MEDIATED GENERALIZATION AND THE INTERPRETATION OF VERBAL BEHAVIOR: V. 'FREE ASSOCIATION' AS RELATED TO DIFFERENCES IN PROFESSIONAL TRAINING¹

BY JOHN P. FOLEY, JR., AND ZEBULON L. MACMILLAN

The George Washington University

In previous papers of this series, direct and indirect, or mediated, types of generalization were theoretically discussed (3) and experimentally demonstrated along various gradients (8, 4). The development of mediated generalization in an everyday-life situation was also experimentally investigated (9). In the present paper, an attempt will be made to study the relationship between professional training and the type of verbal response obtained in the 'free association' experiment. Although mediated generalization *per se* is not necessarily involved in such associations, the empirical demonstration of verbal associations along a dimension established by professional training would appear to indicate a definite possibility of the operation of mediated generalization along 'professional' gradients. The present study is thus more 'general' than previous studies in this series: in the earlier experiments the investigators controlled the formation of the associations (8, 4) or studied associations known to have been formed in a given classroom situation (9), whereas in the present study we are concerned with associations formed in a general curriculum of professional training.

The present experiment may also be regarded as an effort to throw light upon the type of stimulatory factors *responsible* for the verbal associations. It is a curious fact that practically none of the numerous studies on 'free association' have directly attacked this basic psychological problem. No attempt can be made here to survey the extensive literature in this field; suffice it to say that most of such studies, beginning with the pioneer work of Galton in 1879, have been concerned with the measurement of associative reaction time, the classification of associations into various types, the determination of the degree of originality or commonality of an S's responses, or the analysis of the S's associations in order to reveal or diagnose

¹ The present paper represents part of a research project being conducted by Dr. C. N. Cofer and the senior author under a grant-in-aid from the American Association for the Advancement of Science. The writers are indebted to Dr. R. M. Gottsdanker for aid in the classification of the responses and to Dr. Cofer for a critical reading of a preliminary copy of the manuscript.

interests, attitudes, 'guilty' or technical knowledge, aptitudes, emotional 'complexes,' personality traits, pathological processes, and the like.²

The only studies directly relevant to the present paper are those in which an attempt was made to correlate some aspect of the S's stimulatory background with one or more characteristics of his verbal associations. Studies of association frequency as a function of such factors as chronological age or diagnostic syndrome are irrelevant, owing to ignorance of the specific stimulatory factors involved. Likewise, many investigators, such as Mohsin (13), categorically state that the associations originated from 'past experience,' although their experiments were not specifically designed to determine whether or not this was the case.³ A similar interpretation is made by Pintner (15), who designates 'habit' as one of the factors accounting for the 'free associations,' obtained annually from 1925 to 1943, to the item "Think of the name of a President of the United States."

Although primarily interested in the use of 'free association' for the diagnosis of abnormality in children, Goett (10) found a correlation between the type of 'free association' and the social class to which the children belonged. This result was especially true in the case of 'predicative associations' (e.g., *glass—brittle*, *father—good*), which were given by 60 percent of the children under 12 years of age from the 'proletariat' and by only 30 percent of the children of the same age from the 'better circles.'⁴

Rosanoff, Martin, and Rosanoff (16) have attempted to develop a free association technique "whereby a subject's mental capacity might be estimated from a measure of what he has acquired in the course of his education, and from a comparison of his acquisition with the average of a group of subjects of the same amount of education" (p. 2). The stimulus words consisted of 100 orally-presented technical terms, selected from different fields of academic learning (e.g., *Waterloo*, *isomerism*, *burette*, *coagulation*, *titration*, *syntax*, etc.). The writers present frequency tables of the associations of 1000 'superior' persons, including men of science, college professors, candidates for higher degrees, and college graduates. Norms on a 'High Standard' sub-group of 100 selected Ss, such as starred men of science, are also reported. In order to study the effect of education upon frequency of a given response, various elementary school, high school,

² Typical studies are surveyed by Vernon (18, pp. 88-102) and Woodworth (19, pp. 340-367).

³ The influence of 'mental set,' experimentally demonstrated by Mohsin (13), has been emphasized by a number of writers, such as Woodworth (19). Instead of regarding 'mental set' as a causative factor, a sort of hypostatized *deus ex machina*, however, it should be realized that 'mental set' is itself the result of immediately preceding stimulating conditions.

