

Measures of free recall of 900 English nouns: Correlations with imagery, concreteness, meaningfulness, and frequency

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Forty groups of subjects were given six lists of 25 nouns each for immediate free written recall. A measure of free recall was thereby obtained for each of 900 nouns in the Paivio, Yuille, and Madigan (1968) norms, each noun's measure based on the recall of 32 subjects. First-order correlations showed recall to be correlated with imagery, concreteness, meaningfulness, Thorndike-Lorge frequency, and Kučera-Francis frequency. Partial correlations showed meaningfulness to be essentially unrelated to recall and concreteness only moderately related. In contrast to previous comparisons, which were based on smaller ranges of frequency and were more susceptible to list-specific effects, imagery and frequency were found to be approximately equal in their influence on free recall.

Presented with this report are measures of free recall for 900 of the 925 English nouns in the Paivio, Yuille, and Madigan (1968) norms. Several considerations led us to obtain these measures. The first was the general issue of which particular attributes of words affect free recall. It is well established in the Paivio et al. data that attributes suspected to influence recall are themselves correlated. Thus, if a relationship between a variable and recall performance is observed, it is important to establish that the effect is not due to contamination by other variables. Considerable effort has been spent along these lines and the influence of rated imagery on free recall seems firmly established (Postman, 1975). However, there are some recent complications with this picture (Richardson 1975a, 1975b), and the roles of rated meaningfulness and frequency remain ambiguous. A second consideration was the issue of which variable has the greater influence on recall. Since Paivio's (1971) review there has been an increased acceptance of the view that rated imagery is more influential than meaningfulness and frequency. However, in contrast to the weight of evidence implicating the effect of rated imagery on free recall, the claim that imagery is more influential than frequency and meaningfulness is based on very few studies.

Two more immediate concerns compelled the collection of these measures. The first was the outcome of an experiment by Warren (1977), who examined the effect of a pursuit-rotor task on recall by subjects

engaged in recall and tracking concurrently. In two experiments Warren found that the recall-concurrent task interfered with picture recall but not word recall. This is consistent with the view that a concurrent tracking task interferes with, or suppresses, imagery during recall. If this is so, and if the superior recall of concrete as opposed to abstract nouns is due to the use of imagery during recall, then it follows that the tracking task should differentially interfere with concrete nouns. Warren tested this in a third experiment comparing the recall of nouns that were both high imagery and concrete with the recall of nouns that were both low imagery and abstract but found no differential effect of the concurrent task. High-imagery nouns were recalled better than low-imagery nouns under both tracking and nontracking conditions. This result, and a similar failure by Baddeley, Grant, Wight, and Thomson (1974) to find a differential effect of pursuit-rotor tracking during list presentation on concrete and abstract nouns, serves to question whether it is the image-inducing qualities of high-imagery nouns that are responsible for their ease of recall or whether some other variable is involved. More generally, Postman (1975) has concluded that, "It is far too early to take it for granted that the only important difference between concrete and abstract words is the ease of imaginal encoding" (p. 323). Perhaps the difference is not due to ease of imaginal encoding at all. Richardson (1975a, 1975b) has also recently challenged the usual interpretation that concreteness and imagery tap the same underlying attribute. He simultaneously manipulated concreteness and imagery in a free recall task and found a main effect for concreteness as well as an Imagery by Concreteness interaction. Recall of high-imagery nouns was indistinguishable from recall of low-imagery nouns when concreteness was held constant at a high level.

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The second impetus for the present study became apparent subsequent to an unpublished study of free recall by Clayton and Evarts who simultaneously manipulated rated imagery, meaningfulness, and Thorndike-Lorge (1944) frequency. Sampling the entire range of those variables, the study had two levels of imagery, three levels of meaningfulness, and three levels of frequency. Ninety words were selected from the Paivio, Yuille, and Madigan (1968) norms, five for each of the 18 conditions of the design. The study was designed to assess the joint effects of the stimulus variables on free recall, but the purpose was frustrated by the finding of substantial list-specific effects. That is, both frequency and imagery interacted significantly with lists. Inspection of these interactions showed not simply that the magnitude of the frequency and imagery effects depended on lists, but that the direction of the effects did also. In some lists free recall increased with increased imagery; in others it decreased. The same kind of interaction occurred with frequency. The effects of meaningfulness were similar, except the interaction was marginal. We concluded from these results that in order to avoid list-specific effects we would need an experiment with substantially more words representing each condition. What we came to realize, however, is that the number of words used in the Clayton and Evarts experiment is not atypical of published studies in this area. For example, the significant List by Imagery interaction was based on nine words per cell in our study. Dukes and Bastian (1966) simultaneously manipulated concreteness and frequency with five words per cell. Mueller and Jablonski (Experiment 2, 1970), Paivio, Yuille, and Rogers (Experiment 1, 1969), and Winnick and Kressel (1965) had similar designs with four, six, and four words per cell, respectively. The fact that those investigators got different results probably reflects differences among the particular lists chosen to represent their conditions. On the other hand, the requirement to use a large number of words so as to avoid list-specific effects limits the usefulness of the factorial manipulation of imagery, concreteness, meaningfulness, and frequency. Since the variables are correlated, relatively few words will be found in certain level combinations (e.g., high frequency, high meaningfulness, low imagery). Even starting with the large pool of the Paivio et al. norms, Clayton and Evarts were hard pressed to find five words per condition and also control for other variables. The alternative strategy, of course, is the correlational approach used here.

