— METHODS & DESIGNS —

Normative data for number of word meanings

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A corpus of 576 words and orthographically legal pseudowords was rated by 150 undergraduates to obtain a subjective estimate of the number of meanings possessed by the stimuli. The information contained in this corpus may be used to supplement current sources of word-meaning information (e.g., total number of dictionary entries). Experimental evidence is presented that supports the reliability of the normative data.

The influence of lexical ambiguity on language comprehension has been an active topic of theoretical and empirical discussion for the past 30 years. For research purposes, the term *lexical ambiguity* refers to the number of entries an item possesses in a mental lexicon. In published dictionaries, the word *bank* possesses approximately five separate entries and, as a result, it may be termed an ambiguous word. Similarly, the word *garb* has one entry and may be considered an unambiguous word. Research outcomes, however, depend critically on a person's knowledge of these meanings. Nonetheless, a common method of obtaining stimulus materials in ambiguity research has been to consult a common reference dictionary (see, e.g., Jastrzembski, 1981). Dictionaries typically list a word's derivation and meaning as well as the particular number of meanings (or senses) that a word possesses. A recent review by Gernsbacher (1984), however, has yielded an interesting observation about this method of determining the number of meanings that a word possesses. Consider the word *fudge*. It is ambiguous in that it possesses more than one meaning. Indeed, dictionaries may cite up to 15 entries for this word. However, it seems difficult to imagine that any individual knows all meanings associated with the word *fudge*. For this reason, relying solely upon a dictionary in order to estimate a word's senses is questionable for purposes of psychological research (e.g., Kellas, Ferraro, & Simpson, 1988; Kellas, Simpson, & Ferraro, 1988; Millis & Button, 1989). One may make

a distinction between the nominal as opposed to the functional number of meanings. The former is provided by a dictionary; whereas the latter is appropriate for language-related research.

Of course, other normative sources of word meaning exist. For instance, Nelson, McEvoy, Walling, and Wheeler (1980) had subjects write down the first word they thought of in response to a homograph (e.g., in response to BAR, subjects might have responded with the word DRINK). With this procedure, the number of meanings estimated for a homograph is based on the frequency of different responses made across subjects, followed by judgments concerning which meaning sense is referred to by each response. The current procedure is different in that it directly estimates each individual's knowledge of the plurality of word senses. Dictionaries do not provide this information.

In the present experiment, undergraduates rated words and orthographically legal pseudowords for number of meanings, using a rating scale in which "no meaning" was represented by "0," "only one meaning" was represented by "1," and "more than one meaning" was represented by "2."

METHOD

Subjects

A total of 150 University of Kansas undergraduates (78 male, M age = 19.84 years, SD = 1.71, range = 18-24; 72 female, M age = 19.28, SD = 1.09, range = 18-26) participated for course credit. All were native speakers of English.

Stimuli

A pool of 198 ambiguous words, 192 unambiguous words, and 186 orthographically legal pseudowords was

used. Two additional letter strings originally included in the pool of pseudoword stimuli (drub, neap) were later revealed to be actual words and have been excluded here. Ambiguous words were taken from Nelson et al. (1980) and Simpson (1979). Unambiguous words were taken from *Webster's Seventh New Collegiate Dictionary* (1976) and *Roget's II New Thesaurus* (1976). The orthographically legal pseudowords were taken from either Juola, Ward, and McNamara (1982) or were formed by changing a letter from a word taken either from the dictionary or the thesaurus (e.g., waltz became baltz). Pseudowords were orthographically legal (e.g., Massaro, Taylor, Venezky, Jastrzembski, & Lucas, 1980); none were derived from any of the words contained in either the ambiguous or unambiguous word pools. All stimuli were pronounceable, were one syllable, and ranged from 3-7 letters in length. No other constraints were placed on the stimuli.

Procedure

The subjects were given a multipage booklet with approximately 20-25 letter strings per page. Adjacent to each letter string were the numbers 0, 1, and 2, where 0 represented "no meaning," 1 represented "only one meaning," and 2 represented "more than one meaning." The subjects were instructed to read each letter string silently, to decide how many meanings they thought the letter string possessed, and to circle the appropriate number. The entire experimental session lasted approximately 1 h, with no time constraints placed on the subjects. Finally, subjects were instructed that there were no right or wrong responses and that the experiment was basically concerned with what people know about word meaning.

Results and Discussion

The Appendix contains each letter string used in the normative session, its mean and median number of meanings rating, and the percentage distribution of choices of the 150 subjects, who indicated whether a particular letter string possessed none (0), only one (1), or more than one (2) meaning.