⁴ The corresponding figures for children over 12 years of age were: 'proletariat' 40 percent, 'better circles' 25 percent.

and college groups were tested. With an abridged list of 41 'Class A' stimulus words, there was a completely consistent increase in frequency of 'High Standard' associations from the 5th grade in elementary school, through high school, college, and graduate levels, to starred men of science.

Murphy (14), using the first 100 stimulus words of the Woodworth-Wells association test (cf. 20), studied the 'free associations' of 40 Yale seniors and faculty members, classified into five groups according to the experimenter's *a priori* estimate of their scientific *versus* literary interests and abilities. Certain differences between the associations of the 'literary' and the 'scientific' Ss were found.

Burt (1, 2) has described a 'word association learning test' for the measurement of interest. Although not a test of 'free association,' the technique is relevant to the present discussion, since the underlying theory is the same. The method of paired associates learning was used, some of the pairs consisting of common and unrelated words, the other pairs involving technical terms dealing specifically with the type of work in question (e.g., agricultural engineering). The implicit theoretical assumption underlying this procedure is that the pre-experimental reinforcement of the technical associations in the case of the technically interested and trained S will result in his learning the technical associations more rapidly than will an uninterested individual; in each case, of course, it is the ratio of scores on the technical to scores on the neutral words which is to be compared.

Wyman (21, 22) has reported an attempt to measure 'intellectual,' 'social,' and 'activity' interests of children by means of the 'free association' technique. The children's associations to each of 120 stimulus words were classified into the three above categories and the results correlated with teachers' rankings on the three kinds of interest. The obtained validity coefficients of +.65 ('intellectual'), +.50 ('social'), and +.31 ('activity') indicate a tendency for the child's 'free associations' to be related to his interests as estimated by teachers from his past behavior.

As one part of their 'M-F' Test, a personality test to determine the degree to which an S's responses agree with the responses characteristic of men and women in our society, Terman and Miles (17, pp. 19-26) include a 'multiple-response association test.' The test in its final form contains 120 stimulus words, each followed by four multiple-choice responses or common associations to the stimulus word. The S is directed to indicate the one of the four responses which seems to him to 'go best' with the stimulus word. The response words were selected as those showing maximal differences in frequency between male and female groups. That sex differences in

association were obtained, that the associations could be diagnostically used for masculinity-femininity differentiation, and that such associations were often obviously related to the different modes of life of men and women in our society—all of these facts would appear to indicate the importance of stimulatory factors in affecting the nature of the verbal associations obtained.

Perhaps the most relevant study is that of Goodenough (11), who reports the preliminary development of a 'free association' technique for the measurement of masculinity-femininity. A list of 240 visually-presented homographs⁵ (e.g., *bow*, *file*, *ram*, *trip*, *ring*, *firm*, *box*, *ace*, etc.) were used as stimulus words, the responses being divided into classes and sub-classes on the basis of common characteristics of meaning empirically determined to have maximal differential weights⁶ for the two sex groups of 400 Ss each. Thus, for example, to the stimulus word *bow* responses of *hair* or *hair ribbon* were given exclusively by girls, responses referring to *archery* were predominantly masculine but with a sex overlap, responses referring to *persons* were not common but were slightly more frequent among girls, and responses referring to *knots* or *tying* showed little consistent sex trend. Goodenough's procedure clearly demonstrates that the verbal associations of boys and girls differ, presumably as a function of differences in their stimulatory backgrounds, and that 'free associations' to ambiguous stimulus words provide a useful technique for such investigation.⁷

METHOD

Theoretically, professional training, as in law and medicine, consists of the establishment of specific conditioned responses to particular stimulating conditions; and not the least significant of these are verbal responses to verbal stimuli. Thus if a list of homophones, each admitting of legal, medical, and non-professional (neutral) interpretations, were presented in a 'free association' experiment, professionally trained Ss would be predicted to give a larger proportion of professional associations in their respective fields, as compared with a control group of non-professional Ss. The percentage of professional associations would likewise be expected to correlate with amount of professional training, and on the whole should be greater in the case of such ambiguous homo-

⁵ Incorrectly reported by Goodenough as homonyms. A few of the words (e.g., *bow-beau*) would be homonyms if presented auditorily.

