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ONR ltr, 26 Oct 1977

Free Association and Attitude

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Recent experimentation has been concerned with some implications of a point of view concerning attitudes. This notion consists essentially in the hypothesis that the term attitude implies a response system, oriented toward objects, institutions, concepts, etc., (and their symbols), which exists in varying states of availability for evocation or emission. Strength of attitude in this view, is associated with relative degrees of availability. Thus a person with a strong attitude at times would have highly available responses related to the attitude and would tend to emit them under circumstances of mininial environmental stimulation, or respond to equivocal stimili with attitude-related reactions.

Although certain data readily in the literature are capable of interpretation in these terms, there is a need for a more thoroughgoing analysis of the relationship between attitude and response availability. One measure which seems to be indicative of response availability is the number of free associations to stimulus words (see 1,4). If response availability is associated with attitude, then one should expect the following propositions to be substantiated. (1) Response availability, as measured by free association, should vary with the position of an individual on an attitude continuum. (2) Response availability in persons holding at an attitude then for neutral words. (3) The relationship between attitude and response availability should hold for stimulus words of varying frequency. (4) It is possible that there are significant interactions among these variables. The present study was designed to study these four propositions.

METHOD

The variables suggested above were studied in a factorial design, with number of free associations as the dependent variable. Each of the variables will be described, in turn.

1. **Attitude.**

A simple attitude scale was developed for this study, according to the method of Guttman (5). The attitude chosen was attitude toward church activities. Thirteen questions were developed and administered first to a pre-test group of 77 college students and then to the experimental group of 182 college sophomores. Analysis of the pre-test data produced a coefficient of reproducibility of .73, which is not high enough for the content area to be considered scalable. It was felt, however, that by combining or eliminating categories on the larger experimental group a satisfactory coefficient could be obtained.

Analysis of the data for the experimental group showed that retaining eight of the original items and combining response categories on three of these eight items produced a scale with a coefficeint of reproducibility of .88. This is satisfactory for our purposes. The items, as scored, follow:

Attitude Items

1. How often do you think people should attend church?
   a. at least on Sunday
   b. Occasionally
   c. never

2. Do you feel that attendance at church should be a person's primary activity on Sunday?
   a. Yes, it should be the most important thing you do on Sunday.
   b. It doesn't make any difference whether you go to church or not.
   c. No, other things may be more important.

3. Do you think that a person ought to be enrolled as a member of church as well as attend church?
   a. Yes, a person ought to be enrolled as a church member.
   b. It doesn't make any difference as long as he attends.
   c. No, he shouldn't be enrolled as a church member whether he attends or not.

4. Do you think it is all right to work on Sunday?
   a. No, you should not work on Sunday.
   b. It is all right if you are not paid for it.
   c. It is all right to work on Sunday, just as on any other day.

5. Do you feel Sunday observance is a commandment which must be obeyed?
   a. Yes, I do.
   b. Sunday observance should be followed but it not a commandment which must be obeyed.
   c. No, I don't.

6. Do you think a person benefits spiritually from attending church?
   a. Yes, he does.
   b. I don't know whether church attendance results in spiritual benefits.
   c. No, he doesn't.

7. All things considered, do you think a person ought to contribute money to church as well as attend its services?
   a. Yes, he should.
   b. It doesn't make any difference
   c. Ne, he should not.

8. Do you think a person ought to engage in church social and welfare activities as well as attend church?
   a. Yes, he should.
   b. It doesn't make any difference
   c. No, he should not.

   (The responses to categories b and c for items 2,4, and 8 were combined)

2. Stimulus words.

Two stimulus words related to the attitude were chosen, church and prayer, and two words, quick and haste, were chosen as neutral words. Church and quick occur, according to the T-count (6) at least 175 times per million words, and prayer and haste occur 78 and 71 times per million words respectively.

3. Free Associations.

The method used to obtain the associations is indicated in the statement of procedure, which follows:

Procedure

In order that the subjects might not associate the collection of the word association data with the attitude scale (which might influence their responses), the data were collected in two sessions separated by twelve days. For the same reason, two experimenters were employed to collect the data, and each experimental session was presented to the subjects as an independent project. Interviews by the writers with a number of subjects after the amount of the administration of the attitude scale indicated that the subjects did not relate it to the previous session in which they had been requested to respond to several religious-type words. Not a single subject of those interviewed reported even a suspicion of there being any connection between the two sessions.

