significantly better than chance, 71% correct ($t(24) = 10.5$, $p < .001$). Listeners were approximately equally accurate in making same-language and different-language judgments, 70% and 73%.

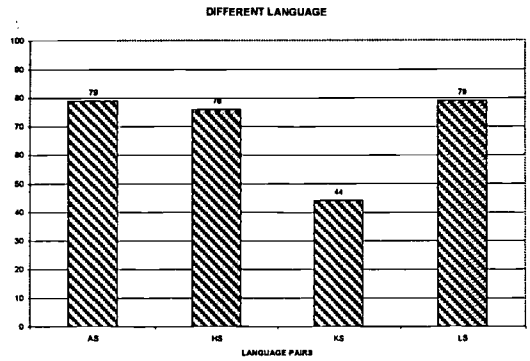

Figure 1: Listeners were able to discriminate 3 of the different-language pairs, but not Kikuyu-Swahili.

In the response patterns to the different-language pairs, listeners were able to discriminate between the different languages at nearly 80% correct, except for Swahili-Kikuyu. The correct discriminations are given in Fig. 1.

Listener responses to same-language pairs varied. Most were identified accurately as representing the same language, but the Kikuyu same-language pairs were difficult (56%) as were the Swahili same-language pairs as produced by the native speaker of Haya (38%). Listener responses to same-language pairs are given in Fig. 2.

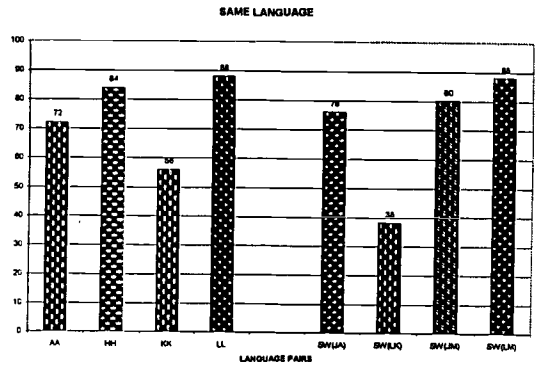

Figure 2: Listeners were able to identify most same-language pairs correctly. Kikuyu and Swahili as produced by one talker were difficult.

DISCUSSION

Even when presented with samples of foreign languages with which they were unfamiliar, listeners were able to make accurate same-language, different-language judgments, indicating that listener success in the task does not require familiarity with test languages. Instead, listener responses were based on acoustic-phonetic information present in the speech samples.

EXPERIMENT 2

In the second experiment, listeners were asked to offer a similarity rating of each language pair. Using a different response format, similarity rating, provides a somewhat more sensitive measure of perceived similarity and difference among the language samples than a categorical yes-no judgment.

METHOD

Materials

The recordings which were used in the first experiment were also employed in the second experiment.

Listeners

Thirty three undergraduate students, selected from the same population as the participants in the first experiment, provided similarity judgments.

Procedure

To each language pair, listeners responded by placing a mark on a line which had one of its ends identified as 'almost identical' and the other end identified as 'not at all similar.'

X

The distance, measured to the nearest mm, from the beginning of the line to the listener mark, served as a measure of similarity; the larger the number, the more similar the two language samples. The smallest number representing 'not at all similar' was by convention 1 mm. The largest number, representing a judgment of 'almost identical' was 13.5 cm.

RESULTS

The listener similarity judgments were quite congruent with the same language, different language judgments obtained in the first experiment. Overall, listeners' evaluations indicated that same-language pairs seemed much more similar to them than different language pairs. The similarity judgments to all same-language pairs are given in Fig. 3. Except for the Kikuyu same-language pairs and the Swahili same-language pairs produced by the Kikuyu speaker, the listeners rated the speech samples produced in the same language as similar.

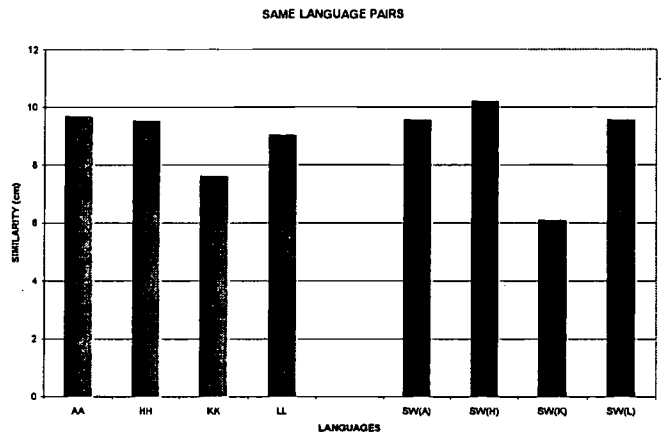

Fig. 3. Similarity judgments of same-language pairs. Kikuyu language pairs and Swahili language pairs as produced by the Kikuyu speaker were judged to be less similar than the other language pairs.