⁶ Weights from 1 to 5 were assigned according to the probability of recurrence of a difference in the same direction as calculated by the χ^2 method; the direction of the difference, furthermore, had to be the same in each of the five age groups. Goodenough points out that in future work, the optimal weighting should be a function of the discriminative value of an item as indicated by small sex overlap and high internal consistency within single-sex groups.

⁷ It will be noted that, unlike the stimulus words employed by Terman and Miles, those used by Goodenough were selected as having two or more discrete dictionary meanings, thereby increasing the probability of divergent associations among different criterion groups. Goodenough describes the use of homographs as stimulus words as "a practice that has the effect of increasing the spread of responses, because, in effect, different subjects are actually responding to different words, the selection of which depends on their own idiosyncratic pattern of interests and attitudes" (p. 102). The use of auditorily-presented homophones, as in the present study, would in many cases increase such a spread even further.

phones ('critical' list) than in the case of common words which do not possess conventionalized professional meanings ('neutral' list). As previously pointed out in the present paper, the empirical demonstration of verbal associations along a dimension established by professional training would immediately suggest a possible gradient for the operation of mediated generalization, although such 'free associations' themselves may have arisen to a large extent from direct conditioning or reinforcement.

1. *Materials*: The stimulus words consisted of 20 'critical'⁸ and 20 'neutral' words, arranged in random order as indicated in the following list, in which the 'critical' words are in italics:

1. <i>confinement</i>	21. black
2. sour	22. <i>system</i>
3. rough	23. bible
4. <i>binding</i>	24. <i>discharge</i>
5. <i>constitution</i>	25. hard
6. girl	26. dream
7. king	27. <i>instrument</i>
8. <i>contract</i>	28. eagle
9. <i>solvent</i>	29. <i>compensate</i>
10. long	30. ocean
11. <i>hereditary</i>	31. lamp
12. river	32. <i>bear (bare)</i>
13. thirsty	33. <i>accident</i>
14. <i>expiration</i>	34. cottage
15. <i>chamber</i>	35. dark
16. <i>administer</i>	36. void
17. man	37. <i>tender</i>
18. blossom	38. tobacco
19. <i>complaint</i>	39. <i>cell (sell)</i>
20. carrier	40. cabbage

The word order was determined by chance, except that care was taken to avoid a sequence likely to be meaningful, or readily associated. The 'critical' words were selected *a priori* by the writers on the basis of the following criteria: (a) each word should be an easily recognized English word in common usage; (b) it must have a legal, a medical, and if possible a neutral meaning or implication; (c) if possible, the legal and medical meanings should have approximately 'equal weight,' i.e., its legal meaning should be as common as its medical meaning, and vice versa; (d) the pronunciation of the word should be the same for its different meanings.

The criteria for the selection of the 'neutral' words were as follows: (a) each word should be an easily recognized English word in common usage; (b) it should not have a common legal or medical meaning or implication; (c) the empirically determined most common verbal responses (associations) to it should have neither a legal nor medical meaning or implication; (d) there should be a high frequency or communality of verbal responses (associations) to each word, i.e., a large number of individuals (according to empirically established norms) should give the same verbal response to the word. The 'neutral' words were selected from those words in the Kent-Rosanoff frequency tables (12) which best fulfilled the above criteria.⁹

2. *Procedure*: The Ss were tested in small groups during a regular class period. Each S was provided with a pencil and mimeographed data sheet with numbers from 1 to 40 inclusive. The following instructions were then read to the group: "This is a test of verbal association. I shall pronounce a word. As soon as I have pronounced it, you are to write down, in the appropriate space on your paper, the *first* word that occurs to you, i.e., the first word you think of after hearing the word that I pronounce. For example, if I say *window* and you think of *door*, you are to write

⁸ Since these words were selected *a priori* by the writers, their essential 'critical nature' could be established only by the empirical data.