Two other correlational studies have been reported that have limited usefulness for our purposes. Frincke (1968) obtained free recall measures on 74 nouns and correlated them with measures on 10 other variables including imagery and frequency. One problem with Frincke's data is that no words were included that had a Thorndike-Lorge frequency count less than seven occurrences per million. In addition, four words were

excluded from the analyses because more than 20% of the subjects reported that they had never heard, seen, or used them before. Thus, the frequency variable was severely restricted in Frincke's study. (Examples of norm words with a Thorndike-Lorge count of six or less per million are: ALLIGATOR, BLISTER, PHOTOGRAPH, LECTURER, and BANDIT.) Paivio's (1968) study was based on 30 measures of 96 nouns and, although not as restricted as Frincke's, only 12 words were included which had a Thorndike-Lorge count of six or less per million. It is reasonable that studies attempting to correlate attributes of words should include only those words with which subjects are familiar. However, this restriction limits the range of the frequency manipulation and correspondingly limits the maximum correlation it can achieve with other variables. The Paivio et al. (1968) nouns are more suitable for our purposes since an effort was made by those authors to sample several frequency levels. Of the 925 nouns, 358 are below nine occurrences per million and 26 are at less than one per million.

All of the above developments encouraged the collection of the free recall norms reported here because the norms permit an extensive correlational analysis of the measures currently available on these words. In addition, and perhaps more important, publication of the free recall norms should facilitate future investigations of characteristics of words that influence recall. Thus, for example, if words rated high-imagery are better recalled, but not because of the images they may induce, and if high-imagery words are better recalled, but not because imagery is confounded with meaningfulness and frequency, it follows that some other property correlated with imagery is producing the effect and has yet to be identified. In general, in fact, the availability of norms on the recallability of 900 nouns should simplify at least initial attempts to relate any properties of words to their recallability.

METHOD

Materials and Procedure

Decisions on procedural detail were guided by the goal to obtain an average free recall measure of approximately 50% correct and the desire to minimize contamination by primacy and recency effects. Realizing that the overall level would depend on list length and presentation rate, we took advantage of Murdock's (1962) study and the results of a pilot study to decide on 25-word lists presented at a 6-sec rate. Using five words at the beginning and end of each list as buffers against primacy and recency meant 15 positions in each list could be used for the norm words. Although a measure of all 925 nouns in the Paivio et al. norms was desired, 925 does not divide evenly by 15; therefore, 900 nouns were randomly chosen with the help of a FORTRAN algorithm. In order to accommodate each group of subjects within a 1-h session, it was decided to give each group six different lists. To obtain a measure on all 900 nouns, 10 different groups were therefore required. Thus, 60 different lists of 15 nouns each were randomly selected and randomly assigned to the 15 nonbuffer positions within the lists. Sixty buffer words, all nouns, were then randomly selected from the

Thorndike-Lorge (1944) word count, with the restriction that their frequency-count distribution resemble the distribution of norm words. These lists were then presented to a total of 80 subjects. These 80 subjects constitute one replication of the study. In all, four replications were run. In each replication 60 new lists were randomly selected and positioned. The same buffers were used throughout, but randomly assigned to different lists and positions across replications. The final measure of free recall for each word is based on the recall of 32 subjects.

The subjects were read standard free recall instructions (i.e., no mnemonic was suggested and word order was to be ignored). To familiarize the subjects with the procedures, a 15-word practice list was given. These words were randomly selected from the 25 Paivio et al. nouns not used in the experiment proper. Each list was presented via Kodak Carousel projector and followed by 2 min of written recall. Ten seconds intervened between the recall of one list and presentation of the next. Recall of the last list was followed by 8 min of unexpected final free recall of all lists. The final free recall measures will not be discussed here.

Subjects

The subjects were 320 college students. Two-hundred and forty were introductory psychology students at Vanderbilt University participating to partially fulfill a course requirement. The other 80 were general psychology volunteers enrolled at David Lipscomb College.

RESULTS AND DISCUSSION

The words are presented in the Appendix, together with their recall measures and Kučera-Francis (1967) frequency count. The Kučera-Francis frequency is the number of occurrences in a corpus of 1,014,232 words. The Thorndike-Lorge frequencies are reported in the original Paivio et al. norms, and the Kučera-Francis measures are included here because they are more recent and because actual frequencies are reported rather than rounded to A and AA for high frequencies as they are in the Thorndike-Lorge count. (Examples of words that have changed in frequency between the two counts are MISSILE, 2 to 80 in the more recent count; CONCEPT, 3 to 112; APPLE, A to 15; and BEAST, A to 9.) The Kučera-Francis scores are positively skewed with mean and mode of 54.7 and 1, respectively, and standard deviation equal to 112.7. The recall scores are symmetrically distributed around a mean of .40, standard deviation of .14. The means and standard deviations calculated on the other measures agree with those in Paivio et al. (1968) as they should.

Correlational Analyses

Reliability. In order to estimate reliability of the recall measure, the following steps were taken. First, the recall score for each replication was calculated for each word. This gave us a 900 by 4 matrix with words as rows and replications as columns. Each word was then treated as "subjects" are treated in standard calculations of reliability, with replications treated as "tests." We then calculated the correlations among the replications, averaged the three correlations between the first and second, first and third, and first and fourth, and inserted this average value into the Spearman-Brown formula. The reliability estimate calculated this way is .57. When reliability was estimated by analysis of variance in accordance with the suggestion of Winer (1971, pp. 283-289), the identical value (.57) was found.

