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A TUTORING PACKAGE TO TEACH PRONUNCIATION OF MANDARIN CHINESE CHARACTERS

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We examined the effects of a tutoring package (verbal modeling, prompts, and contingent praise/Chinese conversations with the tutor) on the performance of a college student's Mandarin Chinese pronunciation. The effects of the tutoring package were analyzed using a multiple baseline design across two sets of 50 Chinese characters. The tutoring package produced improvement in the student's correct pronunciation of Chinese characters from 48% (pretutoring) to 90% (posttutoring). Results suggested that the tutoring package produced mastery pronunciation of targeted Mandarin Chinese vocalizations by a nonnative speaker.

DESCRIPTORS: Mandarin Chinese, Pinyin, tutoring

Chinese is the sixth most frequently taught foreign language in institutions of higher education in the United States, with enrollment increasing by 20% from 1998 to 2002 (Welles, 2004). It is often regarded as the most difficult language for English speakers to learn for two reasons. First, Chinese characters are ideographs without individual characters that represent the component sounds of a word. Second, Chinese is a tonal language, because the same set of sounds can have different meanings depending on the tone with which they are spoken. Thus, the use of tones serves as a remarkable distinguishing quality of the Chinese Mandarin language because variation in pitch is crucial to determining the meaning of a character.

The Chinese government adopted Pinyin in 1979 to represent Chinese characters for non-Chinese speakers. Pinyin represents Chinese characters and their sounds using the Roman alphabet and a set of tonal symbols to represent their pitch (see Figure 1 for an illustration of the representation of 10 Chinese characters using Pinyin). Pinyin uses four diacritical marks to represent the four tones in standard Mandarin Chinese. The first tone, "high level" or "flat," is represented by a macron accent (¯), meaning that the word is pronounced with a constant high pitch. The second tone, "high rising," is represented by an acute accent (´), meaning that the word is initially pronounced with a high pitch that increases throughout the vocalization. The third tone is called "low falling rising" and is represented by a caron accent (ˇ). These words start with a low pitch, fall lower, and then increase above the initial pitch. The fourth tone, represented by a grave accent (`), is called "high falling," meaning that the word starts high in pitch and then falls below the initial pitch. When spoken, many characters with entirely different meanings are distinguished only by the small difference in tone. The correct implementation of the four tones is crucial to the development of spoken competence in Chinese. A limitation of Pinyin is that it cannot provide students feedback on their pronunciation of tones (Lee, 1993). Thus, even if beginners master the rules of Pinyin and learn the meaning of Chinese characters, they may not be able to pronounce those characters correctly.

One solution to this problem may be to provide tutoring in the pronunciation of Pinyin. Tutoring usually involves discrimination training that consists of the presentation of an academic stimulus, the emission of a response, feedback followed by a corrective loop with modeling or prompting if the response is incorrect (e.g., Noell et al., 2000). The purpose

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Pinyin	shuō huà	bāng zhù	hàn zì	nǎ lǐ	róng yì
Characters	说 话	帮 助	汉 字	哪 里	容 易

Figure 1. Example of Chinese characters with their representation in Pinyin.

of this study was to analyze the use of a tutoring package that consisted of modeling, hand prompts, and contingent praise or Chinese conversations with the tutor to increase the effectiveness of Pinyin in teaching correct tonal pronunciation to nonnative speakers learning Chinese.

METHOD

Participant, Setting, and Materials

The participant in this study was a male American college student, 25 years old, who was enrolled in a first-year Chinese class. In the class, he had demonstrated mastery of writing the Pinyin equivalent for approximately 200 Chinese characters. The experiment was conducted in a study room of the university library. The researcher arbitrarily selected 100 of the 200 Chinese characters to use in the experiment. These characters were written on cards for later presentation to the participant. Tutoring sessions occurred outside the participant's routine course work. A digital camera with a microphone was used to record the participant's pronunciation during each session. A female native Chinese (Mandarin) speaker served as tutor.

Measurement and Reliability

The dependent variable was the percentage of correct pronunciations evoked by the first presentation of each Chinese character in a group of 10 words during a single session. Two observers, the tutor and a second native speaker, independently replayed the recordings for a session and judged the correctness of the pronunciation. The second observer was not informed of the purpose of the experiment until the scoring was finished. Interobserver agreement was calculated for 100% of the sessions by dividing the number of agreements in each session by the number of agreements plus disagreements and multiplying by 100%. Reliability was 100% for all sessions.