A subset of these stimuli (60 ambiguous words, 60 unambiguous words, and 120 pseudowords) has been successfully employed with both young and elderly adults (Kellas, Ferraro, & Simpson, 1988; Kellas, Simpson, & Ferraro, 1988). Each of these studies used a manual lexical decision task (LDT; subjects pressed one button if a letter string was a real word and another button if a letter string was not a real word) and both were concerned with attentional resource allocation during visual word recognition. In each experiment, participants responded reliably faster (all $ps < .05$) to words rated as having more than one meaning than they did to words rated as having only one meaning or no meaning. For instance, in Kellas, Ferraro, and Simpson (1988), young adults' mean LDT latencies were 725, 763, and 858 msec for ambiguous words, unambiguous words, and pseudo-

words, respectively. Similarly, in Kellas, Simpson, and Ferraro (1988), young adults' mean LDT latencies were 773, 802, and 896 msec for ambiguous, unambiguous, and pseudoword stimuli, respectively. The same pattern held for elderly adults, whose mean LDT latencies were 1,279, 1,352, and 1,532 msec for ambiguous, unambiguous, and pseudoword stimuli, respectively. This pattern suggests that as the mean number of meanings for a particular word increases, the response latency associated with that word decreases. In all of these experiments, letter strings were equated on word frequency, word familiarity, number of letters, bigram frequency, and number of syllables.

The relationship between RT and mean number of meanings was supported further by correlating the mean LDT latency across subjects ($n = 16$) for the 60 ambiguous and 60 unambiguous words from Kellas, Ferraro, and Simpson (1988) with their corresponding mean number-of-meanings values from the Appendix. This analysis resulted in $r(118) = -.41, p < .001$, indicating that the number of meanings a particular word possesses is predictive of lexical decision performance.

It should be noted that in Kellas, Ferraro, and Simpson (1988) and Kellas, Simpson, and Ferraro (1988), a total of 72 undergraduates provided number-of-meanings ratings for the 60 ambiguous, 60 unambiguous, and 120 pseudoword stimuli. Their mean number-of-meanings ratings were as follows: for ambiguous words, $M = 1.86$, $SD = .06$, range = 1.70-1.97; for unambiguous words, $M = 1.15, SD = .10$, range = .80-1.30; and for pseudowords, $M = .09, SD = .06$, range = .00-.23. The corresponding average number-of-meanings values from the current corpus, which had more than double the participants ($n = 150$), were comparable to the previously reported data. The values were as follows: for ambiguous words, $M = 1.79, SD = .08$, range = 1.57-1.96; for unambiguous words, $M = 1.22, SD = .12$, range = .80-1.45; and for pseudowords, $M = .08, SD = .05$, range = .00-.22.

There is evidence (e.g., Glanzer & Bowles, 1976) to suggest that words that have many meanings are also high in printed word frequency. This relationship was modestly confirmed in the present set of 390 words contained in the Appendix. The resulting correlation between each word's average number of meanings and its corresponding Kučera and Francis (1967) frequency count was $r(388) = +.18, p < .01$.

Finally, the relationship between our norms and the mean number of dictionary entries in two unabridged dictionaries (*Random House College Dictionary*, 1976; *Webster's Ninth New Collegiate Dictionary*, 1983) was examined. The subjects' ratings and the dictionary entries were moderately related [$r(388) = +.34, p < .01$], which accounts for only 12% of the total variance.

Millis and Button (1989, Experiment 3) gathered a small set of similar normative data for experimental purposes. However, their subject and stimulus sample size

was too restricted for general use. The present data set corrects this shortcoming and provides validation across the years of adult development and aging.

In summary, these data should provide an effective tool for researchers in the area of language comprehension and related processes. Furthermore, these data reveal the value of the number of meanings metric and suggest a role for meaning in isolated word recognition (Balota, Ferraro, & Connor, in press).