First-order correlations. The first-order correlations among the stimulus variables and recall are reported in Table 1. The correlations among imagery, concreteness, meaningfulness, and Thorndike-Lorge frequency are all within .02 of those reported in Paivio et al. (1968). The correlations between the recall measure and each of imagery, concreteness, and meaningfulness agree well with Frincke (1968) and Paivio (1968). All three studies have found recall to be most highly correlated with imagery, next highest with concreteness, and least with meaningfulness. In each case the value obtained here falls between the values reported by Frincke and Paivio.

However, the correlations obtained here between recall and frequency are different from those reported by Frincke and Paivio. In contrast to the correlation of .24 between recall and Thorndike-Lorge frequency, Paivio obtained a value of .01 and Frincke a value of .02. This difference most likely reflects the difference in the range of frequency values used in these studies. Notice, also, the difference between the way the two frequency counts correlated with imagery and concreteness. Whereas the Thorndike-Lorge frequency count is moderately correlated with imagery and concreteness, the Kučera-Francis count is not related at all.

Multiple and partial correlations. The multiple correlation between recall and the other variables is .47 regardless of which count is used for frequency. Squaring this value shows that with most word attributes known to influence word recall taken into account there

Table 1
First-Order Correlations for Stimulus Variables and Recall

	Imagery	Concrete- ness	Meaning- fulness	Thorndike- Lorge Frequency	Kučera- Francis Frequency
Concreteness	.83				
Meaningfulness	.72	.55			
Thorndike-Lorge Frequency	.25	.13	.35		
Kučera-Francis Frequency	.02	-.04	.15	.62	
Recall	.44	.40	.31	.24	.15

Table 2
Partial Correlations Involving Recall, Imagery, Meaningfulness, Concreteness, and Frequency

Imagery	Concrete-ness	Meaning-fulness	Thorndike-Lorge Frequency	Kučera-Francis Frequency
.20	.07	-.04		.17
.18	.08	-.05	.17	

Note—The entries give the correlation between the variable labeled for the column and the recall measure, with the other variables partialled out. The first row reports partial correlations when the Kučera-Francis frequency count is used, the second when the Thorndike-Lorge count is used.

remains considerable unaccounted for variance. Of course, the multiple correlation is limited by the less than perfect reliability of the recall measure. But that reliability almost certainly is limited in value, because the relative recallability of a given word surely must also depend on the subject who is doing the recalling and the list context into which the word is placed.

The partial correlations are reported in Table 2. Two sets are reported, one with Kučera-Francis used as the frequency count, the other with Thorndike-Lorge used as the frequency count. In each case the partial correlation reported is that between the variable listed in the column heading and free recall, with all other variables partialled out. The conclusions that can be drawn from that data are fairly clear, within the limitations of the correlational approach and given the departures of some of the distributions from normality. When the effects of the other variables are partialled out, the influence of meaningfulness on free recall disappears. This is consistent with Frincke's (1968) correlational study and Paivio and Smythe's (1971) experimental study. Although considerably weakened, concreteness remains mildly associated with recall. This result is consistent with Richardson's (1975a, 1975b) results, but not with Frincke's (1968). Finally, with the other variables controlled, frequency is found to remain positively correlated with free recall and the magnitude of the correlation is similar to the partial correlation of imagery with free recall. This result does not agree with previous findings (Paivio, 1971) but, given the large number of words and the range of frequency used here, the new results seem to be based on firmer evidence.

Analysis of Variance

The number of norm words correctly recalled by each subject at each serial position within each list was submitted to an analysis of variance. The replication and serial position main effects were significant at the .05 level [$F(3,280) = 4.98$ and $F(14,3920) = 5.49$, respectively]. The replication effect reflected differences in the two colleges sampled and the serial position effect stemmed from the superior recall at the last three or four nonbuffer positions. Thus, in this study the five buffer words did not absorb all of the recency effect

and recency contributed a random source of variance to the recall measures. Efforts were made to adjust individual word recall scores to take into account the position each held throughout the lists, but no effort ever measurably affected the reliability values and the matter was not pursued.

Illustrative Use of the Norms

One of the uses to which these norms can be put is to investigate the effects of simultaneously manipulating several variables without, or before, performing the actual experiment. An advantage of this procedure is that it allows the use of all words that satisfy each level of variable combinations rather than being restricted to a sample. To illustrate this point, consider an attempt to replicate the interaction reported by Richardson (1975a, 1975b). All words in these norms that correspond to the two levels of concreteness and imagery specified by Richardson's cut-off value were selected. Richardson controlled Thorndike-Lorge frequency by matching, so the words were next dichotomized at a frequency count of 17 occurrences per million. This permitted an examination of the triple interaction between imagery, concreteness, and frequency with no less than 31 words in any of the eight conditions of the design. Means and standard deviations of the free recall scores were then calculated for each condition and are reported in Table 3. The results are portrayed there in such a way that the influence of imagery on recall can be examined by comparing across columns. Overall, the results do not agree with Richardson (1975a, 1975b), who found that imagery had no effect at high levels of concreteness. Here it is found that imagery has an effect except when frequency is low. Notice, also, that concreteness has a positive effect only when frequency is low. However, when imagery and concreteness are allowed to covary (i.e., high concreteness/high imagery compared with low concreteness/low imagery), as is usually done in studies of imagery, there is an effect of imagery at both levels of frequency. The results also agree with Paivio and

Table 3
Means and Standard Deviations of Free Recall Scores on Words Selected from the Norms to Represent Eight Conditions of the Factorial Manipulation of Imagery, Concreteness, and Frequency

C	F	Imagery					
		Low			High		
		Mean	SD	n	Mean	SD	n
Low	Low	.34	.11	55	.33	.12	31
	High	.30	.13	57	.40	.15	37
High	Low	.36	.14	35	.38	.13	138
	High	.27	.11	35	.36	.13	92

Note—C = concreteness, F = frequency, and n refers to the number of words that contributed to the mean.

