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Balanced and polarized homographs in verbal discrimination learning

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Balanced and polarized homographs were used to define high and low encoding variability right and wrong terms in verbal discrimination learning. The nature of the homograph made little difference for the right terms, but balanced homographs were better than polarized homographs as wrong terms, especially when the right terms were polarized homographs. This is what would be expected if the wrong-term experiences were distributed across alternative encodings with balanced homographs, accentuating the relative difference between the frequency of experiences for right and wrong terms. The type of homograph had no significant effect on recall.

The verbal discrimination task requires subjects to select the arbitrarily designated correct member for each pair in a series of word pairs. Ekstrand, Wallace, and Underwood (1966) proposed that subjects make such decisions by using the difference in the subjective frequency of experience for the right and wrong terms in each pair. This theory assumes that perceiving, pronouncing, and rehearsal experiences accumulate as the subject attends to the right term and the wrong term, though the accumulation eventually favors the right term. While not explicitly stated, frequency theory seems to imply that the experiences will accrue to the same encoding in each case. However, if the subject encodes an item differently over trials (cf. Martin, 1968), then the distribution of the experiences across various encodings might lead to somewhat different predictions as a function of whether the right or wrong term has more alternative encodings (Mueller, Pavur, & Yadrick, 1974).

If the experiences are independently distributed across alternative encodings, then the net effect would be that an item with multiple encodings would have fewer effective experiences accumulated to any single encoding than would be the case otherwise. Holding wrong-term encoding variability constant (Kw), pairs having either high (Hr) or low (Lr) right-term encoding variability would be learned at different rates. Specifically, Hr-Kw pairs should be learned slower than Lr-Kw pairs, since in the latter case all experiences to the nominal right term accumulate for the same encoding (in the extreme case), while the same number of experiences distributed over multiple encodings for the Hr-Kw pairs would result in a smaller difference between any one encoding of the right term and the wrong term, compared to the Lr-Kw pairs. Similarly, holding right-term encoding variability constant (Kr), pairs with high (Hw) or low (Lw) wrong-term encoding variability should be learned at different rates. Kr-Hw pairs should be learned faster than Kr-Lw pairs, since the experiences will be distributed over multiple encodings of the wrong terms in the Kr-Hw pairs, accentuating the advantage for the right terms, while for Kr-Lw pairs all experiences of the wrong term will accumulate for one encoding, reducing the differential between the right and wrong terms.

Then, in general, high encoding variability right terms should hinder acquisition, but high encoding variability wrong terms should facilitate acquisition, compared to low encoding variability items. Furthermore, when encoding variability (high or low) is factorially combined with item function (right and wrong terms), the best performance should result for pairs with low encoding variability right terms and high encoding variability wrong terms (Lr-Hw). For such pairs, the right-term experiences are concentrated in a small number of encodings while the wrong-term experiences are distributed, thus maximizing the relative difference between any one right-term encoding and any one wrong-term encoding. By similar reasoning, pairs with high encoding variability right terms and low encoding variability wrong terms (Hr-Lw) should be the most difficult to learn.

This experiment used lists composed of homographs. As words with alternative meanings, homographs satisfy the basic requirement of multiple encodings, and word association norms can assess the relative dominance of each meaning (e.g., Kausler & Kollasch, 1970). In some cases, one meaning is more potent than the other, e.g., BANK and TIRE, and these *polarized* homographs will be considered as *low* in encoding variability. In other cases, the alternative meanings are about equally potent, e.g., BARK and SEAL, and these *balanced* homographs will be considered as *high* in encoding variability.

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Table 1
Average Number Correct in Verbal Discrimination, Pooling Over Instructions

	Pair Type (Right-Wrong Term)			
Trials	B-B	B-P	P-B	P-P
1-3	12.81	12.39	13.08	11.64
4-6	13.89	13.41	13.71	13.20
All	26.70	25.80	26.79	24.84

Note—B refers to balanced homographs (high encoding variability) and P refers to polarized homographs (low encoding variability.

