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Norms of restricted color association

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Increasing use of the Stroop color-word test to assess the activation of words in memory requires a pool of words whose color associations are known. To provide such a pool, 100 Ss were asked to indicate which of four common colors (red, blue, yellow, or green) was most closely associated with each of 72 words. Normative response tables of the obtained associations are provided.

In the Stroop task, items are presented printed in color and the S's task is to name the color as quickly as possible. In the standard version of the test, the items are either rows of Xs or antagonistic color words, e.g., the word RED printed in blue ink. Typically, it takes longer to name the ink colors when the latter item type is used as a carrier for the color.

Since the literature review provided by Jensen and Rohwer (1966), experimental work with the Stroop color-word test has increased considerably. A review of recent work is provided by Dyer (1973). Among other applications, the Stroop task has been used to assess the activation of words in memory (Warren, 1972, 1974; Conrad, 1974). In these studies, the word in question is used as the carrier for the color in a Stroop task, and the amount of interference with ink-color naming it produces is taken to be an indicant of its state of activation in memory.

Since the work of Klein (1959), it has been known that the degree to which a concrete word is associated with a color will affect the amount of interference it produces when presented as an item in the Stroop task. BLOOD, for example, is strongly associated with the color red and produces long color-naming latencies when presented in an antagonistic color such as green. Scheibe, Shaver, and Carrier (1967) have shown that abstract words which are associated with a color (e.g., BELIEVE–blue) will also lengthen color-naming latency when presented in antagonistic colors.

It is apparent, then, that studies employing the Stroop task as a tool to study other factors, such as memory activation, should control for the degree of color association of the words used in the various experimental conditions. The object of the present study was to obtain color associations to the colors most commonly used in Stroop tasks for a fairly large pool of words.

METHOD

Subjects

Fifty male and 50 female students enrolled in graduate and undergraduate psychology courses at Columbia University participated in the experiment as part of a course requirement. Ss were run in groups ranging in size from 18 to 50.

Materials and Procedure

The 72 words used in the study are shown in Table 1. The words were arbitrarily divided into two 36-word groups (Groups A and B), and each group was presented on a separate sheet of paper in individual test booklets. Test instructions appeared on the first page of the booklet. Half the Ss of each sex received booklets with the page of Group A words first and the page of Group B words second; the remaining Ss received booklets with Group B first and Group A second. Ss were instructed to print the first letter of the color which best fit or corresponded to each word in a space provided after it on the response sheet. Color associations were restricted to red, blue, yellow, and green.

RESULTS

Normative response frequencies obtained for the 72 words are shown in Table 1. Using the normal approximation to the binomial and assuming p = .25 for each color, it is possible to assess the probability that the

Table 1
Restricted Color Association Frequencies

	Color			
Word	R	B	Y	G
APPLE	91	2	4	3
ARTIST	39	35	13	13
AUNT	18	15	34	33
BABY	20	38	34	8
BASIC	26	49	9	16
BOND	25	24	15	36
BRAVE	62	26	4	8
BREAD	2	13	75	10
BUG	12	26	24	38
BUY	17	21	17	45
CATS	16	15	41	28
CENTER	37	27	14	22
CHAIR	20	16	39	25
CLEAN	5	35	40	20
COLD	7	75	9	9
COMB	9	41	29	21
CUT	70	8	10	12
DARK	20	66	3	11
DESK	13	23	40	24
DIME	5	30	40	25
DRAIN	7	30	29	34
DRINK	19	36	30	15

Table 1 Continued

Word	Color			
	R	B	Y	G
DRY	10	25	50	15
DUST	14	17	51	18
FAST	57	12	17	14
FATHER	19	48	9	24
FIGURE	34	26	19	21
FIRE	87	0	11	2
FLOWERS	35	5	36	24
FRONT	28	23	20	29
GIRL	38	23	27	12
HARD	31	36	16	17
KNOCK	48	19	17	16
LOVE	60	25	5	10
LOW	3	41	26	30
MAD	91	3	2	4
MATCH	60	10	16	14
MUSIC	19	48	15	18
NAIL	28	29	23	20
NEEDLE	27	35	28	10
ODD	24	11	35	30
OYSTER	6	34	50	10
PEACE	6	58	19	17
PLAN	11	39	16	34
PLATE	11	33	36	20
QUEEN	51	14	16	19
RAMP	19	17	31	33
READ	28	33	17	22
RIVER	4	66	7	23
ROAD	19	19	35	27
ROUGH	62	12	10	16
RUG	20	28	22	30
SALT	11	24	53	12
SCORE	43	22	19	16
SEED	6	8	36	50
SHEEP	4	16	52	28
SHORT	13	22	31	34
SLEEP	4	63	20	13
SONG	18	44	22	16
SOUND	35	28	16	21
SPIDER	32	31	17	20
STAGE	30	31	25	14
STRONG	68	21	7	4
SWEET	28	16	47	9
TIGER	32	0	64	4
TONE	21	45	20	14
TOP	30	26	24	20
TOWN	29	23	17	31
VIEW	2	27	19	52
WIND	12	60	21	7
WINDOWS	3	48	31	18
WOMAN	59	18	14	9

Note–R = red, B = blue, Y = yellow, and G = green.

frequency of association of a word with a particular color (f) is greater or less than one would expect by chance. For $\alpha = .05$, these values are $f \geq 33$, $f \leq 17$. For $\alpha = .01$, these values are $f \geq 36$, $f \leq 14$.

Sex differences in color association were assessed using chi-square tests for words showing high overall absolute differences in response frequencies for the two sexes. Words showing significant differences are: ROAD, $p < .01$, RAMP, and CATS, both $p < .05$. Since the number of words showing differences at each significance level is approximately that to be expected by chance from 72 independent tests, response distributions by sex for these words are omitted.

DISCUSSION

As expected, substantial differences in the degree of association with the four colors were obtained for the 72 test words. This result reinforces the belief that unless other means of compensating for these differences are utilized, experiments using the Stroop test as a tool to study other factors must equate the degree of color association of the words in different experimental conditions.

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