Smythe's (1971) finding that low-frequency words imagery and concreteness are both held constant at a high level.

APPENDIX

Listed, in alphabetical order, are the 900 nouns together with each word's Kučera-Francis frequency and free recall measure. The Kučera-Francis frequency is the number of occurrences in a corpus of 1,014,232 words and is the sum of singular and plural forms (except for *child* and *geese*). The free recall measure is the proportion of 32 subjects who correctly recalled the word.

NOUN	K-F	FR	NOUN	K-F	FR
ABBESS	0	.438	AUTOMOBILE	74	.375
ABDICATION	0	.438	AVALANCHE	1	.594
ABDOMEN	6	.500	AVENUE	51	.344
ABDUCTION	1	.375	BABY	74	.813
ABERRATION	8	.375	BACKGROUND	74	.250
ABILITY	87	.375	BACTERIA	8	.438
ABODE	4	.313	BAGPIPE	1	.344
ABYSS	4	.438	BANALITY	0	.344
ACCORDION	1	.375	BANDIT	6	.469
ACROBAT	1	.375	BANKER	20	.438
ADAGE	3	.313	BANNER	10	.375
ADMIRAL	1	.500	BAR	122	.656
ADVANTAGE	101	.281	BARD	5	.656
ADVERSITY	2	.469	BARON	3	.406
ADVICE	51	.313	BARREL	32	.313
AFFECTION	22	.281	BASEMENT	33	.500
AFTERLIFE	0	.406	BEAST	9	.375
AGILITY	3	.281	BEAVER	3	.406
AGONY	10	.438	BEGGAR	4	.500
AGREEMENT	121	.250	BELFRY	1	.406
AIR	257	.625	BELIEF	87	.375
ALCOHOL	15	.469	BELONGINGS	4	.219
ALGEBRA	2	.406	BEREAVEMENT	5	.469
ALIMONY	2	.531	BETRAYAL	6	.344
ALLEGORY	3	.219	BEVERAGE	9	.281
ALLIGATOR	4	.500	BIVOUAC	5	.813
AMBULANCE	7	.500	BLACKSMITH	2	.344
AMOUNT	216	.438	BLANDNESS	1	.344
AMOUR	0	.500	BLASPHEMY	6	.438
AMPLIFIER	7	.313	BLESSING	13	.281
ANECDOTE	13	.469	BLISTER	5	.594
ANGER	48	.563	BLOOD	122	.531
ANGLE	62	.188	BLOOM	15	.594
ANIMAL	126	.625	BLOSSOM	14	.625
ANIMOSITY	3	.563	BLUNDERBUSS	0	.594
ANKLE	15	.563	BOARD	286	.375
ANSWER	196	.250	BODY	340	.531
ANTITOXIN	0	.531	BOOK	289	.500
ANXIETY	43	.438	BOREDOM	11	.594
APPEARANCE	71	.156	BOSOM	9	.844
APPLE	15	.438	BOSS	25	.563
APPLIANCE	13	.219	BOTTLE	91	.406
APTITUDE	4	.438	BOULDER	13	.500
ARBITER	5	.156	BOUQUET	5	.500
ARM	215	.656	BOWL	26	.594
ARMADILLO	2	.594	BOY	385	.813
ARMY	147	.438	BRAIN	63	.406
ARRAY	11	.344	BRASSIERE	2	.688
ARROW	20	.313	BRAVERY	4	.313
ARTIST	112	.563	BREAST	20	.594
ASSAULT	19	.062	BREEZE	16	.406
ATHLETICS	9	.438	BRONZE	11	.406
ATMOSPHERE	84	.344	BRUTALITY	14	.406
ATROCITY	2	.469	BRUTE	6	.438
ATTENDANT	19	.438	BUFFOON	2	.594
ATTITUDE	155	.188	BUILDER	56	.406
ATTRIBUTE	18	.156	BUILDING	236	.563
AUTHOR	69	.438	BULLET	49	.688