Fig. 4 gives the similarity judgments for different-language pairs. Listeners consider speech samples produced in different languages not to be particularly similar. The average similarity ratings for same-language vs. different language pairs were statistically significantly different ($t(32) = 16.5$, $p < .001$).

The listeners rated the Kikuyu-Swahili language pairs as most similar, and the Swahili-Luhya pairs as least similar. This response pattern is somewhat surprising in that Luhya is spoken in a neighboring geographic area to Swahili whereas Haya is spoken in Tanzania and Akan is geographically the most distant, spoken in West Africa. Although listeners may be sensitive to broad geographic areas, apparently they were not particularly sensitive to geographical regions within Africa.

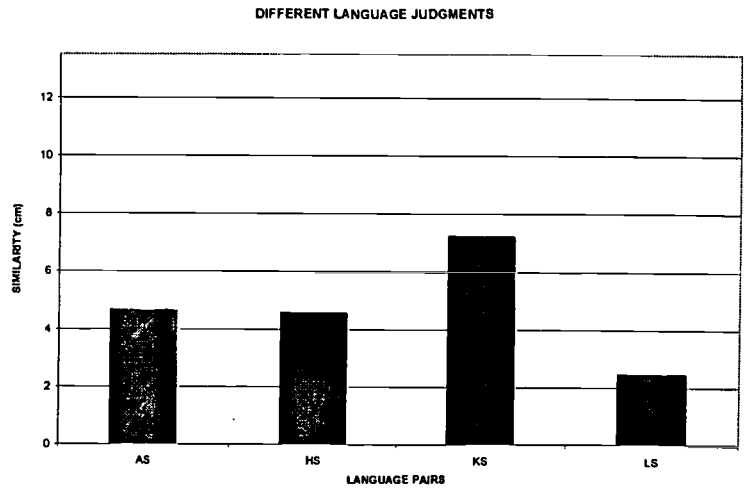

Fig. 4. Similarity judgments of different-language pairs. Only Kikuyu-Swahili speech samples were judged as not clearly different.

DISCUSSION

Whether listeners responded with similarity judgments or categorically, their evaluations yielded very similar results. Except for Kikuyu, the listener responses indicated that same-language samples sounded similar and different-language samples did not sound similar to them.

GENERAL DISCUSSION

One interesting issue underlying this investigation concerns the acoustic-phonetic properties on which the listeners based their judgments.

All the languages in the test employ syllable-based rhythm; therefore it is not likely that listeners based similarity or discrimination judgments on rhythmic patterns. If listeners were making judgments solely on rhythmic properties, they would have shown a bias toward same language judgments and produced many false alarms. Rather, different-language judgments were made correctly for 71% of the items, and different-language pairs were rated quite differently from same-language pairs.

Swahili is the only language among those tested which does not employ tone, so the listeners may have been basing different judgments on tone patterns. Because listeners whose native language does not employ tone have difficulty detecting tone patterns [16], it is not clear to what extent the American listeners were relying on the presence vs. absence of tone. The presence vs. the absence of tone did not seem to affect listener similarity judgments of the Swahili language pairs in comparison with the same-language pairs representing the other languages.

Listeners may have used information provided by the segment inventories of the languages. The languages from East Africa have relatively similar consonant and vowel inventories, employing either 5 or 7 vowels and prenasalized consonants. Although Swahili differs from the other languages in that it may employ implosive stops, American listeners are likely to assimilate these to the category of voiced stops [17, 18]. On the other hand, the nasalized vowels of Akan appear to be highly salient. It is possible that Akan was judged different from Swahili on the basis of vowel inventory. The differences in vowel inventory did not seem to have much effect similarity judgments.

Listeners employ talker characteristics associated with specific geographic areas in making discrimination judgments and can often identify the geographic area in which a language is spoken [19]. However, the talkers in the current study were from the same geographic area as far as the listeners were concerned.

Bilingual talkers sometimes produce their different languages with what appears to be a change in affect. All the talkers, except the Kikuyu talker, appeared to speak Swahili more quickly than their home language. Listeners may have been listening for perceived changes in speaking rate. The Kikuyu talker produced both languages at about the same rate perceived rate, and Kikuyu-Swahili and Kikuyu-Kikuyu language pairs produced very low correct discriminations, 44% and 56%, respectively. One of the most important components of clear speech is speaking rate [21]. It is possible that because of the perceived fast speech rate of this talker, listeners had difficulty extracting the information they needed for discrimination and similarity judgments.

Listeners were probably using multiple sources of information in arriving at discrimination judgments and similarity ratings undoubtedly including affect. Even without previous knowledge about any of the languages, they were able to separate talker characteristics from language characteristics.

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