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APPENDIX

Number of Meaning Norms

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Words					
Ace (A)	1.76	2.00	0	24	76
Age	1.53	2.00	0	47	53
Aim	1.57	2.00	0	43	57
Arm	1.70	2.00	1	27	72
Badge (U)	1.32	1.00	3	63	34
Bait	1.33	1.00	0	67	33
Ball	1.84	2.00	0	16	84
Ban	1.44	1.00	0	56	44
Band	1.87	2.00	0	13	87
Bank	1.74	2.00	0	26	74
Bar	1.89	2.00	0	11	89
Base	1.76	2.00	0	25	75
Bass	1.74	2.00	0	26	74
Bat (A)	1.82	2.00	0	18	82
Bay	1.61	2.00	0	39	61
Beam	1.70	2.00	1	27	72
Bear	1.65	2.00	0	35	65
Bed	1.47	1.00	2	49	49
Beef	1.45	1.00	1	53	46
Belt	1.84	2.00	1	14	85
Bet	1.44	1.00	0	56	44
Bid	1.46	1.00	1	52	47
Bill	1.83	2.00	0	16	84
Bind	1.38	1.00	5	53	42
Bit	1.66	2.00	0	33	67
Blame (U)	1.19	1.00	1	80	19
Blaze	1.37	1.00	0	63	37
Blend	1.46	1.00	1	52	47
Bliss (U)	1.36	1.00	2	60	38
Blow	1.79	2.00	0	21	79
Bluff (A)	1.63	2.00	1	35	64
Blurb	1.37	1.00	1	61	38
Bolt (A)	1.79	2.00	1	19	80
Boost	1.27	1.00	1	71	28
Boot (A)	1.68	2.00	1	29	70
Bound	1.60	2.00	1	37	62
Bowl (A)	1.77	2.00	0	23	77
Box	1.82	2.00	0	18	82
Brag (U)	1.13	1.00	0	87	13
Branch	1.73	2.00	1	25	74
Brawl (U)	1.27	1.00	0	73	27
Break	1.57	2.00	3	37	60
Breathe	1.15	1.00	3	80	17
Breed	1.21	1.00	1	77	22
Brick	1.21	1.00	1	77	22
Bridge	1.71	2.00	1	26	73
Broom	1.13	1.00	3	81	16
Buck (A)	1.88	2.00	1	10	89
Bulge	1.36	1.00	5	54	41

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Bump	1.61	2.00	1	37	62
Burst (U)	1.44	1.00	0	56	44
Buy	1.37	1.00	0	63	37
Call	1.56	2.00	1	43	56
Calm	1.27	1.00	1	70	29
Cane	1.43	1.00	0	57	43
Case	1.88	2.00	0	12	88
Cast	1.84	2.00	1	15	84
Catch	1.45	1.00	0	55	45
Cause (U)	1.49	2.00	2	47	51
Chance	1.29	1.00	0	71	29
Charge (A)	1.84	2.00	1	14	85
Charm	1.73	2.00	0	27	73
Chat (U)	1.16	1.00	0	84	16
Cheat (U)	1.42	1.00	1	56	43
Check	1.83	2.00	1	14	85
Cheer	1.56	2.00	1	42	57
Chest (A)	1.74	2.00	0	27	73
Chew	1.43	1.00	0	57	43
Chop	1.67	2.00	0	33	67
Chuck	1.56	2.00	3	39	58
Clash (U)	1.40	1.00	1	59	40
Clip	1.64	2.00	0	36	64
Cloak	1.28	1.00	3	66	31
Club	1.84	2.00	0	15	85
Clump (U)	1.19	1.00	6	70	24
Coach	1.41	1.00	0	59	41
Coast	1.87	2.00	0	12	88
Coat	1.53	2.00	2	43	55
Comb	1.56	2.00	3	39	58
Cord	1.45	2.00	2	52	46
Cost (U)	1.31	1.00	1	68	31
Count	1.68	2.00	1	29	70
Court	1.77	2.00	1	20	79
Cove	1.23	1.00	4	70	26
Crust	1.57	2.00	1	42	57
Cure	1.36	1.00	0	64	36
Curse	1.66	2.00	0	34	66
Dare	1.32	1.00	5	57	38
Dash (A)	1.76	2.00	1	21	78
Date (A)	1.96	2.00	0	4	96
Deaf (U)	1.13	1.00	5	78	17
Deck (A)	1.84	2.00	1	15	84
Deed	1.42	1.00	1	56	43
Dive	1.91	2.00	0	9	91
Doom (U)	1.22	1.00	0	78	22
Doubt (U)	1.20	1.00	1	78	21
Drab	1.00	1.00	13	74	13
Draft (A)	1.90	2.00	1	8	91
Drag (A)	1.73	2.00	1	25	74
Dream	1.47	1.00	3	48	49
Dress	1.85	2.00	1	13	86
Drill	1.68	2.00	1	31	68
Drink	1.51	2.00	0	49	51
Drip	1.75	2.00	1	23	76
Drop	1.44	1.00	0	56	44
Drug	1.57	2.00	1	41	58
Drum	1.61	2.00	5	30	65
Duck (A)	1.86	2.00	0	15	85