NOUN	K-F	FR	NOUN	K-F	FR
BUNGALOW	1	.469	CONTRACT	84	.313
BUSYBODY	0	.344	CONTRIBUTION	66	.125
BUTCHER	8	.250	CONVENTION	37	.406
BUTTER	27	.656	COOPERATION	34	.250
BUTTERFLY	3	.438	COPYBOOK	1	.219
CABIN	30	.500	CORD	8	.500
CAMOUFLAGE	3	.406	CORE	40	.188
CAMP	93	.531	CORN	36	.594
CANDIDATE	72	.375	CORNER	133	.375
CANDY	18	.500	CORPSE	12	.625
CANE	12	.563	COST	405	.281
CAPACITY	88	.094	COSTUME	28	.375
CAPTIVE	7	.281	COTTAGE	25	.500
CAR	386	.656	COTTON	38	.469
CARAVAN	10	.188	COURTSHIP	2	.344
CASH	36	.375	COWHIDE	1	.531
CAT	41	.844	CRADLE	8	.344
CATERPILLAR	2	.469	CRAG	2	.500
CATTLE	97	.531	CRANIUM	0	.563
CAUSALITY	0	.344	CREATOR	16	.344
CELL	146	.594	CREATURE	35	.250
CELLAR	27	.406	CRIME	48	.406
CENTENNIAL	6	.344	CRISIS	103	.219
CEREBRUM	0	.594	CRITERION	22	.250
CEREMONY	32	.313	CUISINE	1	.281
CHAIR	89	.344	CUSTOM	32	.313
CHANCE	155	.281	DAFFODIL	1	.438
CHAOS	17	.438	DALLIANCE	0	.375
CHARLATAN	1	.313	DAMSEL	1	.531
CHARM	28	.219	DAWN	29	.406
CHARTER	37	.250	DAYBREAK	1	.219
CHASM	2	.375	DAYLIGHT	16	.469
CHIEF	125	.375	DEATH	285	.625
CHILD	213	.531	DEBACLE	3	.375
CHIN	29	.500	DECEIT	2	.344
CHLORIDE	6	.281	DECORATION	16	.250
CHRISTMAS	27	.563	DECREE	8	.344
CHURCH	444	.594	DEDUCTION	23	.188
CIGAR	12	.469	DEED	16	.313
CIRCLE	92	.281	DELIRIUM	3	.313
CIRCUIT	27	.219	DELL	6	.469
CITATION	6	.281	DELUGE	4	.313
CITY	500	.531	DEMOCRACY	25	.531
CLAW	4	.531	DEMON	16	.500
CLEANNESS	0	.344	DESTRUCTION	38	.469
CLEMENCY	2	.344	DETERMINATION	41	.313
CLOCK	28	.563	DETONATION	3	.406
COBBLESTONE	2	.406	DEVELOPMENT	378	.344
CODE	57	.344	DEVIL	27	.406
COFFEE	78	.500	DEVOTION	21	.406
COIN	19	.469	DIAMOND	15	.625
COLLEGE	306	.656	DIRECTION	164	.375
COLONY	35	.406	DIRT	43	.750
COMBUSTION	12	.344	DISASTER	30	.313
COMEDY	41	.344	DISCIPLINE	31	.188
COMFORTER	0	.406	DISCLOSURE	6	.062
COMMITTEE	186	.406	DISCONNECTION	0	.219
COMPARISON	54	.156	DISCOVERY	55	.219
COMPETENCE	18	.438	DISCRETION	14	.156
COMPETITION	63	.344	DISEASE	72	.531
COMRADE	14	.219	DISPARITY	3	.219
COMRADESHIP	2	.406	DISPOSITION	14	.156
CONCEPT	112	.344	DISTINCTION	56	.375
CONFIDENCE	57	.219	DISTRACTION	4	.469
CONNOISSEUR	6	.656	DISTURBER	1	.281
CONQUEST	11	.094	DOCTOR	130	.656
CONTENTS	16	.156	DOLL	22	.625
CONTEXT	37	.313	DOLLAR	143	.469

NOUN	K-F	FR	NOUN	K-F	FR
DOMICILE	1	.344	FLAG	21	.219
DOOR	348	.469	FLESH	52	.563
DOORMAN	7	.781	FLEXIBILITY	16	.281
DOVE	5	.656	FLOOD	25	.563
DRAMA	49	.188	FLOWER	80	.438
DREAM	94	.375	FOAM	59	.313
DREAMER	2	.500	FOIBLE	3	.563
DRESS	77	.563	FOLLY	12	.313
DUMMY	4	.313	FOOTWEAR	1	.563
DUST	71	.500	FOREHEAD	18	.406
DUTY	95	.250	FOREST	88	.531
DWELLER	4	.344	FORETHOUGHT	1	.313
DYNASTY	6	.313	FORK	21	.469
EARTH	150	.438	FORM	498	.344
ECCENTRICITY	5	.594	FORMATION	44	.125
ECONOMY	86	.375	FORTUNE	31	.438
EDIFICE	3	.375	FOWL	1	.469
EDITION	47	.219	FOX	13	.656
EFFORT	272	.281	FRANCHISE	6	.281
EGO	13	.375	FREEDOM	131	.313
ELABORATION	2	.219	FRICTION	18	.281
ELBOW	17	.563	FRIEND	295	.656
ELEPHANT	17	.625	FROG	2	.688
EMANCIPATION	14	.594	FRONTAGE	7	.250
EMBEZZLEMENT	1	.625	FUN	44	.656
EMERGENCY	46	.219	FUNCTIONARY	2	.125
EMPORIUM	0	.406	FUR	18	.344
ENCEPHALON	0	.375	FURNITURE	39	.500
ENCORE	1	.188	GADFLY	3	.563
ENGAGEMENT	30	.500	GAIETY	12	.406
ENGINE	67	.469	GALAXY	10	.438
ENSEMBLE	14	.219	GALLERY	32	.344
ENTERPRISE	45	.438	GARDEN	92	.531
EPISODE	18	.188	GARMENTS	12	.281
EPISTLE	1	.281	GARRET	0	.563
EQUITY	7	.469	GEESE	3	.406
ERRAND	7	.250	GEM	6	.406
EVANGELIST	2	.625	GENDER	3	.281
EVENT	182	.313	GENIUS	24	.344
EVIDENCE	209	.156	GHOST	16	.531
EXACTITUDE	0	.281	GIFT	44	.469
EXAMINATION	37	.344	GILT	3	.375
EXCLUSION	8	.313	GINGHAM	3	.281
EXCUSE	29	.188	GIRL	362	.844
EXERTION	2	.219	GIST	1	.469
EXHAUST	8	.344	GLACIER	2	.500
EXHAUSTION	1	.250	GLORY	25	.250
EXPLANATION	58	.344	GLUTTON	3	.406
EXPRESSION	94	.219	GOBLET	0	.344
EXTERMINATION	1	.594	GODDESS	3	.563
FABRIC	44	.406	GOLD	52	.594
FACILITY	110	.281	GOLF	34	.469
FACT	534	.438	GORE	7	.438
FACTORY	56	.375	GRADUATION	11	.438
FALCONER	0	.313	GRANDMOTHER	10	.781
FALLACY	1	.281	GRASS	54	.438
FANTASY	18	.281	GRAVITY	7	.250
FATE	36	.375	GREED	3	.281
FATIGUE	13	.438	GREEN	121	.750
FAULT	29	.188	GRIEF	10	.188
FELINE	2	.563	GUARDHOUSE	1	.594
FESTIVITY	8	.188	GYMNASTICS	11	.656
FEUDALISM	1	.438	HABITATION	0	.469
FIGMENT	2	.188	HAIRPIN	1	.281
FIORD	2	.500	HALL	156	.531
FIRE	204	.313	HAMLET	7	.406
FIREPLACE	7	.406	HAMMER	9	.438
FIRMAMENT	0	.500	HANKERING	0	.219
FISHERMAN	12	.563	HAPPINESS	23	.594