METHOD

Design and Subjects

The basic design involved the factorial combination of instructions (informed that the list contained homographs, uninformed), type of right-term homograph (balanced, polarized), and type of wrong-term homograph (balanced, polarized), with the last two factors varying within subjects. A mixed-list design was used, since if the balanced and polarized homographs are discriminable as such, then, with an entire list of pairs with polarized (balanced) right terms and balanced (polarized) wrong terms, for example, subjects might respond on the basis of that attribute alone rather than a frequency differential. Thirty subjects participated in partial fulfillment of course requirements in introductory psychology.

Materials

The unrelated homographs were chosen from those used by Winograd and Geis (1974).[1] Three 20-pair lists were used, each with five pairs representing the four pair types: balanced homographs for both the right and wrong terms (B-B), balanced homographs as the right terms and polarized homographs as the wrong terms (B-P), polarized homographs as the right terms and balanced homographs as the wrong terms(P-B), or polarized homographs as both right and wrong terms (P-P). Each was arranged in six different random orders for presentation, with the left-right spatial position of the right and wrong terms varied equally within and over trials.

Procedure

Each subject performed for six trials, using the study-test method of presentation at a 2-sec rate on a memory drum. Both members of a pair were shown, with the correct word underlined for study. Half of the subjects were told that all of the words in the list were homographs, but that this had no bearing on which word was correct; the remaining subjects were not told that the words were homographs. Following the sixth trial, the subjects were required to recall all of the words that had been used. This written test was unpaced.

RESULTS

The average number of correct responses in verbal discrimination is shown in Table 1, with the first three trials and the last three trials presented separately for each pair type. There was no main effect due to instructions about the homographs, nor any interactions with instructions, Fs < 1.98. The main effect of right-term encoding variability was not significant[2], $F < 1$. There was a main effect of wrong-term encoding variability, $F(1,24) = 14.81$, $MSe = 6.78$, as balanced homographs (high encoding variability) led to better performance than polarized homographs (low encoding variability). There was no interaction for Right-Term by Wrong-Term Encoding Variability, $F = 1.07$, but there was a Right-Term by Wrong-Term by Trials interaction, $F(5,20) = 2.31$, $MSe = .430$. This interaction indicated that the effect of wrong-term encoding variability was more apparent for pairs with low encoding variability right terms, and early in learning. Most of this difference was attributable to poor performance at the outset for pairs with polarized homographs in both right and wrong functions, with this difference diminishing as all pair types were eventually learned.

In terms of recall, the only significant effect was due to item function, with more right terms than wrong terms recalled, $F(1,24) = 31.36$, $MSe = 1.617$. There was no main effect due to type of homograph, $F < 1$. The mean number of items recalled was 5.33 and 4.93 for balanced and polarized right terms, respectively, and 3.57 and 4.10 for balanced and polarized wrong terms, respectively. There was a nonsignificant tendency for balanced homographs to lead to better recall when used as right items, but to hinder recall when used as wrong items, $F(1,24) = 2.55$, $MSe = 2.56$, $p < .13$.

DISCUSSION

The verbal discrimination results were partially in accord with the present application of encoding variability theory. There was little effect overall when encoding variability was manipulated among right terms, though it was expected that high encoding variability (balanced homographs) would hinder performance. When the wrong terms were balanced homographs, it made little difference whether the right terms were balanced or polarized homographs, and with polarized wrong terms, the use of balanced homograph right terms actually led to better, rather then worse, performance.

The original expectation that high encoding variability (balanced homograph) wrong terms would improve performance was supported, but most of this difference was due to the particularly poor performance on pairs with low encoding variability (polarized) items as both right and wrong terms. The pair type which was expected to be the best, polarized right terms and balanced wrong terms, was indeed the best in terms of rank order; but the pair type which was expected to be the worst, balanced right terms and polarized wrong terms, in fact led to fairly good performance.

NOTES

1. The authors wish to acknowlege E. Winograd for providing these materials.

2. Effects described as significant involve $p < .05$, or less.

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