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Ear	1.26	1.00	1	72	27
Edge	1.51	2.00	2	45	53
Egg	1.43	1.00	3	51	46
Fade (U)	1.19	1.00	0	81	19
Fair	1.80	2.00	0	20	80
Faith (U)	1.28	1.00	1	70	29
Fall	1.79	2.00	1	19	80
Fast	1.64	2.00	0	37	63
Fear (U)	1.27	1.00	0	73	27
Feast	1.56	2.00	0	44	56
Feel	1.43	1.00	1	55	44
Fell	1.38	1.00	0	63	37
Felt	1.75	2.00	0	25	75
Fence	1.71	2.00	0	29	71
Field (A)	1.70	2.00	1	29	70
Fight	1.36	1.00	1	63	36
File	1.31	1.00	1	67	32
Fine (A)	1.78	2.00	0	22	78
Fire	1.78	2.00	0	22	78
Flag	1.68	2.00	1	31	68
Flat	1.38	1.00	0	62	38
Fleet	1.53	2.00	0	47	53
Fling	1.62	2.00	1	37	62
Flood	1.39	1.00	0	62	38
Foam	1.34	1.00	0	67	33
Foil (A)	1.71	2.00	3	23	74
Fold	1.55	2.00	1	43	56
Foot	1.64	2.00	0	35	65
Forge	1.22	1.00	3	72	25
Freight (U)	1.28	1.00	1	71	28
Frisk	1.21	1.00	4	72	24
Front	1.58	2.00	0	42	58
Froth	.34	0	66	34	0
Fuel	1.33	1.00	1	66	33
Fuss (U)	1.20	1.00	4	72	24
Gag	1.40	1.00	5	51	44
Garb	.58	1.00	47	48	5
Gas	1.75	2.00	0	25	75
Ghost (U)	1.17	1.00	2	79	19
Gift	1.38	1.00	0	62	38
Glance	1.23	1.00	3	72	25
Glint	.46	0	57	40	3
Gold	1.34	1.00	0	67	33
Golf (U)	1.08	1.00	7	78	15
Gown	1.55	2.00	0	45	55
Grace	1.67	2.00	0	33	67
Grade (A)	1.67	2.00	3	27	70
Grave (A)	1.76	2.00	0	23	77
Green	1.36	1.00	1	62	37
Grieve	1.09	1.00	3	84	13
Grill	1.68	2.00	0	33	67
Grin (U)	1.04	1.00	7	82	11
Grind	1.42	1.00	1	56	43
Gulp (U)	1.12	1.00	6	77	17
Hail (A)	1.50	2.00	4	42	54
Halt (U)	1.17	1.00	3	77	20
Ham	1.71	2.00	1	28	71
Hand	1.78	2.00	0	22	78
Hang	1.45	1.00	4	48	48

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Hard	1.60	2.00	1	39	60
Harm (U)	1.21	1.00	3	72	25
Haste (U)	1.19	1.00	1	79	20
Hat	1.16	1.00	3	79	18
Hatch	1.57	2.00	0	43	57
Hate	1.35	1.00	0	65	35
Head	1.78	2.00	0	23	77
Heat	1.61	2.00	1	37	62
Height	1.23	1.00	0	78	22
Hem	1.28	1.00	2	68	30
Hide	1.52	2.00	0	48	52
Hint (U)	1.22	1.00	3	72	25
Hog (A)	1.79	2.00	0	22	78
Hoist	1.46	1.00	0	54	46
Horn	1.63	2.00	2	33	65
Hound (A)	1.82	2.00	0	18	82
Hunt	1.41	1.00	1	57	42
Hurt	1.34	1.00	3	61	36
Ink	1.41	1.00	0	60	40
Jab (U)	1.17	1.00	0	78	22
Jade	1.26	1.00	6	62	32
Jail (U)	1.12	1.00	0	88	12
Jerk (A)	1.76	2.00	1	21	78
Joint (A)	1.82	2.00	0	19	81
Joy	1.52	2.00	0	48	52
Juice	1.44	1.00	0	55	45
Key	1.73	2.00	0	27	73
Kick	1.44	1.00	1	54	45
Kid	1.85	2.00	1	14	85
Lamp (U)	1.14	1.00	0	86	14
Land	1.80	2.00	0	20	80
Lapse	1.17	1.00	3	77	20
Laugh (U)	1.27	1.00	3	67	30
Leaf	1.74	2.00	0	25	75
Lean (A)	1.79	2.00	0	21	79
Leap (U)	1.45	1.00	0	55	45
Least	1.26	1.00	0	74	26
Leave	1.43	1.00	0	57	43
Left	1.84	2.00	0	16	84
Light (A)	1.78	2.00	0	22	78
Like	1.59	2.00	0	41	59
List	1.47	1.00	1	50	49
Loaf (A)	1.75	2.00	0	25	75
Lock	1.57	2.00	1	41	58
Long	1.57	2.00	0	43	57
Lot	1.71	2.00	1	27	72
Lung (U)	1.23	1.00	2	73	25
Lush	1.25	1.00	9	57	34
Lust (U)	1.26	1.00	1	73	26
Mass	1.78	2.00	1	20	79
Match (A)	1.87	2.00	0	12	88
Mean	1.82	2.00	1	17	82
Mesh	1.45	1.00	2	51	47
Might	1.61	2.00	1	37	62
Mine	1.72	2.00	1	27	72
Mint (A)	1.74	2.00	1	25	74
Miss (A)	1.78	2.00	0	23	77
Mist	1.29	1.00	3	66	31
Mix	1.39	1.00	1	59	40