⁹ The selection was in all cases automatic, in terms of magnitude of most common response frequency, except in the cases of the words *scissors*, *bed*, and *bath*, which were omitted on the basis of conditions (b) and (c) above. Reference to the Kent-Rosanoff frequency tables will reveal that the most common response frequency ranged between 650 and 338 (out of 1000) in the case of the 20 stimulus words selected.

down *door* immediately. Each word will be pronounced only *once*; it will not be repeated. Please do *not* make any interruptions or ask *any* questions whatsoever about the spelling or other characteristics of the stimulus words or anything else. Do not converse with your neighbor, and do not look at his data sheet: we want your own individual reactions. Please remember: you are to write down the very first word you think of after hearing the stimulus word. Write down only *one* word. Write it down regardless of what it is."

The words were then presented in the same order to all groups (*cf.* Materials), *E* pronouncing each word distinctly and without accent, and allowing 15 sec. for the *Ss* to record their responses before presenting the next word. As indicated in the instructions, no word was repeated and, fortunately, no question was asked by any *S* during the presentation of the list to any group. At the conclusion of the experiment, the *Ss* were asked to indicate name, age, sex, and year in college.

3. *Scoring and Treatment of Data:* The frequencies of the various responses to each of the 40 stimulus words were tabulated in each of the groups of *Ss*. The next question was that of determining the 'legal,' 'medical,' or 'neutral' nature of each of such responses. For this purpose a master list of responses was prepared for each stimulus word: the master list contained the stimulus word at the top, followed by an alphabetized list of all the responses made to it by all *Ss* in all groups. Only the responses themselves were given, with no indication of their frequency or of their distribution in the various groups of *Ss*. Three judges¹⁰ were asked to consider each verbal association in relation to the stimulus word and to judge the association as 'legal,' 'medical,' or 'neutral.' The last-named category was to apply to all associations which were neither predominantly legal nor medical; if a response was non-legal and non-medical or if it was ambiguous, it was to be classified as 'neutral.' The three judges worked independently, without knowledge of each other's judgments. The final classification assigned to each response was determined by agreement of two or all three of the judges.¹⁰

4. *Subjects:* A total of 218 *Ss* were employed in the experiment. All of the *Ss* were male, distributed as follows with respect to professional training at the time of the experiment:

First-year Law	40
Second-year Law	23
First-year Medicine	37
Second-year Medicine	43
Non-professional	75

The non-professional (control) group consisted of liberal arts students in elementary psychology classes; they were on the whole slightly younger than the *Ss* in the professional groups, although the small age differential is not important in the light of their adult status. All *Ss* were naive with respect to the purpose of the experiment.

RESULTS

In Table I will be found the percentage of judged 'legal,' 'medical' and 'neutral' associations given by each group of *Ss* to each of the 20 'critical' stimulus words; corresponding percentages for each of the 'neutral' stimulus words are presented in Table II. Looking first at the responses to the 'critical' words, we find that some of the words are heavily weighted toward the 'legal' or 'medical' type of response. Thus, for example, *confinement* and *constitution* seem to be predominantly 'legal' for all groups, as is *compensate* for all groups except the second-year medical. *Hereditary* elicits a preponderance

¹⁰ Two of the judges were members of the Psychology Department; the third was a graduate student in psychology with some legal training. Recourse to professional lawyers and doctors as judges was abandoned in the light of the amount of time required to judge the large number of associations. The marked agreement of the three judges employed would seem to indicate the adequacy of the present procedure.

TABLE I

PERCENTAGE OF JUDGED 'LEGAL' (L), 'MEDICAL' (M) AND 'NEUTRAL' (N) RESPONSES
GIVEN BY EACH GROUP OF SUBJECTS TO EACH OF THE 20
'CRITICAL' STIMULUS WORDS *