The stimulus words were presented to the subjects in the form of a five page mimeographed booklet. The cover page provided space for the recording of pertinent biographical information. The remaining four pages each contained one of the stimulus words which appeared at the top of the page in capital letters. At the bottom of each page was a line of instructions reading, "Please do not turn page until signal is given." Each page was ruled into three columns too so that the subjects' responses would vary too not far from and wide over the page. The use of such booklets permitted control over the order in which the subjects would respond to the four stimulus words. The booklets were prepared in such a manner that each of the 24 possible orders in which the stimulus words might appear occurred equally often. The instruction to the subjects for the word association session were the same as those used in a previous study (1).

The Analysis of the Data

Both measures—the attitude scale and number of free associations—were obtained on 182 subjects. The designing permitted the data to be analyzed by means of the analysis of variance. Two separate analyses were carried out. In the first, only the associations to one stimulus word per subject were followed. The design for both analyses was as follows:

	High Frequency Word		Low Frequency Word	
Attitude	Related Word	Un-related Word	Related Word	Non-related Word
Favorable Group				
Unfavorable Group				

This design gives rise to the following sources of variation, each of which may be tested for significance.

Source of Variation

	df
Attitude	1
Frequency of Occurrence of stimulus words	1
Kinds of stimulus words	1
Interactions:	
Attitude x frequency	1
Attitude x kinds	1
Frequency x kinds	1
Attitude x frequency x kinds	1
Within cell (individual differences)	168
Total	175

For computational convenience, six subjects were selected at random and dropped from the analysis (Ranks 9,13,39,102,151, and 159), so as to provide an equal N of 22 in each cell. Thus there was a total of 175 degrees of freedom. After dividing the 176 subjects into a "favorable" and "unfavorable" group (the upper and lower 50 % respectively) the subjects were randomly assigned to the eight cells of the experimental design.

In the second analysis, all the experimental data were employed, i.e., the response of the subjects to each of the four stimulus words were subjected to analysis. In addition, the attitude variable was divided into nine groups rather than two. For this analysis, two subjects were selected at random and omitted from the analysis (ranks 10 and 96) so as to provide an equal N of 20 in each cell. In this case there was a total of 719 degrees of freedom apportioned as follows:

Source of Variation

	df
Bet. Attitude	8
Bet. Frequency	1
Bet. Kinds of Words	1
Interactions:	
Att. x Freq.	8
Att. x Kinds	8
Att. x Freq. x Kinds	8
Freq. x Kinds	1
Total Bet. cells.	35
Bet. subj, in group(same)	171
Pooled subj. x stimulus words	513
Total within cells	684
Total	719

It was felt that some control over the subjects' ability to verbalize would be desirable for the purposes of this experiment, in order to prevent this factor from obscuring otherwise significant results, or, on the other hand, from creating apparently significant results from where none existed. Since it was impossible to control initial verbal ability experimentally, it was hoped that statistical control could be exerted through the analysis of covariance. The control was exerted by means of regressing on the L-score (language score of the American Council on Education Psychological Examination, which was considered as a measure of ability to verbalize. These scores were available fro the battery of entrance examinations administered to all incoming freshmen at the University

of Maryland. However the Pearson product-moment correlation between number of free
association and L-score based on the data of the first analysis of variance described
above (N=176) was only +.03. Since this is obviously not a significant relationship,
it was decided that the analysis of covariance was not justified in this case.

Results

It will be recalled that the experimental procedure provides four measurements
on each individual–the number of free associations given in response to each of the
four stimulus words. This makes possible two analyses of variance of the data. In
the first, individuals are randomly assigned to the cells of the design. Under this
condition, the analysis is performed upon data which represent only one measure per
individual. Thus each measurement is independent of all the others. In the second
analysis, all the data–representing repeated measurements on each individual–are
subjected to analysis. The paradigm for this analysis follows that presented by
Edwards (2). Both analyses will be presented followed by a general interpretation of
the results.

ANALYSIS OF VARIANCE BASED UPON INDEPENDENT MEASUREMENTS

The mean number of free associations for each of the experimental conditions is
shown in Table I.

Table 1

Mean Number of Free Association for Each Experimental Condition
Independent Measures
N=176.

