Word Association Results: A Window to the Lexicons of ESL Students

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The results of word association tests can give useful information about how words are clustered in the mental lexicon of second language learners. Seeing patterns in associations can help teachers present new vocabulary and evaluate student comprehension. This study investigated the results of a 50-item word association test administered to 198 ESL students at the University of Washington. Which kinds of responses were common, how ESL responses compared to native speakers', and how gender, level, native language, and age affected answers were considered. The results suggest that as students have more experiences with words, their lexicons reorganize into meaning clusters which reflect attitudes, emotions, or strong memories. There was also a great deal of similarity in the responses of native speakers and the second language learners. Finally, significant differences appeared according to gender, language, and levels of English and education.

連想語検査の結果：第二言語学習者の語彙を知る手がかり

第二言語学習者の観念語彙の中でどのような過程で単語が集められるかを知る上で、連想語検査の結果は有益な情報を提供する。連想に型があることを知ることは、教師が新しい語彙を紹介したり学生の理解度を評価するのに役立つ。本研究はワシントン大学の198人のＥＳＬ学生が受けた50の単語を使った連想語検査の結果を調査したものである。どのような応答が一般的か、ＥＳＬ学習者とネイティブ・スピーカーの応答の相違点は何か、又性差、学力、母国語、年齢が答えにどのように影響しているか等を考慮した。この結果から、多くの単語を知っている学生ほど、自分の語彙を意味のある語群（これは見解、感情、強い記憶を反映する）に整理していると推察される。同様に、ネイティブ・スピーカーと第二言語学習者の応答には多くの類似点があった。最後に、性差、母国語、英語力や教育によって、顕著な異なりが現われた事を述べる。

1. Introduction

After decades of neglect, vocabulary teaching in the field of English language instruction has been experiencing a revival in interest (Bahns, 1993; Judd 1978; Meara, 1980). This renewal is also evident in research into the organization of the human lexicon. Current theories focus on the idea that there is a network of associations, a web-like system that allows for easy storage and retrieval of words. Words seem to be linked in the mind in semantic fields with certain kinds of links being especially strong due to

linguistic habits. Coordinates (words which are on the same level, cat—>dog, including opposites, cold—>hot) and collocations (words commonly occurring together, hot—>weather) have the strongest links (Aitchison, 1987).

Word association experiments have been used to access word links in mental lexicons (see Fodor, 1983). With a typical word association test, the researcher presents a word and asks the subject to give the first word that comes to mind, the Kent-Rosanoff list (Postman & Keppel, 1970) often being the source for stimulus words. This list of 100 common words was originally used in 1910 to distinguish how words were associated in the minds of the mentally ill in contrast to the mentally healthy. The list has been popular in word association experiments because of the large amount of normative data available.

Since the mid-fifties, numerous word association studies have been done with second language learners. Researchers have asked for single responses, continuous responses (as many words as possible in *n* seconds), and restricted associations (giving a synonym, for example) in their studies. Some have allowed bilingual subjects to make interlingual responses.

Analysis of word association test results has often been done by word class: **supra/subordinate classifications** (words that show category relationships up or down; e.g., fruit—>apple, bread—>food, mountain—>Fuji); **synonyms** (words with similar meanings, e.g., ocean—>sea, boy—>guy, hard—>difficult); **coordinates** (words equal in rank and importance, e.g., bath—>shower, salt—>sugar, green—>blue); **contrasts** (words that show opposite meanings, e.g., doctor—>patient, slow—>quick, baby—>adult); and **collocations** (words that commonly go together, e.g., cold—>weather, eating—>lunch, dark—>night). Another type of association has been part of speech: **noun, verb, adjective, adverb.** Researchers have also ranked responses according to their popularity: primary (most popular), secondary, tertiary, and so forth. This ranking is known as an associative response hierarchy.

