Free recall of a mixed language list*

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Bilingual Ss were given a free-recall test after listening to a mixed-language list (English and Spanish). Instructions emphasized recall of the word even if the language had to be guessed. There were three groups of Ss who heard 1, 4, or 8 repetitions of the list. Repetitions increased performance, with a high percentage of the words recalled in the correct language in all cases.

Research that employs monolingual Ss often tends to mask an important factor in communication, the particular language used. Casual observations reveal that in some cases language seems to be an input-output mode that has little effect on the content of the message, e.g., people often remember a conversation without remembering the language in which it was conducted. In other cases the language used appears to carry distinctive connotations; for example, a word and its translation may have entirely different associations. Kohlers (1968) has performed a number of interesting experiments that are related to these phenomena.

In a different but related type of research, Hintzman, Block, and Inskeep (1972, Experiment II) found that the probability of remembering the printing style of a word (upper or lower case), given that the word was recognized, was .58. While this is above chance level, it is still low enough to indicate that some features, such as printing style, are not always retained in long-term memory storage (LTS) along with the word. This is quite in keeping with the general conception of LTS as a predominantly semantic store.

When bilingual information processing is considered, findings indicating semantic storage suggest an interesting question: Is the language in which a word is presented an important aspect that is retained over long periods of time, or is it a more incidental feature, like the printing style of a written word? Kohlers (1968) in one experiment found that repeating a word in another language increased its strength in memory. This led Kohlers to emphasize the semantic commonality of translated words; yet, this in no way settles the question of whether or not a language tag is also retained in memory.

In this investigation, recall instructions following a mixed-language list emphasized the importance of recalling the word even if it was necessary to guess concerning the language in which the word was presented. This manipulation should allow an assessment of the extent to which a word and its language "tag" are associated.

METHOD

Forty Spanish-English noun pairs were selected from a frequency list (Eaton, 1940) such that each word was a translation of its pair-member and each occurred in the 1,000 most frequent words of that count. One member was chosen randomly from each pair subject to the constraint that there be 20 English and 20 Spanish words in the final list. These words were then arranged in eight different random presentation orders subject to two constraints: (1) for all experimental groups, the occurrence of Spanish and English words was balanced for the first four positions to control for a possible primacy effect; (2) the size of same-language runs were limited to three items.

All instructions and lists were recorded by a native Spanish speaker. The words were presented at a 2-sec rate to fluently bilingual Ss (graduate students and advanced undergraduates at the University of Puerto Rico) whose native language was Spanish and whose second language was English. Ss were told to remember the words but not the order in which the words were presented. They were further told that a given word would be presented in only one of the two languages throughout the experiment, e.g., they would not hear both "hat" and "sombrero." Thirteen of the Ss heard one of the eight presentation orders, 16 heard four, and 16 heard eight. Following the presentation of the lists, an arithmetic test was given for approximately 5 min to avoid a possible recency effect. This was followed by a written recall test in which Ss were told to recall the words in the correct language, if possible. However, it was emphasized that even if they could not remember the language in which the word was presented, they should try to recall it. For example, if they knew that "man" or "hombre" was on the list, but could not remember which, they were free to guess. Ss were given 10 min for the free recall task.

RESULTS

Correct items were defined as those recalled, regardless of the language in which they were recalled, e.g., if "hat" was presented, either "hat" or "sombrero" was counted as correct. In cases in which both a word and its translation were given by a S, only the first response was recorded. An unweighted-means analysis of variance revealed that the between-group factor of the number of repetitions (1, 4, or 8) was significant, $F(2,42) = 21.61$, $p < .01$. Neither the within-S factor of presentation language nor the interaction of the two variables was significant, $F(1,42) = 1.57$ and $F(2,42) < 1$, respectively.

A similar analysis was performed on the items which were recalled in the correct language, e.g., "hat" was counted correct only if it was recalled as "hat" rather

Table 1
Items Recalled and Items Recalled in Presentation Language

Presentation Language		Presentations		
		1	4	8
English items recalled	Mean	4.00	6.94	10.50
	SD	2.00	2.72	3.37
English items recalled in presentation language	Mean	3.61	6.12	9.37
	SD	1.98	2.96	3.85
Spanish items recalled	Mean	4.08	7.25	11.62
	SD	1.55	2.74	5.14
Spanish items recalled in presentation language	Mean	3.77	6.87	11.44
	SD	1.69	2.73	5.24

than "sombrero." In this analysis repetitions was again significant, $F(2,42) = 17.69$, $p < .01$, and the presentation language was also significant, $F(1,42) = 5.93$, $p < .05$. The interaction of the two variables was not significant, $F(2,42) = 1.92$. Table 1 illustrates these effects in terms of mean items recalled and mean items recalled in their presentation language. As can be seen, increasing presentations had the expected effect of improving recall performance under either scoring system. There was a reliable tendency for words presented in Spanish to be recalled in the correct language more often than those presented in English. Inspection of the means, however, shows that in both cases, words were usually recalled in the correct language, the percentages being .96 and .89 for Spanish and English words, respectively.

DISCUSSION

Without overgeneralizing the results, it is probably safe to say that in lists of this type, if a word is stored, a language tag of some sort is usually stored in LTS with it. In this experiment, this was especially true for words which were presented in the Ss' native language (Spanish); yet, those which were presented in English also retained a tag in the vast majority of cases.

There are many other variables to be examined in mixed language free recall tasks, such as the effect of interitem similarity, categorization, etc. It is also important to extend this type of research using materials such as sentences which are more representative of real-life situations.

Research in bilingualism is important, not only because of the number of bilinguals in the world, but because of the fact that all humans are potentially multilingual; such an important aspect of cognitive processing can hardly be neglected.

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