Experimental Design

The effects of tutoring were evaluated using a two-panel multiple baseline (each panel consisted of a set of 50 Chinese characters). The first panel, Word Set 1, consisted of 50 Chinese characters formed into five groups of 10 characters each. The second panel, Word Set 2, consisted of an additional 50 Chinese characters formed into five groups of 10 characters each.

Procedure

Pretutoring. Pretutoring consisted of the presentation of a Chinese character and a 5-s interval for the participant to attempt to pronounce it. No feedback was provided. Each session consisted of 10 trials, and a different word was presented on each trial.

Tutoring. Tutoring sessions were similar to pretutoring sessions, with the following exceptions. First, the tutor presented verbal modeling and prompts contingent on an incorrect response. The prompt consisted of (a) a manual gesture to indicate the correct change in tone, (b) a demonstration of how to form the lips and tongue to produce the correct pronunciation, and (c) repetition of response attempts until a correct response occurred. Second, the tutor provided praise (in both English and Chinese) and a brief Chinese conversational exchange contingent on a correct response. Finally, the tutor informally conversed with the participant in Chinese contingent on correct pronunciation of the 10 words in each group.

Posttutoring. Posttutoring sessions were identical to pretutoring sessions. The purpose of the posttutoring session was to evaluate the maintenance of treatment effects of the tutoring sessions.

RESULTS AND DISCUSSION

Figure 2 shows the percentage of correct pronunciations of Chinese characters during