In studies of native speakers of English, Aitchison (1987) concludes that coordinates, including contrasts, are found to be very closely associated. In addition, collocations have "powerful and long-lasting" links. Aitchison also reports findings of various word association tests on native speakers, showing that people respond by using words in the same semantic field (needle—>sew), words in the same word class (n—>n, adj—>adj), and the partner in a pair (man—>woman) (1987). Browman (1978) writes that nouns and verbs strongly associate within their own part of speech (90%) and adjectives do so with less frequency (60%). Deese's (1965) work reveals that nouns will elicit

nouns (80%), whereas verbs and adjectives will elicit their own part of speech less often (50%).

Past word association research with second language learners leads us to expect that nouns are most likely to solicit nouns (Ludwig, 1984), and verbs will get more varied responses (Ruke-Dravina, 1971). Previous research also indicates that beginners have fewer primary responses because their lexicons are small and less organized (Meara, 1978). Advanced students have more synonyms and contrast words (Soudek, 1981). Regarding age and education, Riegel's (1968) study shows that older and more educated students have fewer primary responses.

However, these studies need to be looked at cautiously. The Kent-Rosanoff list, for example, has been criticized because its high-frequency words elicit highly "stereotyped" responses. That is, the majority of responses will be the same. Meara (1980), surveying second language word association studies, finds them hard to summarize since their purposes and methods of data collection are very different. He regrets that results speak for groups and not individuals and that these studies lack an overall strategy that would help us understand storage of vocabulary.

Aitchison (1987), in her analysis of studies with native speakers, points out that problems exist with word association results, since these surveys do not replicate natural speech activities and single word responses cannot tell us the many-faceted structure of mental word links. In addition, Coleman (1964) finds that the words around the stimulus can alter the results. In spite of these drawbacks, Aitchison feels word association gives useful information about mental links when it is combined with other sources of information about the lexicon, such as the results of slip of the tongue experiments and experiments with people who have speech disorders. In fact, these other experiments support the strong links of coordinate responses (bath—>shower) and collocational responses (blue—>sky) as well as the weaker links of classification and synonym responses.

Therefore, the present study is based on the belief that word association results do have a place in the search for understanding the semantic networks in the mind. Although they cannot help us accurately map all the words semantically clustered, they do tell us in general about the strongest types of links. The Kent-Rosanoff list, where students typically produce similar responses rather than idiosyncratic ones, may be very useful in showing trends that could help form pedagogical strategies for teachers who face classrooms of second language learners. Stevick (1976) believes that since words are

stored in associations, presenting words in a network of associations is an effective way to facilitate learning vocabulary in a second language. Consequently, although teachers cannot teach all the links in the mental lexicon, they could strive for the most common types in their presentations of vocabulary. The question is, which associations are most useful to teach?

2. The Study

The purpose of this word association study was to find trends in ESL learners' responses. It was hoped that the patterns in the responses would give insights into the following questions: What types of associations do ESL students commonly have? Are native speaker responses similar to ESL students'? Are gender, ESL level, native language, age, and education significant variants in responses? Finally, what implications do the answers to these questions have for the practical teaching of vocabulary?

3. Methodology

3.1 The Subjects

The survey was administered midquarter during Spring and Summer Quarters of 1990 at the University of Washington. Of the 198 respondents, 94 were men, 104 women. The levels were 92 beginners (in the first or second quarter of ESL study), 59 intermediates (in the third quarter of ESL study) and 47 advanced students. The respondents consisted of Japanese (108), Chinese (16), Arabic (13), Korean (18), and 43 others, including 26 who did not identify their native language. The majority of the respondents had a high school degree and some advanced education, and were in the age range of 20-30.

3.2 Data Collection

Teachers in an intensive English program and an academic English program volunteered to administer the survey to their students. To keep administration of the survey consistent, teachers were given explicit directions to read to their students.

