Next, it should be remembered that the present investigators have studied reactions to specific, concrete behaviors, whereas many other studies in the area have used lists of adjectives as the descriptive stimuli. When an S accepts a trait, e.g., "considerate," as given, he is already one step removed from the kind of problem he faces in the present study, in which he is presented with evidence that the stimulus person sometimes behaves considerately and sometimes inconsiderately. It should also be noted that the negative bias observed has appeared most strongly as a delayed effect. Most of the studies in this area have used immediate ratings only; thus there would have been no opportunity to observe a delayed effect, even supposing it had occurred with the type of stimulus materials used.

Finally, there is some recent evidence that even with different types of stimulus materials and procedures, negative information may be more heavily weighted. Wyer & Watson (1969) note that results they obtained with judgments of likeability of sets of personality traits "could . . . indicate that negative adjectives have a disproportionately greater influence upon evaluations than would be predicted on the basis of their relative polarization [p. 25]." The same authors cite a relevant study by Feldman (1966) which reports a correlation of $-.69$ between the evaluation of a given adjective and its influence on

ratings of pairs of adjectives that include it.

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of verbal habits that have been revealed by cultural norms of free association . . . [Rosenberg, 1956, p. 123], whereas grammatical habits are "... those which underlie the sequential behavior corresponding to grammatical rules [Stanners, 1969, p. 99]." The present experiment was concerned with the differential efficacy of these mechanisms in a multitrial free-recall task when noun (N) and verb (V) form classes served as items.

The free-recall task involved a modification of the usual free-recall input procedure in which items are presented individually for study and in a different serial order for each input phase. The modification consisted of exposing items contiguously as pairs during inputs, with both the interpair item content and the intrapair spatial (left-right) assignment of items remaining constant across trials. Outputs, however, consisted of the standard recall of single items in any order.

The list contained an equal number of N and V items, which entered, in turn, into equal numbers of N-N, N-V, V-N, and V-V pairs. Generalizing from earlier studies on form class (e.g., Simpson, 1965), total recall of N items was expected to exceed total recall of V items. Of greater interest, however, was the expected difference in recall between N and V items when they occurred as components of heterogeneous pairs (i.e., N-V and V-N pairs) and when they occurred as components of homogeneous pairs (i.e., N-N and V-V pairs). A heterogeneous pair of items (either N-V or V-N) forms a grammatical sequence characteristic of natural language, and it is likely to be learned as a unit (Glanzer, 1962). Consequently, the recall differential between N and V items should be negligible for heterogeneous pairs. On the other hand, a homogeneous pair of items (either N-N or V-V) does not form a grammatical sequence, and it is unlikely to be learned as a unit. Instead, associative habits akin to those accounting for the preponderance of paradigmatic associations in word-association norms are likely to be activated when contiguous homogeneous items are exposed. Since N-N clustering generally exceeds V-V clustering in free-recall learning (Stanners, 1969), N-N associations in the present situation are likely to accrue strength at a faster rate than V-V associations. Since increments in interitem associative strength are presumed to underlie increments in free recall (Tulving, 1968), recall of homogeneous N items was expected to exceed recall of homogeneous V items.

LISTS

The total population of Thorndike-Lorge (1944) high-frequency (A and AA) words, six to eight letters in

The effects of form class on the free recall of contiguous items*

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Noun (N) and verb (V) items were exposed contiguously as pairs during the input phases of a free-recall task, with the list containing equal numbers of N-N, V-V, N-V, and V-N pairs. Recall of N items was superior to recall of V items for homogeneous pairs (N-N and V-V), but not for heterogeneous pairs (N-V and V-N). The results supported the hypothesis that recall of items in homogeneous pairs is mediated by associative habits, whereas recall of items in heterogeneous pairs is mediated by grammatical habits.

A number of studies (e.g., Glanzer, 1962; Shapiro & Palermo, 1967; Simpson, 1965; Stanners, 1969) have found differential rates of learning for the various

grammatical form classes. Both associative and grammatical habits have been postulated as being mechanisms underlying the effects of form class on verbal learning (Glanzer, 1962; Rosenberg, 1965; Stanners, 1969). In terms of the distinction made by Rosenberg (1965) and Stanners (1969), associative habits are "... the kind

*This study is based upon a thesis submitted by the first author to the Graduate School, Saint Louis University, in partial fulfillment of the requirements for the Master of Science degree.