NOUN	K-F	FR	NOUN	K-F	FR
HARDSHIP	14	.156	INTELLECT	5	.375
HARDWOOD	1	.406	INTEREST	413	.281
HARNES	10	.344	INTERIM	11	.375
HARP	1	.281	INTERVIEW	52	.438
HATRED	20	.313	INTIMATE	21	.438
HEADLIGHT	8	.438	INVESTIGATION	73	.438
HEADQUARTERS	65	.469	INVOICE	1	.313
HEALTH	105	.375	IRON	50	.469
HEARING	84	.156	IRONY	13	.188
HEAVEN	52	.656	ISLANDER	6	.375
HENCHMAN	3	.406	ITEM	126	.344
HEREDITY	3	.250	JAIL	24	.688
HEROISM	3	.156	JEALOUSY	5	.438
HIDE	27	.406	JELLY	4	.406
HIERARCHY	10	.438	JEOPARDY	4	.094
HILLSIDE	9	.656	JOKE	31	.406
HINDRANCE	2	.250	JOURNAL	47	.219
HINT	19	.219	JOY	47	.656
HISTORY	297	.438	JUDGE	97	.531
HOME	609	.656	JUGGLER	0	.344
HOMICIDE	6	.344	JURY	68	.531
HONEYCOMB	0	.281	JUSTICE	117	.438
HONOR	81	.500	KEG	3	.563
HOOF	9	.469	KERCHIEF	1	.344
HOPE	226	.469	KEROSENE	6	.375
HORSE	185	.563	KETTLE	3	.438
HORSEHAIR	1	.563	KINDNESS	6	.344
HOSPITAL	130	.594	KINE	0	.500
HOSTAGE	5	.281	KING	95	.531
HOSTILITY	11	.281	KISS	21	.563
HOTEL	146	.438	KNOWLEDGE	145	.250
HOUND	10	.438	LABYRINTH	1	.438
HOUR	319	.500	LAD	7	.688
HOUSE	674	.625	LAKE	62	.750
HUMOR	47	.313	LANDSCAPE	25	.438
HURDLE	4	.313	LARK	4	.375
HURRICANE	8	.219	LAW	387	.719
HYPOTHESIS	22	.406	LAWN	20	.469
ICEBOX	3	.500	LEAFLET	4	.313
IDEA	338	.313	LECTURE	31	.406
IDIOM	10	.281	LECTURER	6	.375
IGNORANCE	16	.281	LEGGINGS	1	.469
ILLUSION	44	.375	LEGISLATION	46	.281
IMMUNITY	7	.375	LEMON	19	.563
IMPACT	70	.156	LEMONADE	3	.375
IMPOTENCY	1	.250	LENGTH	139	.125
IMPROPRIETY	1	.188	LEOPARD	1	.500
IMPULSE	32	.219	LETTER	260	.625
INANITY	0	.313	LETTERHEAD	1	.469
INCIDENT	50	.156	LIBRARY	90	.344
INCLEMENCY	0	.313	LICE	2	.344
INCREMENT	0	.375	LIFE	715	.406
INDUCEMENT	3	.406	LIMB	10	.469
INDUSTRY	207	.375	LIME	13	.656
INEBRIETY	0	.344	LIMELIGHT	1	.250
INFANT	14	.344	LINK	23	.250
INFECTIION	13	.469	LIP	87	.656
INFIRMARY	1	.594	LOBSTER	1	.500
INGRATITUDE	1	.438	LOCKER	9	.438
INHABITANT	13	.219	LOQUACITY	1	.375
INJURY	38	.469	LORD	96	.750
INK	8	.375	LOVE	251	.625
INN	10	.688	LOYALTY	25	.250
INSECT	37	.500	LUBRICANT	2	.406
INSOLENCE	6	.313	LUMP	10	.313
INSTANCE	112	.188	MACARONI	0	.406
INSTITUTE	51	.281	MACHINE	157	.313
INSTRUCTOR	9	.563	MADNESS	2	.313
INSTRUMENT	73	.219	MAGAZINE	64	.250