The survey consisted of fifty words from the Kent-Rosanoff list which were simple enough that even ESL students with five weeks of classes would be familiar with them. There were 30 nouns, 19 adjectives, and 1 verb. Although only half of the words from the Kent-Rosanoff list were chosen, the order of presentation of those words was the same as on the original list. Aural cues were provided to students as a class, and each student responded in writing on a numbered form. An individual aural/oral survey format was rejected since it would have been time-consuming and more anxiety-laden for students.

Aural stimuli were also used because it was feared that students would slow down if they had written stimuli, belaboring words and not giving the first response that came to mind. Also, Cramer (1968) had found that the frequency of primary responses increased under time pressure. Although there was a risk that ESL students could misunderstand aural cues, this only appeared to happen in a small percentage of cases. These responses were analyzed based on what the student appeared to have heard, rather than what the stimulus was.

These were the words and their order on the survey: table, dark, music, man, deep, soft, eating, mountain, house, black, hand, short, fruit, chair, sweet, woman, cold, slow, river, white, beautiful, window, foot, girl, sickness, hard, yellow, bread, boy, bath, blue, hungry, ocean, head, long, city, butter, doctor, loud, bed, heavy, baby, moon, scissors, quiet, green, salt, street, king, cheese.

3.3 Data Analysis

There were 9049 responses to be individually coded and entered into the database. Each word association relationship was analyzed and coded on three levels: word class, part of speech, and popularity.

The initial division was by word class into five categories: supra/subordinate **classifications**, **synonyms**, **coordinates**, **contrasts**, and **collocations**. Contrasts were defined in a broad range as being opposites, for example, quick—>slow, doctor—>patient. Collocations were defined as words which go together from left to right. For example, woman—>beautiful was not considered to be a collocation since in normal speech it would be reversed. In addition, three other "classes" had to be created in order to categorize responses which did not fit into the five above. The first, **nonsense**, meant the coder could not determine what the relationship was, such as scissors—> honesty, butter—> long, salt—>people. The second was for **word forms** as seen in associations such as sickness—>sick, deep—>depth, and bad—> worse. Finally, an **affective** category was necessary for associations which showed a visual image, an opinion, an emotional response, or a personal past experience. Examples of these were table—>study, dark—>scared, sickness—>hospital.

The second division of all responses was for part of speech: noun, adjective, or verb. Adverbs were combined with adjectives since they were both modifiers; however, there were actually very few adverb responses.

The last division was based on the top three most popular responses for each stimulus word and coded as primary, secondary, and tertiary. In order to correct any inconsistencies in coding, numerous database searches were run to calibrate the codes.

4. Results

4.1 Non-Native Speaker Responses

Table 1 shows the categories of responses and the number of responses in each.

Table 1
Word Class Responses

Word Class	Number of Responses
Affective	4,284
Collocations	1,540
Contrasts	1,157
Coordinates	839
Classifications	652
Synonyms	474
Nonsense	76
Word forms	27

As can be seen in the table, most words solicited "affective" associations, suggesting that students develop word associations based on feelings, attitudes, or strong memories.

Parts of speech results (Table 2) confirm the work of Deese (1965), Ludwig (1984), Ruke-Dravina (1971), and the noun and adjective results of Browman (1978). Noun stimuli usually elicited noun responses while verb or adjectives did so less often. Adjective and verb stimuli were more likely to stimulate a response which formed a syntactic unit: adjective—>noun (deep—>kiss), verb—> noun (eating—>rice).

Table 2
Part of Speech Responses

Stimulus		number	%
Noun	Noun—>Noun	3,694	68.36
	Noun—>Adjective	1,192	22.06
	Noun—>Verb	518	9.59
Adjective	Adjective—>Noun	2,131	61.45
	Adjective—>Adjective	1,151	33.19
	Adjective—>Verb	186	5.36
Verb	Verb—>noun	105	59.32
	Verb—>Adjective	46	25.99
	Verb—>Verb	26	14.69

The next analysis involved word class associations within each part of speech. Within all of the noun stimuli, most responses were affective. The next

highest categories were coordinates and classifications. The fact that the number of collocations stimulated by nouns was very low may be, as Aitchison (1987) concludes, because nouns have fewer syntactic restrictions. Most of the adjective stimuli elicited collocational or affective responses (35% each). Contrasts were in second place. Verbs also had a high percentage of collocational (47%) and affective (40%) responses. Coordinates were third. There were no contrast responses. The percentages for each word class are displayed in Table 3.