Stimulus Words	First-Year Legal Group (N = 40)			Second-Year Legal Group (N = 23)			First-Year Medical Group (N = 37)			Second-Year Medical Group (N = 43)			Non- Professional Control Group (N = 75)		
	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N
Confinement	80	13	8	87	9	4	76	11	14	89	5	7	72	7	21
Binding	8	8	85	13	0	87	11	11	78	5	19	77	9	5	85
Constitution	70	18	13	87	4	9	76	11	14	61	26	14	75	16	9
Contract	33	10	58	56	0	43	3	62	35	7	30	63	11	12	77
Solvent	30	10	60	30	13	56	0	46	54	0	44	56	15	17	68
Hereditary	18	58	25	13	56	30	0	86	14	0	84	16	3	55	43
Expiration	60	25	15	65	17	17	0	89	11	9	82	9	39	40	21
Chamber	3	20	78	17	17	65	11	16	73	5	14	82	4	4	92
Administer	38	30	33	52	26	22	8	76	16	16	68	16	21	47	32
Complaint	23	3	75	52	0	48	11	41	49	7	37	56	23	15	63
Carrier	40	5	55	52	4	43	3	27	70	2	28	70	12	9	79
System	18	5	78	17	4	78	5	70	24	0	84	16	9	29	61
Discharge	5	10	85	22	4	74	0	32	68	2	56	42	5	9	85
Instrument	5	15	80	9	22	69	3	78	19	2	58	40	3	24	73
Compensate	98	0	3	100	0	0	70	14	16	35	44	21	87	1	12
Bear (Bare)	0	0	100	0	4	96	0	3	97	0	0	100	0	0	100
Accident	20	3	78	22	4	74	0	19	81	5	28	68	1	17	81
Void	48	3	50	69	0	30	14	46	41	5	70	26	49	0	51
Tender	20	0	80	26	4	69	5	22	73	0	63	37	7	1	92
Cell (Sell)	25	13	63	26	30	43	11	62	27	14	70	16	31	15	55

* All percentages in this and the following tables have been rounded off to the nearest integer. Zero percentages, therefore, may represent an actual frequency greater than zero but less than 0.5 percent. For the same reason, the total percentages within any one category may not be exactly equal to 100.

of 'medical' responses in all groups, although it is not as predominantly 'medical' as *confinement* and *constitution* are 'legal.' Other 'critical' words, such as *binding*, *chamber*, *bear (bare)*, and *accident* yield a majority of 'neutral' responses in all groups, *discharge* and *tender* also showing this result except in the case of the second-year medical Ss. The remaining words show greater 'spread' of responses within a group of Ss as well as from group to group, the best examples of such spread being found in the cases of *administer*, *complaint*, and *cell (sell)*.

Most of the 'neutral' stimulus words yield an extremely high percentage of 'neutral' responses in all groups, as will be seen from Table II. Thus *blossom* and *ocean* are consistently 'neutral,' whereas *lamp*, *cottage*, and *dark* yield 100 percent 'neutral' associations in all but one group. Among the 'neutral' words resulting in the largest percentage of 'legal' or 'medical' associations are *sour*, *hard*, *dream*, and *eagle*, although in all of these cases, with the exception of the

TABLE II
PERCENTAGE OF JUDGED 'LEGAL' (L), 'MEDICAL' (M) AND 'NEUTRAL' (N) RESPONSES
GIVEN BY EACH GROUP OF SUBJECTS TO EACH OF THE 20
'NEUTRAL' STIMULUS WORDS

Stimulus Words	First-Year Legal Group (N = 40)			Second-Year Legal Group (N = 23)			First-Year Medical Group (N = 37)			Second-Year Medical Group (N = 43)			Non- Professional Control Group (N = 75)		
	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N
Sour.....	0	13	88	0	13	87	0	16	84	0	7	93	0	16	84
Rough.....	3	3	95	0	0	100	0	3	97	0	16	84	0	1	99
Girl.....	0	3	98	0	0	100	0	22	78	0	14	86	0	4	96
King.....	3	0	98	13	0	87	0	0	100	2	0	98	7	0	93
Long.....	0	0	100	0	0	100	0	3	97	0	2	98	0	0	100
River.....	0	0	100	0	0	100	0	3	97	0	0	100	0	1	99
Thirsty.....	0	0	100	0	0	100	0	0	100	0	7	93	0	1	99
Man.....	0	3	98	4	0	96	0	0	100	14	86	0	1	99	99
Blossom.....	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100
Black.....	5	0	95	9	0	91	0	3	97	0	5	96	1	0	99
Bible.....	3	0	98	0	0	100	3	0	97	2	2	96	1	0	99
Hard.....	3	0	98	4	0	96	0	11	89	0	28	72	0	0	100
Dream.....	0	10	90	0	4	96	0	27	73	0	49	51	0	3	97
Eagle.....	0	10	90	0	9	91	0	19	81	0	19	82	0	12	88
Ocean.....	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100
Lamp.....	0	0	100	0	0	100	0	0	100	0	2	98	0	0	100
Cottage.....	0	0	100	4	0	96	0	0	100	0	0	100	0	0	100
Dark.....	0	0	100	0	0	100	0	3	97	0	0	100	0	0	100
Tobacco.....	0	3	98	0	0	100	0	5	95	0	9	91	0	0	100
Cabbage.....	0	3	98	0	4	96	0	5	95	0	0	100	0	1	99