NOUN	K-F	FR	NOUN	K-F	FR
MAGNITUDE	30	.250	OBEDIENCE	10	.313
MAIDEN	4	.344	OBSESSION	6	.219
MAJORITY	60	.188	OCCASION	80	.219
MAKER	31	.375	OCEAN	37	.406
MALADY	3	.438	ODOR	22	.438
MALARIA	3	.406	OFFICER	184	.469
MALICE	2	.281	OFFSHOOT	0	.344
MAMMAL	4	.219	ONSLAUGHT	6	.313
MANAGEMENT	93	.531	OPINION	140	.281
MANTLE	48	.406	OPIUM	16	.563
MARKET	186	.469	ORCHESTRA	64	.344
MARRIAGE	122	.500	ORIGIN	51	.156
MAST	8	.344	ORIGINATOR	0	.281
MASTER	96	.500	OSCULATION	0	.344
MASTERY	10	.219	OUTCOME	37	.313
MATERIAL	271	.344	OUTSIDER	11	.250
MATHEMATICS	20	.469	OVEN	8	.313
MEADOW	24	.375	OWNER	68	.500
MEAT	57	.500	OWNERSHIP	25	.313
MEDALLION	1	.344	OXYGEN	46	.313
MEETING	187	.250	PACIFISM	3	.188
MEMORY	91	.656	PACT	5	.531
MENACE	9	.188	PAINTER	34	.375
MERCY	20	.375	PALACE	43	.281
METAL	68	.469	PANIC	22	.250
METHOD	284	.469	PANORAMA	5	.531
METROPOLIS	8	.219	PARTY	208	.406
MICROSCOPE	9	.375	PARITY	275	.375
MILEAGE	15	.344	PASSAGEWAY	4	.344
MIND	381	.563	PASSION	40	.406
MIRACLE	24	.188	PATENT	54	.188
MIRAGE	0	.250	PEACEMAKER	0	.406
MISCHIEF	5	.313	PEACH	4	.594
MISCONCEPTION	6	.531	PELT	9	.469
MISERY	17	.469	PENCIL	38	.469
MISSILE	80	.469	PEP	0	.438
MOLECULE	14	.313	PEPPER	13	.406
MOMENT	296	.250	PERCEPTION	38	.281
MONARCH	3	.500	PERFORMER	20	.344
MONEY	267	.563	PERIODICAL	9	.313
MONK	26	.500	PERJURY	3	.531
MONTH	319	.250	PERMISSION	27	.219
MOOD	45	.281	PERSON	296	.656
MORAL	149	.406	PHANTOM	2	.250
MORGUE	1	.500	PHOTOGRAPH	34	.156
MOSQUITO	2	.438	PHYSICIAN	20	.469
MOSS	9	.531	PIANIST	17	.438
MOTHER	241	.813	PIANO	39	.406
MOUNTAIN	76	.563	PICTURE	230	.344
MUCUS	2	.500	PIPE	27	.406
MULE	7	.406	PISTON	10	.375
MULTIPLICATION	6	.438	PLAIN	62	.344
MURDER	87	.438	PLANK	12	.438
MUSICIAN	64	.469	PLANT	184	.375
NAIL	20	.313	PLEASURE	68	.375
NAMESAKE	2	.344	PLEDGE	6	.219
NECESSITY	53	.188	POET	131	.375
NECTAR	3	.344	POETRY	88	.250
NEPHEW	14	.563	POLE	30	.438
NEWSPAPER	103	.469	POLICEMAN	34	.563
NIGHTFALL	4	.438	POLLUTION	6	.313
NONSENSE	13	.125	PORTAL	3	.281
NOOSE	3	.469	PORTRAIT	24	.281
NORTHWEST	25	.406	POSITION	295	.094
NUN	6	.563	POSTER	8	.344
NURSERY	1	.344	POTATO	30	.375
NUTMEG	4	.281	POVERTY	20	.156
NYMPH	2	.438	POWER	415	.406
OATS	7	.531	PRAIRIE	21	.438