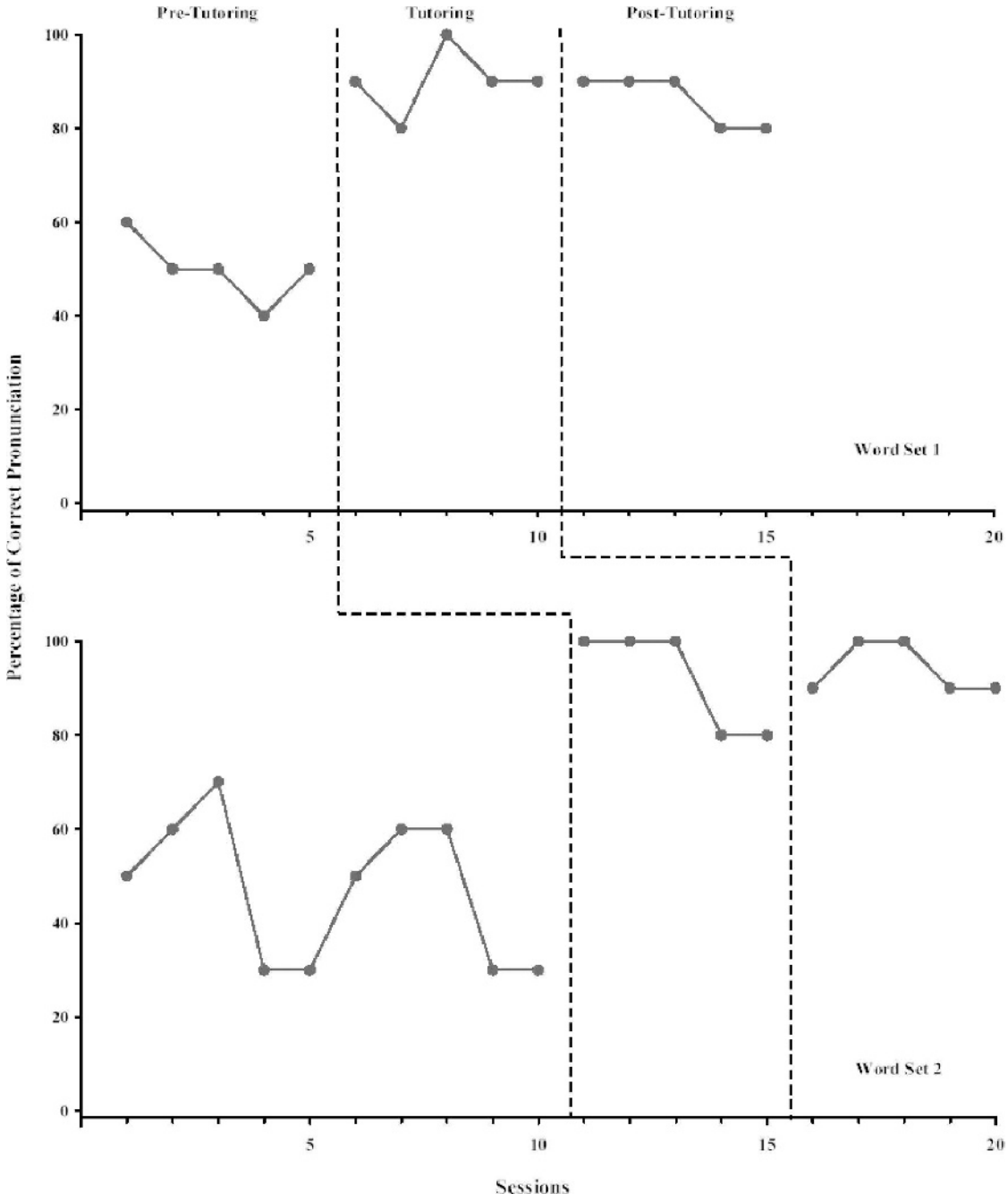

Figure 2. The percentage of correct pronunciation responses of Chinese characters in Word Set 1 (top) and Word Set 2 (bottom) during pretutoring, tutoring, and posttutoring conditions.

pretutoring, tutoring, and posttutoring. During pretutoring for Word Set 1, the average percentage correct pronunciation of characters was 50% and was on a downward trend. During tutoring, the average percentage correct increased to 90%, and in the posttutoring phase, the average percentage was 86% (range, 80% to 100%). During pretutoring for Word

Set 2, the average percentage correct pronunciation was 47% and was also on a downward trend. During tutoring, the average percentage correct was 92%, and during posttutoring, the average percentage correct was 94% and stable (range, 80% to 100%). Thus, the percentage correct pronunciation of Chinese characters for the tutoring and posttutoring conditions was higher than for the pretutoring condition and approached mastery level.

This experiment examined the effects of a tutoring package on correct pronunciation of Chinese characters and found that adding tutoring to Pinyin produced rapid progress in pronouncing Chinese characters. The increase in correct pronunciation occurred for both Word Sets 1 and 2 only after introduction of the tutoring package, as demonstrated in the multiple baseline design. This suggests that the tutoring package was responsible for the increase in correct pronunciation. The tutoring package may be conceptualized as a form of discrimination training involving prompts and a correction procedure. The Pinyin symbols may have served as discriminative stimuli for the correct pronunciation of a Chinese character subsequent to appropriate modeling and contingent praise and Chinese conversation. However, it is possible that (a) modeling the correct response via manual gestures and proper lip and mouth formation, (b) contingent praise and Chinese conversation, or (c) a combination may have produced the increases in correct pronunciation. Because the antecedent and consequence manipulations were not independently analyzed, the results must be interpreted with caution. The necessary and sufficient components of the tutoring package should be evaluated in future research, in addition to replication with additional participants.

Anecdotally, Word Set 1 required 45 min of tutoring to meet mastery criteria, and Word Set 2 required 25 min to meet criteria. This finding suggests that students may require decreasing amounts of tutoring to master additional words. Future research should examine the possibility that with sufficient tutoring, the Pinyin representation of Chinese characters may evoke correct pronunciations in the absence of contingent reinforcement and with minimal antecedent intervention. Further research on the usefulness and sustainability of the intervention by Chinese-language tutors under natural teaching conditions may be necessary to create a practical technology.

REFERENCES

Lee, P. Y. (1993). *You can speak Mandarin*. Sydney, Australia: Harcourt Brace.

Noell, G. H., Witt, J. C., LaFleur, L. H., Mortenson, B. P., Ranier, D. D., & LeVelle, J. (2000). Increasing intervention implementation in general education following consultation: A comparison of two follow-up strategies. *Journal of Applied Behavior Analysis*, *33*, 271–284.

Welles, E. (2004). Foreign language enrollments in United States institutions of higher education, Fall 2002 [Electronic version]. *ADFL Bulletin*, *35*, 1–24.

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