

Word associations of bilinguals*

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Arabic-English bilinguals gave a greater number of identical associations when they responded to the same word twice, than when they responded the second time to the translation of the stimulus word. It is suggested that this result may be due to translation equivalents having the status of synonyms and not to bilinguals' setting up associations independently in each language.

Kolers (1963) reports that not more than one-third of the associations given by bilinguals to translation-equivalent words are semantically equivalent. While he recognizes that there are some difficulties in interpreting word-association data, he concludes that his results are consistent with the view that for bilinguals "experiences and memories of various kinds are not stored in common in some supralinguistic form but are tagged and stored separately in the language S used to define the experience to himself [p. 300]." That the overlap in associations was greater than zero he attributes to commonality of experiences independently associated with each member of some of the translation pairs. Thus, because pencils and pens, for example, tend to occur together in the same environments, the association between the words for these two objects may come to be established independently in the two languages of the bilingual. This interpretation received support from the greater commonality of responses he found when the stimulus words named "concrete" things than when the referents were abstract. However, instead of accepting Kolers's "separate" hypothesis, we are inclined to the view that both languages exist within a single system and tap a common memory store. The question then is why the overlap of associations was not found to be anywhere near perfect in Kolers's study. A possible explanation is suggested by the fact that even monolinguals responding to the same word on two occasions will not always give the same response on both (cf. Fox, 1970). For example, an individual who responds to "black" with "white," "night," or "coal" with probability .5, .3, and .2, respectively, will be expected to give the same response on two occasions with probability $.38 (= .5^2 + .3^2 + .2^2)$, assuming his response on the second

occasion is made independently of his response on the first. Could the low degree of commonality observed by Kolers be due entirely to variability in responding that could occur even when the response hierarchy is identical in both languages?

The present study was an attempt to answer this question. Arabic-English bilinguals gave free associations to English words in English, or to their Arabic equivalents in Arabic. Some of the Ss were then asked to respond a second time to the same words in the same language, while others were given the translations of the words they had responded to before, and intralingual associations were once again obtained. It was argued that if the number of matched (translation equivalent) responses given by the Ss responding once in Arabic and once in English is no less than the number of matched (identical) responses given by Ss responding on both occasions in Arabic, or in English, then one may conclude that the hierarchy of responses is identical in both languages. If, however, fewer matching responses were found in the former case, then one must conclude that there are different associative relations between semantically equivalent words in the two languages, and this would need to be explained if one still wished to retain the "single-system" hypothesis.

MATERIALS

Two sets of six ("critical") words were selected from the Jenkins & Palermo (1964) norms. One set (H) consisted of words to which more than 50% of the college students tested gave the primary response. The other set (L) consisted of words to which the primary response was given by fewer than 20% of the same Ss. The words were: (H set) bed, black, dogs, king, man, table; (L set) butterfly, cheese, doctor, music, people, street. These words were randomized and embedded in two different lists of 32 randomly ordered "buffer" words. Each of the 12 critical words occupied the same position in both lists with three buffer words separating successive critical words. These two lists (E lists) were translated into Arabic to provide

two further lists (A lists). The four lists were mimeographed one list to a page, the words in a single column with blanks for the responses to the right (E lists) or to the left (A lists). By putting the four lists together two at a time in all possible arrangements, excluding those involving lists that completely translated each other, eight "forms" were obtained. A brief questionnaire was attached in order to get information on the languages known by the Ss, when they were acquired, etc. Taking regard only of the language of the lists and of the order of the lists when both were in different languages, four conditions may be identified: AA, EE, AE, and EA.

PROCEDURE

The eight lists were given to students in different sections of an introductory psychology course during a scheduled class session. Prior to distribution, the forms were arranged in such a way as to ensure near equal proportions of Ss working on each form in each section and yet have random allocation of Ss to conditions. A separate set of EE forms was distributed to Ss claiming little or no knowledge of Arabic—these were later discarded. Ss were instructed to read each word and then write in the space provided the first word in the same language that the stimulus made them think of. They were further told not to worry about spelling but to write clearly and to work through the list as quickly as possible in strict order, omitting none of the items and not turning back to a page once they had completed it.

SUBJECTS

After eliminating the few who had been observed not to follow the instructions, only those Ss were retained who had indicated that Arabic was their first language. All Ss were sufficiently proficient in English to be able to pursue university studies in that language. Some more Ss were eliminated because they had not responded to all the words or because their responses to critical words were not legible. Further random elimination of Ss from some conditions was necessary in order to obtain equal numbers of Ss (11) for each of the eight forms, i.e., 22 Ss for each condition.

Table 1
Summary of Data on Responses
to Critical Words

Word Set	Response Variability		Mean Proportion of Matched Responses			
	Arabic	English	EE	AA	AE	EA
H	2.94	3.17	.71	.75	.42	.30
L	4.37	4.39	.48	.60	.19	.19

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RESULTS

The analyses reported here and summarized in Table 1 were confined to responses given to the 12 critical words.