length, was screened by means of Webster's Collegiate Dictionary. Words listed exclusively as nouns and words listed exclusively as transitive verbs were selected for inclusion in an initial N and V word pool. Since both nouns and verbs function as other form classes in natural language, a further screening involved actual use of words (West, 1953). Nouns and verbs in the initial pool that functioned as other form classes for 20% or more of their total usage were eliminated from the pool. Nouns were screened further in terms of the abstract-concrete dimension. Lockhart (1969) reported that, for adjective-noun paired associates, concrete nouns yielded asymmetrical recall, regardless of their presentation order, whereas abstract nouns yielded symmetrical recall. Since a similar asymmetrical effect for the pairings of this experiment would have produced a potential source of confounding, only abstract nouns were permitted to remain in the pool. When applicable, the normative data of Paivio, Yuille, & Madigan (1968) and Spreen & Schulz (1966) served as the screening device. Nouns not listed in either source were rated by 15 graduate students using the instructions and the c scale of Paivio et al (1968). The criterion for continuation in the pool was $c \leq 4.00$. Finally, all words were screened for associative relatedness, using available word norms and Es' judgments to screen out related words.

The final word pool contained 16 nouns (examples: *effort, liberty, memory*) and 16 verbs (examples: *agrees, destroys, prefers*). For purposes of greater generalization and greater control of idiosyncratic associations, two different 16-item free-recall lists (A and B) were constructed by randomly assigning half of the nouns and half of the verbs to each list. Additional random assignments of items generated a number of variations of Lists A and B, each containing two N-N, two N-V, two V-N, and two V-V pairs. The criteria for these variations were: (1) each N item and each V item appeared equally often in heterogeneous and homogeneous pairs; (2) each N item and each V item appeared equally often on the spatial left and spatial right; and (3) each type of pair appeared equally often at each of the eight serial positions. The list content variable and the other control conditions were subsequently found to have negligible effects on recall scores, and these variables were omitted from the analyses reported below.

Subjects and Design

The Ss were 40 undergraduates in psychology courses, all of whom were naive with respect to prior participation in free-recall experiments. They were assigned alternately to Lists A and B and also to the

other list variations introduced for purposes of greater generalization and control. Except for these control variables, the experimental design was a 2 by 2 by 2 by 5 within-group factorial. The within-group variables were form class (N vs V), type of pairing (homogeneous vs heterogeneous), spatial position (left vs right), and trials (1-5).

PROCEDURE

Five input-output trials were given to each S. The serial order of pairs during input phases varied from trial to trial. Pairs were exposed on a memory drum at the rate of 2 sec per pair. A 3-min written recall test followed each complete input phase, with S being instructed to recall as many words as he could and in any order. A response was scored as correct if the word was phonetically equivalent to the stem word regardless of spelling, tense, or suffix.

RESULTS AND DISCUSSION

As expected, the main effect of trials was highly significant, $F(4,156) = 151.81$, $p < .001$. However, none of the interactions involving trials with the other variables approached significance. Consequently, only recall scores summated across trials are reported below.

The recall means for N items and V items were 28.10 (4.41) and 24.45 (6.65), respectively. In agreement with earlier studies, the main effect of form class was statistically significant, $F(1,39) = 22.97$, $p < .001$. Neither the main effect for spatial position nor the main effect for type of pairing approached significance, $F(1,39) < 1$. The means were 26.30 (5.41) and 26.25 (5.59) for items in spatial left and right positions, respectively, and 26.33 (5.84) and 26.23 (5.67) for items in homogeneous and heterogeneous pairings, respectively.

The only significant interaction was the Form Class by Type of Pairing interaction, $F(1,39) = 9.76$, $p < .01$, with all other interactions falling far short of statistical significance. The Form Class by Type of Pairing interaction was, of course, the one of primary concern in this experiment. As hypothesized, the difference in recall between N and V items was greater when they entered into homogeneous pairings than when they entered into heterogeneous pairings. For homogeneous pairs, mean recall was 14.55 (2.87) for N items and 11.78 (3.74) for V items; for heterogeneous pairs, the comparable means were 13.55 (2.61) and 12.68 (3.64). Correlated t tests revealed a clearly significant difference between N and V recall in homogeneous pairs, $t(39) = 5.38$, $p < .001$, but not for heterogeneous pairs, $t(39) = 1.87$, $p > .05$. Moreover, a more detailed analysis revealed that mean recall

of N and V items was nearly identical for both N-V pairs (means of 6.83 for N and 6.20 for V) and V-N pairs (means of 6.73 for N and 6.48 for V). Thus, superior recall of N items over V items was manifested only when the learning context stimulated the activation of associative habits. When the learning context stimulated the activation of grammatical habits, recall of N and V items was virtually symmetrical.

The use of a complete within-group design militates against a statistical analysis of differences between types of pairings in the clustered recall of contiguously presented items. However, it is of interest to note that the proportions of contiguous items recalled together support the earlier finding (Stanners, 1969) that N-N clustering exceeds V-V clustering. As averaged across trials, these proportions were .54 and .42 for N-N and V-V pairs, respectively. It seems likely that this difference in clustering accounts for the superior recall of N items over V items when they occur in homogeneous pairs.

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