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Mob	1.39	1.00	1	59	40
Mold	1.70	2.00	3	25	72
Name	1.46	1.00	3	48	49
Need	1.49	1.00	0	51	49
Net	1.72	2.00	0	28	72
Niece	1.02	1.00	4	90	6
Noise (U)	1.21	1.00	0	79	21
Note	1.85	2.00	0	15	85
Once	1.16	1.00	3	78	19
Pace	1.52	2.00	1	46	53
Page	1.63	2.00	0	37	63
Palm (A)	1.74	2.00	1	25	74
Pass	1.83	2.00	0	17	83
Pat	1.71	2.00	0	29	71
Perch	1.74	2.00	0	26	74
Pet (A)	1.87	2.00	0	13	87
Phrase	1.26	1.00	3	68	29
Play	1.73	2.00	1	25	74
Plight	.99	1.00	9	82	9
Plot	1.66	2.00	1	33	66
Plunge	1.26	1.00	0	74	26
Poach	1.30	1.00	3	63	34
Poise	1.28	1.00	1	70	29
Pool	1.79	2.00	1	19	80
Port	1.53	2.00	3	41	56
Post	1.72	2.00	5	18	77
Pot	1.85	2.00	0	15	85
Pound (A)	1.86	2.00	0	14	86
Praise (U)	1.30	1.00	3	65	32
Press	1.80	2.00	1	19	80
Probe	1.52	2.00	1	46	53
Prod	.76	1.00	40	45	15
Prune	1.49	1.00	0	51	49
Punch (A)	1.87	2.00	0	13	87
Quack	1.84	2.00	2	12	86
Quake (U)	1.27	1.00	0	73	27
Quart	1.15	1.00	3	79	18
Quest (U)	1.32	1.00	2	64	34
Quit	1.21	1.00	1	77	22
Race	1.79	2.00	1	19	80
Rage	1.30	1.00	1	69	30
Raise	1.60	2.00	0	40	60
Rake	1.43	1.00	0	57	43
Ram (A)	1.72	2.00	2	25	73
Range	1.74	2.00	2	22	76
Rank	1.62	2.00	1	37	62
Rare	1.78	2.00	0	22	78
Rash	1.57	2.00	1	41	58
Rate	1.57	2.00	3	37	60
Rear	1.77	2.00	0	23	77
Rib	1.22	1.00	0	78	22
Ring	1.76	2.00	0	24	76
Risk	1.29	1.00	2	67	31
Road (U)	1.27	1.00	2	70	28
Roar (U)	1.27	1.00	2	70	28
Rock	1.81	2.00	0	19	81
Roll (A)	1.86	2.00	0	14	86
Room	1.45	1.00	5	46	49
Root	1.66	2.00	0	34	66