Inter-S Intralingual Response Variability

Shannon's measure of uncertainty, $\hat{H} = -\sum p_i \log_2 p_i$, was computed for the distribution of responses to the English words by Ss under Conditions EE and EA, excluding responses given to the English words the second time in the former case. Similarly, \hat{H} was computed for the Arabic responses in Conditions AA and AE, excluding responses given the second time in the former case. Mean values for the H and L word sets are given in Table 1. In the case of Arabic, the range of values was from 1.50 (man) to 3.58 (dogs) for the H set and, for the L set, from 3.61 (cheese) to 5.01 (music). In the case of English, the range was from 2.45 (black) to 3.88 (bed) and from 4.21 (cheese) to 4.69 (music) for the H and L sets, respectively. A Wilcoxon signed-ranks test revealed no significant difference between the values of this measure for translation-equivalent pairs, while the correlation (Spearman's rho) between pairs was +.82 ($p < .01$). Thus, it is clear that there was about the same amount of variability in the responses given to words that were translations of each other, this variability being decidedly less for the H set than for the L set.

Number of Matched Responses

Table 1 also shows the mean percentage of time the same (or translation equivalent) response was given to the H and L words on the two occasions when there was a response. Analysis of variance on the total number of matched responses per S revealed a significant difference between conditions, $F(3,84) = 22.92$, $p < .001$, and between sets of words, $F(1,84) = 26.27$, $p < .001$. The interaction was not significant ($p > .10$). Orthogonal comparisons were made between condition means. Matched responses under Condition EE were not significantly fewer than those under AA, $F(1,84) = 1.79$, $p > .10$, nor was the comparison between EA and AE significant ($F < 1$). However, the difference between AA and EE, on the one hand, and AE and EA, on the other, was highly significant, $F(1,84) = 66.13$, $p < .001$.

DISCUSSION

The results of this study indicate that the difference in the associations bilinguals give to translation equivalent words is not

due solely to the sort of response variation that occurs when responses are given to the same word on more than one occasion. If identical hierarchies of responses exist in both languages of the bilingual, as many matched responses should have occurred when the individual responded the second time to the same word as to its translation. The present results indicate, then, that Kolers was not wrong in regarding the low proportion of matched responses given by his Ss as evidence of different associative relations in the bilingual's languages. (The average proportion of associates that translated each other in conditions AE and EA was .28, very close to the values of .34, .28, and .30 that Kolers reports for German-, Spanish-, and Thai-English bilinguals, respectively).

Differences in the number of matched responses to H and L words appear to support Kolers's explanation of why some commonality appears to exist between responses given in two languages. If one accepts the view that the association between two words reflects the experiencing of their referents together, then greater variation among Ss in the responses they give to a particular word would suggest a greater range of situations in which the referent of the stimulus may be experienced. Consequently, if the bilingual's associations are set up independently in each language, the likelihood that the same association is set up in both languages would be less for such words. As Table 1 shows, the less the variation in responses given to an English word, the less the variation of responses given to its Arabic equivalent, and the larger the number of matching responses given to these words. This interpretation would be more convincing if one could satisfactorily account for the greater variability in the responses given to words such as "butterfly," "people," and "cheese" (L set) than to words such as "dogs," "black," and "man" (H set). Kolers's point about lesser variety of actions tied to concrete as opposed to abstract referents can scarcely apply here. Perhaps the whole idea of word associations reflecting experiences with the referents of the words in question is mistaken. Certainly associations given to objects or to pictures of objects are rather different from those given to words that name these objects (Deno, Johnson, & Jenkins, 1968; Karwoski, Gramlich, & Arnott, 1944).

We suggest that the differences in the associations given to translation-equivalent words, over and above those arising out of variation in responses from occasion to occasion, may be due to the stimulus words not being identical in referential and connotative meaning, that this arises out of linguistic factors and has little or nothing to do with the bilinguals' experiences with the referents of the words. The lack of strict equivalence in meaning may in some cases arise out of one word having multiple referents not all of which are covered by its translation. Some instances of this are fairly obvious, e.g., the Arabic word for "doctor" would not be used to refer to a holder of a doctoral degree who is not a medical practitioner. In many cases, however, the lack of complete correspondence of meaning may arise out of connotations that are determined by linguistic conventions, for example, metaphorical usage that has become part of the idiom of the language. If one associates stubbornness with mules, uncleanness with pigs, wisdom with owls, it is very likely due to simile acquired with the language than to nonlinguistic experience. It is possible, therefore, that differences in associations given to translation pairs reflect differences in the meanings of the stimulus words, i.e., differences that arise out of linguistic factors. This is tantamount to saying that data such as Kolers's and ours can tell us nothing about whether or not the bilingual has language-specific memory stores of the sort Kolers has envisaged. These data we feel can be readily understood if we regard translation-equivalent pairs as having the status not unlike that of synonyms within the same language, the degree of synonymy being greater when words have concrete referents.

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