Attitude	High Frequency Words		Low Frequency Words		
	Related Word	Non-related Word	Related Word	Non-related Word	X
Favorable Group	43.68	33.95	38.50	31.50	38.9
Unfavorable Group	47.86	30.91	40.55	42.05	40.3
X	45.77	32.43	39.52	36.78	38.6

As can be seen from these figures, there is a tendency for individuals to produce a
larger number of free associations in response to words of relatively high frequency
of occurrence, except for a decided reversal in the case of the response of the un-
favorable group to the low frequency, non-related word as compared to the high frequency
non-related word. It also appears that there is a tendency to respond with a greater
number of free associations words which are related, to an attitude. No trend appears
in the means associated with position on the attitudinal continuum.

The analysis of variance of the independtent measurements is presented in Table II.
The null hypothesis concerning the homogeneity of sub-group variances was accepted on the
basis of the L_1 test (3).

TABLE II
ANALYSIS OF VARIANCE OF INDEPENDENT MEASUREMENTS
(INDEPENDENT MEASUREMENTS, N=176)

Source	Sum of Squares	df	Mean Square	F
Bet. Attitude	517.55	1	517.55	1.69
Bet. Frequency	40.09	1	40.09	
Bet. Kinds of Words	2,848.09	1	2,848.09	9.31
Interactions:				
Att. x Freq.	360.82	1	360.82	1.18
Att. x Kinds	4.45	1	4.45	
Freq. x Kinds	1,233.84	1	1,233.84	4.03
Att. x Freq. x Kinds	680.88	1	680.88	2.22
Error (within cell)	51,419.52	168	306.07	
Total	57,105.25	175		

The results of this analysis indicate that the only variable which significantly affects verbal behavior is the kind of stimulus word employed. In this instance, words which are related to an attitude embracing religious overtones elicited a greater number of free associations than did neutral words involving little or no emotional tone.

The small variability associated with the frequency variable is particularly interesting. The mean values presented above indicated that there was a tendency for the subjects to respond with a greater number of free association to the high frequency words as compared with the low frequency words. But there was one reversal of this tendency (now in the case of the responses to the low frequency, non-related stimulus word by the unfavorable group) of considerable magnitude. This reversal apparently acted to eliminate any statistical significance which can be attributed to the frequency variable. This phenomenon, however, has served to produce statistical significance in the case of the interaction between the frequency and kinds of variables. The means associated with this interaction are as follows:

		Kinds	
		Related	Non-Related
Frequency	High	45.77	32.43
	Low	39.52	36.77

From these figures it can be seen that the related, i.e., religious words elicit more associations than do the more neutrally toned non-related words. This agrees with the significance attributed to the kinds of words variable. Apparently, however, individuals tend to respond with a greater number of free associations to emotionally toned words which are in common usage as compared to emotionally toned words in less common usage. On the other hand, they tend to respond relatively more frequently to less commonly used words which are not emotionally toned as compared to widely used neutral words. This situation results in a significant interaction effect between the frequency and kinds variables.

There is no significant variation in number of free association attributable to position on the attitude continuum in terms of this analysis. It is possible, however, that the coarse grouping of the subjects into upper and lower 50 per cent may serve to obscure variations associated with the attitude variable. There is some evidence to support this conclusion in the succeeding analysis.

ANALYSIS OF VARIANCE BASED UPON REPEATED MEASUREMENT

The mean number of free associations for each of the experimental conditions is shown in Table III. In this case, the attitude continuum was divided into nine groups. Thus, attitude group 1 included the twenty individuals most favorable toward church activities, group 2 includes the next twenty most favorable and group 9 included the twenty individuals least favorable toward the attitude.

Table III

Mean Number of Free Associations of Each Experimental Condition
(Repeated Measurements, N=720)

Attitude	High Frequency Word		Low Frequency Word		
	Related Word	Non-related Word	Related Word	Non-related Word	X
Group 1	46.35	38.40	39.30	31.00	38.76
2	43.50	34.15	38.55	32.05	37.06
3	43.20	29.35	35.05	30.00	34.40
4	42.00	37.35	39.20	32.00	37.70
5	39.25	31.90	35.40	32.85	34.85
6	46.45	39.05	42.85	42.50	42.71
7	44.75	40.55	37.55	36.85	39.88
8	45.35	31.30	34.15	27.20	34.50
9	51.00	45.75	42.55	43.60	45.72
X	44.65	36.47	38.29	34.31	38.40

The null hypothesis concerning the homogeneity of sub-group variances was rejected on the basis of the L_1 test (3). The data were subjected to square root and reciprocal transformations in an attempt to obtain homogeneity among the sub-group variances. Neither of these techniques accomplished this purpose. We shall assume, then, that the sub-group variances are heterogeneous.