responses to *dream* made by the second-year medical group,¹¹ the associations are overwhelmingly 'neutral.' The difference between the 'critical' and 'neutral' words in number of 'professional' versus 'neutral' associations would appear to indicate the success with which the two sets of stimulus words were chosen, since it will be recalled that the former were selected on purely *a priori* grounds and the latter from the Kent-Rosanoff list in terms of magnitude of the most common response frequency.

The mean percentages of 'legal,' 'medical,' and 'neutral' associations given by each group are reported in Table III. In the case of the 'critical' stimulus words, it is found that the mean percentage of 'legal' responses is greater than that of 'medical' responses in both legal groups, whereas the percentage of 'medical' responses is greater

¹¹ The relatively large percentage (49 percent) of 'medical' responses made by the second-year medical group to the 'neutral' stimulus word *dream* can be understood in terms of the 'mental set' aroused by the two immediately preceding stimulus words *discharge* and *hard* (cf. Materials). Although an attempt had been made to avoid a sequence of stimulus words likely to be professionally meaningful, or readily associated, many of the second-year medical subjects perceived medico-sexual connotations in this sequence, as indicated by such responses as *Freud*, *orgasm*, *psychiatry*, *psychoanalysis*, and *sex*, so that intra-serial factors were at least in part involved in the relatively large percentage of 'medical' associations made by this group.

than that of 'legal' responses in both medical groups. Furthermore, there is a small but consistent trend toward increasing percentage of 'legal' or 'medical' responses from the first to the second year of professional training. The responses of the non-professionally trained (control) group are predominantly 'neutral.' If we take the

TABLE III

MEAN PERCENTAGE OF JUDGED 'LEGAL' (L), 'MEDICAL' (M) AND 'NEUTRAL' (N) RESPONSES GIVEN BY EACH GROUP OF SUBJECTS TO THE 'CRITICAL,' 'NEUTRAL,' AND COMBINED LIST OF STIMULUS WORDS

Stimulus Words	First-Year Legal Group (N = 40)			Second-Year Legal Group (N = 23)			First-Year Medical Group (N = 37)			Second-Year Medical Group (N = 43)			Non-Professional Control Group (N = 75)		
	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N
'Critical' Words.....	32	12	56	41	11	48	15	41	44	13	46	42	24	16	60
'Neutral' Words.....	1	2	97	2	2	97	0	6	94	0	9	91	0	2	98
Combined List.....	16	7	77	21	6	72	8	24	69	7	27	66	12	9	79

control group as a basis or standard of comparison, it is found that the first and second year legal groups make 8 percent and 17 percent *more* 'legal' responses, respectively, than does the control group, whereas they make 4 percent and 5 percent *fewer* 'medical' responses, and 4 percent and 12 percent *fewer* 'neutral' responses. The first and second year medical groups make 25 per cent and 30 percent *more* 'medical' responses, respectively, than the control group, 11 percent *fewer* 'legal' responses, and 16 percent and 18 percent *fewer* 'neutral' responses, respectively.

The responses to the 'neutral' stimulus words show a mean of 91 percent or more 'neutral' responses in every group, the largest percentage (98 percent) of such responses being shown by the control group. Although there are relatively few 'professional' responses to the 'neutral' stimulus words, there is a small but rather consistent tendency for the legal group to give slightly more 'legal' associations and the medical group more 'medical' associations than the control group. Thus, the first and second year legal groups give 1 percent and 2 percent *more* 'legal' associations, respectively, than the control group, whereas they give the *same* percentage of 'medical' associations, and 1 per cent *fewer* 'neutral' associations. The first and second year medical groups give 4 percent and 7 percent *more* 'medical' associations, respectively, than does the control group, and give the *same* percentage of 'legal' associations, and 4 percent and 7 percent *fewer* 'neutral' associations. The tendency for increasing percentage of 'professional' responses to be correlated with increasing amount of

professional training is here suggested in the case of the medical groups, although the tendency is obviously not as marked as in the case of the 'critical' stimulus words, discussed above.