NOUN	K-F	FR	NOUN	K-F	FR
PRAYER	40	.531	SEASON	122	.281
PRESENT	410	.188	SEAT	69	.469
PRESSURE	223	.438	SENSATION	24	.375
PRESTIGE	29	.188	SENTIMENT	10	.250
PREVIEW	1	.250	SERF	1	.531
PRIEST	32	.781	SERIES	130	.281
PRISON	45	.594	SESSION	106	.406
PRISONER	28	.625	SETTLEMENT	32	.344
PROCESSION	5	.344	SETTLER	15	.156
PRODUCT	195	.219	SHADOW	56	.375
PROFESSION	42	.500	SHAME	22	.250
PROFESSOR	73	.625	SHEEPSKIN	3	.250
PROFILE	18	.188	SHIP	126	.594
PROMOTION	26	.125	SHOCK	36	.406
PROPERTY	222	.313	SHORE	70	.469
PROPRIETOR	16	.281	SHOTGUN	9	.531
PROSECUTOR	10	.531	SHRIEK	5	.406
PROSPERITY	14	.219	SICKNESS	6	.469
PROXY	7	.344	SILENCE	55	.406
PUDDING	1	.563	SIMILE	1	.250
PUPIL	45	.375	SITUATION	247	.062
PYTHON	14	.438	SKILLET	2	.500
QUALITY	159	.219	SKIN	54	.563
QUANTITY	44	.313	SKULL	5	.406
QUEEN	51	.344	SKY	70	.656
QUEST	16	.219	SLAVE	74	.625
RAILROAD	74	.313	SLIPPER	10	.531
RATING	19	.094	SLUSH	0	.469
RATTLE	6	.344	SNAKE	70	.500
REACTION	166	.250	SOBRIETY	1	.563
RECITAL	11	.313	SOCIALIST	21	.344
RECOGNITION	44	.500	SOIL	69	.375
REFLECTION	39	.344	SONATA	15	.469
REFLEX	10	.219	SOUL	69	.531
REFRIGERATOR	25	.656	SOVEREIGN	33	.375
REMINDER	10	.219	SPEAKEASY	1	.625
RENDEZVOUS	7	.375	SPEAKER	63	.313
REPLACEMENT	23	.188	SPEECH	82	.438
REPTILE	0	.469	SPIRE	8	.281
RESEARCH	172	.500	SPIRIT	226	.250
RESIDUE	11	.406	SPRAY	17	.188
RESTAURANT	53	.594	SPREE	4	.125
RETAILER	6	.469	SQUARE	156	.375
REVOLT	10	.250	STAGECOACH	3	.281
REVOLVER	14	.344	STAIN	16	.438
RHAPSODY	0	.469	STAR	54	.281
RHEUMATISM	3	.375	STEAM	17	.375
RITUAL	29	.281	STEAMER	1	.281
RIVER	182	.594	STEERAGE	0	.188
ROBBER	8	.594	STONE	70	.531
ROBBERY	13	.281	STOREROOM	1	.438
ROCK	98	.563	STORM	32	.188
ROD	22	.469	STRAWBERRY	2	.594
ROSIN	0	.344	STREET	304	.375
RUBBLE	1	.313	STRENGTH	140	.406
SADNESS	6	.313	STRING	35	.344
SAFETY	48	.219	STUB	5	.438
SALAD	12	.344	STUDENT	344	.688
SALARY	51	.188	STYLE	118	.156
SALOON	20	.406	SUBSTITUTE	27	.125
SALUTATION	1	.188	SUBTRACTION	6	.156
SALUTE	3	.344	SUDS	9	.438
SATIRE	12	.250	SUGAR	34	.313
SAUCE	25	.406	SULPHUR	3	.188
SAVANT	0	.344	SULTAN	7	.563
SCARLET	3	.375	SUNBURN	5	.281
SCIENCE	166	.594	SUNSET	14	.500
SCORPION	0	.313	SUPPLICATION	0	.281
SEA	105	.688	SUPPRESSION	7	.215

NOUN	K-F	FR	NOUN	K-F	FR
SURTAX	0	.406	VILLAGE	84	.469
SWAMP	7	.531	VIOLATION	20	.156
TABLE	242	.313	VIRTUE	45	.344
TABLESPOON	13	.375	VISION	63	.344
TANK	30	.438	VOCATION	3	.219
TEACHER	149	.688	VOLCANO	3	.438
TEMERITY	1	.344	VOLUME	179	.438
TEMPEST	2	.219	WARBLER	0	.406
TEMPLE	42	.594	WARMTH	28	.469
TENDENCY	54	.125	WATER	484	.500
THEOLOGIAN	14	.500	WEAPON	103	.406
THEORY	149	.250	WELFARE	53	.406
THICKET	3	.438	WENCH	0	.563
THIEF	17	.250	WHALE	0	.469
THISTLEDOWN	0	.469	WHALEBONE	0	.375
THORN	4	.438	WHEAT	9	.469
THOUGHT	569	.375	WHOLESALER	1	.250
TICKET	30	.438	WIFE	249	.781
TIDBIT	3	.250	WIGWAM	0	.406
TIME	1899	.531	WINDOW	172	.469
TIMEPIECE	1	.281	WINE	96	.531
TOAST	19	.281	WINTER	85	.406
TOBACCO	19	.250	WISTFULNESS	0	.438
TOMAHAWK	0	.438	WOMAN	419	.781
TOMB	13	.406	WOODS	25	.500
TOOL	74	.500	WORKHOUSE	0	.406
TOWER	18	.531	WORLD	794	.469
TOY	15	.594	YACHT	7	.469
TRACTION	0	.281			
TRAGEDY	56	.156			
TREE	160	.531			
TRELLIS	1	.406			
TRIBUTE	25	.281			
TRIPOD	4	.344			
TROOPS	69	.594			
TROUBLE	156	.250			
TRUCE	5	.219			
TRUCK	79	.563			
TRUMPET	7	.250			
TRUTH	130	.438			
TWEEZERS	0	.469			
TWILIGHT	4	.250			
TYPHOON	1	.281			
UMBRELLA	11	.281			
UNBELIEVER	0	.250			
UNDERWORLD	6	.500			
UNIFICATION	10	.313			
UNIT	190	.375			
UNIVERSITY	246	.719			
UNREALITY	2	.188			
UPKEEP	6	.281			
UTENSIL	3	.469			
VACCINATION	2	.219			
VACUUM	20	.313			
VALLEY	78	.375			
VANITY	8	.344			
VAPOR	12	.219			
VEGETABLE	26	.563			
VEHICLE	88	.313			
VELOCITY	32	.500			
VENOM	2	.500			
VESSEL	28	.250			
VEST	5	.406			
VESTIBULE	2	.406			
VICTIM	46	.469			
VICTORY	68	.406			
VIGILANCE	4	.313			
VIGOR	14	.375			

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