This condition complicated the interpretation of the tests of significance associated with the analysis of variance. Since the sub-group variances are heterogeneous, it is impossible to determine definitively whether any significant differences which may occur are due to differences in means, in variances, or in both. Nevertheless, the results of the analysis are valid as descriptions of the properties of the data. For from this information, it may be possible to obtain at least some clues as to the relationship which may exist between the three independent variables and the dependent variable. The results of the analysis are shown in Table IV.

Table IV

Analysis of Variance of Repeated Measurements

Source	Sum of Squares	df	Mean Square	F
Bet. Attitude	9,648.04	8	1,206.00	16.52
Bet. Frequency	3,345.42	1	3,345.42	45.82
Bet. Kinds of Words	6,771.20	1	6,771.20	92.73
Interactions:				
Att. x Freq.	984.33	8	123.04	1.69
Att. x Kinds	1,460.40	8	182.55	2.50
Freq. x Kinds	756.45	1	756.45	10.36
Att. x Freq. x Kinds	584.15	8	73.02	
Total bet. cells.	23,549.99	35		
Bet. Subj. in same group	174,090.16	171	1,018.07	13.34
Pooled subj. x stimulus word	39,161.04	513	76.34	
Total within cells	213,251.20	684		
Totals	236,801.19			

The first thing we may note is that this analysis confirms the results obtained in the previous analysis insofar as the kinds variable and the interaction between the frequency and kinds variables are concerned. These two sources of variation are significant at the .01 and .05 levels of confidence respectively, just as they were in the analysis based upon a single measure per individual. It would seem that we are justified including that these factors have a significant effect upon verbal behavior as measured by number of free associations.

In addition the remaining two main sources of variation are also statistically significant. The mean number of associations given in response to the words of high frequency of occurrence is 40.56, and the mean number of associations given in response to the words of low frequency of occurrence is 36.25. There is then a difference of 4.31 between these two means. We have already seen that there is a significant difference between the means associated with the kinds variable, and the magnitide of this difference is 6.13. These two differences are of approximately the same magnitude, indicating that we may place confidence in the statistical significance associated with the frequency variable despite the heterogeneity of sub-group variances[1].

It is difficult to see whey the frequency variable should have tested significantly in the second analysis are not in the first. The means associated with the high and low frequency words in the first analysis are 39.10 and 38.15 respectively: the comparable means in the second analysis are 40.56 and 36.25. Obviously there is a much larger discrepancy in the latter figures, which contributes to the significant result obtained in the second analysis. The discrepancy between these two sets of means may be due to sampling. It is possible that the sample drawn may not have been representative of the population.

[2] A statistical tests of the difference between the means associated with the frequency variable agrees with this conclusion; the critical ration is 3.22 and P is less than .01.

There is a significant variation among the means associated with the nine attitude groups, as is evident from an inspection of the figures listed in the last column of Table III. However, whatever, the relationship between attitude and verbal behavior may be, it appears to be an extremely complex function. No meaningful interpretation of these given figures can be made on the basis of the results of this study. Further research is necessary to clarify this relationship.

The last F test shown in Table IV is a test of individual differences. It is to be expected that this would prove a significant source of variation indicating that there are significant individual differences in the number of free associations given by the subjects in response to stimulus words.

Interpretation of Results

On a variable-kinds of stimulus words-unquestionably produces differing numbers of free association in response to stimulus words. This variable was defined for the purpose of this study, as words related to an attitude and words not related to that attitude or any other. It represents an attempt to determine at a relatively crude level whether words can be classified in a meaningful manner with respect to their effects upon verbal behavior. In this case, the characteristic, upon which the stimulus words can be distinguished, is the presence or absence of affective value. The two stimulus words which are related to attitude toward chruch activities are words with rich religious connotations. To this extent, they are emotionally toned words.

The stimulus words which are not related to the attitude were chosen so as to be neutral words and are, therefore, relatively free of affective value. The absence of this factor tends to reduce the number of free associations to neutral words as compared to emotionally toned words. The effects of the attitude and frequency are equivocal. These two variables are significant in terms of one analysis of the data and not significant in terms of another analysis. In view of the results obtained in previous work with variables of this nature, it would seem that the results of the second analysis are more reliable, i.e., attitude and frequency of occurrence of stimulus words do affect verbal behavior. A more precise description of the relation which exists between verbal behavior and the frequency and emotional dimensions will require further research. This is particularly true in the case of the attitude variable, which appears to bear a complex relationship to verbal behavior as measured by number of free associations.

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