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Rose	1.77	2.00	1	22	77
Row (A)	1.78	2.00	0	23	77
Rule	1.72	2.00	1	26	73
Sack (A)	1.76	2.00	0	24	76
Saw	1.88	2.00	1	11	88
Say	1.28	1.00	1	70	29
Scale	1.76	2.00	0	25	75
Scorn (U)	1.09	1.00	0	91	9
Scout	1.41	1.00	1	58	41
Scrap	1.39	1.00	0	61	39
Screen (A)	1.88	2.00	0	12	88
Seal (A)	1.88	2.00	0	12	88
Set	1.83	2.00	0	17	83
Shade	1.36	1.00	1	62	37
Sham (U)	.80	1.00	30	60	10
Shame (U)	1.38	1.00	0	62	38
Share	1.61	2.00	1	38	61
Sharp	1.66	2.00	1	33	66
Shed (A)	1.72	2.00	3	23	74
Shell	1.77	2.00	0	23	77
Ship	1.75	2.00	0	24	76
Shock	1.59	2.00	0	41	59
Shoot	1.77	2.00	1	21	78
Shot	1.76	2.00	0	25	75
Shrill (U)	1.10	1.00	7	77	16
Siege (U)	1.16	1.00	9	65	26
Sink (A)	1.78	2.00	0	23	77
Slab (U)	1.34	1.00	3	61	36
Slip	1.76	2.00	1	23	76
Slug	1.76	2.00	1	23	76
Smear (U)	1.35	1.00	0	65	35
Sneak	1.30	1.00	4	62	34
Sneer (U)	1.00	1.00	4	92	4
Snuff	1.44	1.00	3	50	47
Solve	1.34	1.00	1	64	35
Sound	1.52	2.00	1	47	52
Spade (A)	1.73	2.00	7	14	79
Speck (U)	1.03	1.00	7	83	10
Spice	1.31	1.00	0	69	31
Spring (A)	1.89	2.00	0	11	89
Spy	1.55	2.00	0	46	54
Squeal	1.41	1.00	2	55	43
Squint (U)	1.12	1.00	5	79	16
Stab (U)	1.16	1.00	0	84	16
Staff	1.61	2.00	0	39	61
Stalk	1.88	2.00	0	12	88
Stall (A)	1.89	2.00	0	10	90
Stand	1.77	2.00	0	22	78
Star (A)	1.90	2.00	0	10	90
State	1.90	2.00	0	10	90
Stay	1.33	1.00	1	66	33
Steep	1.28	1.00	5	62	33
Steer (A)	1.77	2.00	1	22	77
Stew	1.59	2.00	1	39	60
Stick (A)	1.80	2.00	0	20	80
Still	1.66	2.00	1	33	66
Stir	1.43	1.00	3	50	47
Store	1.78	2.00	0	22	78
Strain	1.60	2.00	1	39	60

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2
Strike (A)	1.88	2.00	0	12	88
Strip (A)	1.71	2.00	1	28	71
Suit	1.81	2.00	1	18	81
Swamp (A)	1.57	2.00	1	40	59
Switch (A)	1.77	2.00	3	17	80
Swoop	1.17	1.00	7	68	25
Tab	1.68	2.00	0	32	68
Tag (A)	1.78	2.00	1	20	79
Taint	.93	1.00	22	64	14
Tap	1.77	2.00	0	23	77
Tax	1.51	2.00	0	49	51
Tear	1.77	2.00	0	23	77
Tend (U)	1.27	1.00	6	61	33
Think (U)	1.15	1.00	0	85	15
Tick (A)	1.82	2.00	0	18	82
Tie	1.84	2.00	1	14	85
Tile	1.23	1.00	0	77	23
Tint (U)	1.18	1.00	1	80	19
Tip (A)	1.77	2.00	0	23	77
Tire (A)	1.77	2.00	1	21	78
Toast	1.77	2.00	1	21	78
Tool	1.41	1.00	1	57	42
Top	1.77	2.00	1	22	77
Tote	1.29	1.00	3	65	32
Tour	1.34	1.00	1	64	35
Trace	1.59	2.00	2	37	61
Trade	1.72	2.00	0	29	71
Train	1.80	2.00	0	20	80
Trash	1.65	2.00	0	35	65
Trust	1.67	2.00	0	33	67
Type (A)	1.88	2.00	0	12	88
Urge	1.44	1.00	0	56	44
Vast (U)	1.12	1.00	7	75	18
Vault (A)	1.77	2.00	4	15	81
Wake	1.78	2.00	0	22	78
Want (U)	1.37	1.00	0	63	37
Wash	1.40	1.00	1	59	40
Watch (A)	1.93	2.00	0	7	93
Weird (U)	1.05	1.00	4	87	9
Well	1.85	2.00	0	15	85
Wind	1.71	2.00	0	28	72
Wise (U)	1.29	1.00	0	71	29
Word (U)	1.23	1.00	0	77	23
Yard	1.74	2.00	1	25	74
Yarn	1.80	2.00	0	20	80
Yield	1.37	1.00	1	61	38
Pseudowords					
Baive (P)	.06	0	93	7	0
Balp (P)	.05	0	95	5	0
Baltz	.06	0	94	6	0
Bidst (P)	.06	0	95	4	1
Bime (P)	.05	0	95	5	0
Blant (P)	.17	0	85	14	1
Bodge (P)	.08	0	92	8	0
Bouse	.17	0	84	15	1
Breat (P)	.12	0	91	6	3
Broft (P)	.05	0	96	4	0
Brole (P)	.03	0	97	3	0