The same general results are obtained when the percentages of different types of responses to the *combined list* of 40 stimulus words are analyzed. Although 'neutral' responses are most common in all groups, 'legal' responses are more numerous than 'medical' responses in the legal group, and 'medical' outnumber 'legal' responses in the medical group, each of the professional groups showing a small increase in percentage of associations within its own field with increased amount of professional training.

Of all of the intercomparisons possible in the present study, perhaps the most crucial is that involving a comparison of the total legal and total medical groups with respect to the percentage of 'legal' and 'medical' responses to the 'critical' stimulus words. Such data are presented in Table IV. It will be noted that the legal

TABLE IV

RELIABILITY OF THE PERCENTAGES OF 'LEGAL' AND 'MEDICAL' RESPONSES TO THE 'CRITICAL' STIMULUS WORDS IN TOTAL LEGAL AND TOTAL MEDICAL GROUPS

Type of Response	Legal Group			Medical Group			Legal-Medical Difference		
	N	P	σ_p	N	P	σ_p	Diff.	$\sigma_{\text{Diff.}}$	Significance Ratio
'Legal'.....	63	35	6.0	80	14	3.9	21	7.1	3.0
'Medical'.....	63	12	4.1	80	44	5.6	-32	6.9	-4.6

group as a whole gives 21 percent *more* 'legal' associations to the 'critical' stimulus words than the medical group, this difference yielding a significance ratio of 3.0. The medical group gives 32 percent *more* 'medical' associations than the legal group, the significance ratio of this difference being 4.6. Each of these significance ratios indicates that there are well over 99 chances out of 100 that the obtained difference could not have arisen as a sampling error from a true difference of zero.

Space does not permit publication of the specific responses made to each stimulus word, together with the frequencies of such responses. By way of example, we may take the 'critical' stimulus word *administer*, the responses to which admirably illustrate intergroup differences in frequency of the three types of response (*cf.* Table I). Combining the responses of the various groups, we find the following complete list of 'legal' responses: *administrator, administrative, business, decreed, direct, estate, execute, execution, executive, govern, government, handled, judge, justice, law, money, oath,*

president, punishment, render, rule, senate, settle, swear, taken over, wills. The 'medical' responses to the same stimulus word include: *adenoids, aid, anesthetic, attend, doctor, dosage, dose, drug(s), first aid, give(s), give aid, heal, inject, medicine, operation, saline solution, sick, syringe, treat.* Finally, the 'neutral' responses are as follows: *beating, blows, boss, care, deal, deliver, dictate, distribute, do, ecclesiastical, escape, foreman, friend, help, inspire, instigate, liquor, minister, official, preacher, present, priest, pronounce, Red Cross, receive, sacrament, sermon, set forth, serve, service, spoon, succor, supervise, take care, task, tell, tests, use, wait upon.*

Thus, it would appear that professional training definitely influences the type of response elicited in the 'free association' experiment.¹² In fact, professional training might be said to involve a conditioning process in which certain prescribed stimulation is imposed upon the trainee for the establishment of specific conditioned behavior. And not the least important of such behavior are the verbal responses characteristic of different professional groups. That such verbal conditioning acquired in the course of professional training influences the 'free associations' of an S seems strongly suggested by the present results. Not only do the same 'critical' stimulus words elicit more 'legal' than 'medical' responses in the legal group and more 'medical' than 'legal' responses in the medical group, but there is a slight tendency for this to be true also in the case of 'neutral' stimulus words; and there is a definite tendency toward a greater degree of 'legal' or 'medical' type of response with increased amount of professional training. Not only do direct verbal associations occur along a dimension established in part by professional training, but such associations provide a possibility for the operation of mediated generalization along such 'professional' gradients.

SUMMARY

This experiment was designed to demonstrate differences in type of verbal responses in the 'free association' experiment as a function of differences in type and amount of professional training. Results indicate professional differences in such associations, thus affirming the occupational conditioning of verbal reactions and suggesting the possibility of the operation of mediated generalization along 'professional' gradients.

(Manuscript received July 23, 1943)

¹² For evidence concerning the occupational conditioning of other responses (e.g., motor speed and preferential auditory tempo) cf. Foley (5, 6, 7).

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