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)			Stimulus Letter String	Number of Meanings Values		Distribution of Choices (in %)		
	Mean	Median	0	1	2		Mean	Median	0	1	2
Bron (P)	.17	0	85	14	1	Leem	.07	0	95	4	1
Crand (P)	.13	0	89	9	2	Lenp	.04	0	98	1	1
Creath	.15	0	87	12	1	Lidge	.03	0	97	3	0
Crosh (P)	.06	0	94	6	0	Linb	.10	0	92	5	3
Delbe (P)	.09	0	92	8	0	Loint	.08	0	95	4	1
Dinp	.03	0	98	2	0	Lonk	.06	0	94	6	0
Dirth	.24	0	76	23	1	Lotch	.12	0	89	10	1
Doot (P)	.05	0	97	2	1	Louns	.10	0	92	6	2
Drate	.23	0	78	21	1	Mage	.23	0	77	22	1
Dreb (P)	.11	0	89	11	0	Marse	.12	0	90	9	1
Dreeze (P)	.03	0	97	3	0	Meap (P)	.04	0	97	2	1
Dreight	.16	0	87	11	2	Melf (P)	.03	0	96	4	0
Dresk (P)	.10	0	91	8	1	Mesp (P)	.08	0	92	8	0
Droack (P)	.06	0	95	4	1	Mest (P)	.07	0	93	7	0
Dulp (P)	.05	0	95	4	1	Metch (P)	.05	0	95	5	0
Felp (P)	.11	0	90	9	1	Milp (P)	.09	0	92	7	1
Fime (P)	.06	0	93	7	0	Moce (P)	.10	0	91	8	1
Flaze (P)	.09	0	91	9	0	Moke	.08	0	92	7	1
Flunt (P)	.05	0	95	5	0	Mosp	.03	0	97	3	0
Foad (P)	.07	0	93	6	1	Motch (P)	.12	0	89	10	1
Foaf (P)	.07	0	95	3	2	Moy	.07	0	93	6	1
Freg (P)	.00	0	100	0	0	Mund (P)	.09	0	91	9	0
Froms (P)	.06	0	95	4	1	Narb	.04	0	96	3	1
Fube (P)	.06	0	95	4	1	Neak (P)	.16	0	84	16	0
Gax (P)	.03	0	98	2	0	Nean	.07	0	95	4	1
Geast (P)	.03	0	97	3	0	Neave (P)	.22	0	81	16	3
Gend (P)	.04	0	96	4	0	Nex (P)	.01	0	99	1	0
Giff (P)	.05	0	95	5	0	Nink	.03	0	98	1	1
Gint (P)	.15	0	87	11	2	Nong (P)	.02	0	98	2	0
Ginth	.05	0	95	5	0	Nort	.07	0	95	4	1
Glar (P)	.04	0	96	4	0	Nouth (P)	.04	0	96	4	0
Glent	.08	0	94	5	1	Nove (P)	.11	0	91	7	2
Glub (P)	.13	0	87	13	0	Nuche	.01	0	99	1	0
Gock (P)	.15	0	88	9	3	Nuck (P)	.03	0	97	3	0
Golt (P)	.13	0	92	3	5	Nund (P)	.03	0	97	3	0
Gos (P)	.03	0	97	3	0	Nurt (P)	.03	0	97	3	0
Greme (P)	.07	0	94	6	0	Olms	.22	0	78	22	0
Grens (P)	.05	0	95	5	0	Ousk (P)	.04	0	97	3	0
Gribe	.13	0	90	8	2	Pakes (P)	.05	0	95	5	0
Grike (P)	.02	0	99	1	0	Pamb (P)	.04	0	96	3	1
Grut (P)	.08	0	93	7	0	Peash (P)	.05	0	97	2	1
Guld (P)	.04	0	97	3	0	Perd (P)	.16	0	84	16	0
Hanb	.06	0	94	6	0	Pim	.11	0	89	11	0
Harse (P)	.14	0	88	11	1	Plip (P)	.05	0	96	4	0
Helk (P)	.05	0	95	5	0	Plutch (P)	.07	0	93	6	1
Hest	.05	0	96	3	1	Poge	.08	0	94	5	1
Hode (P)	.05	0	95	4	1	Preat (P)	.11	0	89	11	0
Holp	.05	0	95	5	0	Pron	.15	0	85	15	0
Hom (P)	.05	0	97	2	1	Prudge	.18	0	85	13	2
Hort	.15	0	87	12	1	Pulf (P)	.03	0	97	3	0
Hotes	.07	0	93	7	0	Pust (P)	.07	0	93	6	1
Hurke	.09	0	92	7	1	Quabe (P)	.05	0	97	2	1
Jauce (P)	.10	0	91	9	0	Quate (P)	.09	0	92	7	1
Jeint	.04	0	97	2	1	Queff	.08	0	93	5	2
Jull (P)	.15	0	87	12	1	Ralte	.09	0	91	9	0
Kend (P)	.07	0	93	6	1	Reas	.03	0	97	3	0
Kinp (P)	.04	0	97	3	0	Reat (P)	.05	0	96	3	1
Kloom (P)	.12	0	90	9	1	Renp	.04	0	97	3	0
Kund (P)	.04	0	98	1	1	Rolm (P)	.07	0	94	5	1

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values Mean	Median	Distribution of Choices (in %) 0	1	2
Rorce (P)	.01	0	96	3	1
Saip	.04	0	98	1	1
Sart (P)	.05	0	95	5	0
Sasp (P)	.06	0	94	4	2
Scaf (P)	.13	0	88	11	1
Scang (P)	.13	0	89	10	1
Sibe	.11	0	89	11	0
Sirth (P)	.10	0	92	7	1
Skote (P)	.05	0	95	5	0
Skurd	.14	0	86	14	0
Sleme	.02	0	98	2	0
Sline	.10	0	90	10	0
Smift (P)	.05	0	96	4	0
Snop	.11	0	89	11	0
Sodge (P)	.15	0	87	12	1
Solt (P)	.11	0	89	11	0
Soth (P)	.13	0	89	10	1
Spluce	.14	0	86	14	0
Spost	.14	0	86	14	0
Squain (P)	.17	0	87	11	2
Srint	.28	0	79	13	8
Stap (P)	.09	0	92	7	1
Ston	.01	0	99	1	0
Sught (P)	.17	0	87	11	2
Swetch	.13	0	88	11	1
Tade (P)	.12	0	89	11	0
Telf (P)	.08	0	94	5	1
Tep	.04	0	97	3	0
Thaif (P)	.05	0	92	7	1
Thare (P)	.04	0	97	2	1
Thob (P)	.13	0	89	9	2
Thome	.07	0	93	6	1
Thonk	.10	0	90	10	0
Torge	.19	0	90	10	0

APPENDIX (Continued)

Stimulus Letter String	Number of Meanings Values Mean	Median	Distribution of Choices (in %) 0	1	2
Trabe	.11	0	91	8	1
Trage (P)	.09	0	93	5	2
Trendst	.07	0	93	7	0
Tris (P)	.06	0	95	5	0
Trosh (P)	.06	0	95	4	1
Truf (P)	.05	0	95	5	0
Trun (P)	.13	0	90	8	2
Trut	.07	0	93	7	0
Ture (P)	.11	0	90	9	1
Twim (P)	.13	0	89	10	1
Vilch (P)	.05	0	95	5	0
Vort (P)	.07	0	94	4	2
Wape (P)	.00	0	100	0	0
Warse	.09	0	91	8	1
Wause	.07	0	95	4	1
Weague (P)	.06	0	95	5	0
Wouse (P)	.09	0	92	7	1
Yeab (P)	.07	0	93	7	0
Yoast	.12	0	88	12	0
Yoom (P)	.02	0	99	1	0
Yourg (P)	.03	0	97	3	0
Zild	.01	0	99	1	0
Zist	.06	0	94	6	0
Zoost (P)	.18	0	82	18	0

Note—A, U, and P denote stimulus materials used by Ferraro (1986), Kellas, Ferraro, and Simpson (1988), and Kellas, Simpson, and Ferraro (1988). A = words rated as having more than one meaning (i.e., Ambiguous); U = words rated as having only one meaning (i.e., Unambiguous); P = letter strings rated as having little meaning (i.e., Pseudoword).