Table 3
Responses Categorized by Word Class

Stimulus	Response	number	%
Noun	affective	3,025	56.35
	coordinates	771	14.36
	contrasts	466	8.68
	synonyms	267	4.97
	collocations	263	4.90
Adjective	collocations	1,195	35.06
	affective	1,193	35.01
	contrasts	691	20.28
	synonyms	205	6.02
	classifications	74	2.17
	coordinates	50	1.47
Verb	collocations	82	47.13
	affective	70	40.23
	coordinates	18	10.34
	classifications	2	1.15
	contrasts	0	0.00

The popularity of answers is arranged in the associative response hierarchy (Table 4, on the two following pages). These are sorted in descending order by the strength or popularity of response: "man" receiving 102 out of 2173 primary responses and "quiet" receiving only 17 out of the 2173.

To summarize the kinds of associations that ESL students make, the most striking result is that the majority of responses were affective. There were also many responses in the categories of collocations, coordinates, contrasts, or classifications. Only 25 percent of the primary responses were contrasts. However, where there were contrasts, they were very strong. Looking at the ten words with the most popular responses (stimulus words "man" through "woman"), seventy percent of those responses were contrasts. Finally, nouns usually solicited nouns, adjectives solicited adjectives or nouns, and verbs solicited nouns.

Table 4
Associative Responses by Popularity

Stimulus	Response (number of respondents)	Respondents to each stimulus (n)
man	woman,-en (103), strong (12), human (7)	186
blue	sky (87), sea (26), color (8)	189
bed	sleep,-ing (79), good (13), comfortable (11)	184
girl	boy (76), pretty (21), beautiful (10)	184
table	chair (75), desk (29), wood (15)	193
king	queen (73), England, president (7)	182
short	long (72), hair, tall, pants (14)	181
boy	girl,-s (70), play,-ing, young (7)	180
black	white (69), dark (18), cat (14)	184
woman	man, men (63), beautiful (25), pretty (10)	189
butter	bread (59), milk (13), cow (11)	175
deep	sea (58), water (12), hole (8)	166
foot	shoes (56), walk,-ing (21), hand (19)	183
soft	hard (55), bread (10), cream, cake, woman,-en (7)	188
cold	winter (54), hot (32), snow (15)	187
long	short (53), hair (20), way (9)	183
chair	table (49), sit,-ting (33), desk (28)	181
fruit	apple,-s (49), orange (21), sweet (17)	185
green	tree,-s (46), grass,-es (26), wood,-s (12)	190
dark	night (45), cat (30), black (23)	186
hungry	food,-s (44), eat,-ing (38), lunch (11)	192
bath	shower (44), room (11), soap, water (8)	153
white	black (43), snow (24), pure, house, clean (7)	174
head	hair (40), brain (24), ache (15)	178
slow	fast (39), quick,-ly (25), walk,-ing (9)	174
baby	cute (37), pretty (29), mother (14)	197
hard	soft (35), study,-ing (33), work (15)	179
eating	food (35), hungry (20), drink,-ing (17)	177
river	water (33), mountain (17), long (12)	181
scissors	cut,-ting (32), paper (26), sharp (5)	116
doctor	hospital (31), nurse (26), sick (24)	191
house	family (31), home (21), big (13)	189
hand	finger,-s, foot (30), leg,-s (12)	175

Table 4
Associative Responses by Popularity (Continued)

Stimulus	Response (number of respondents)	Respondents to each stimulus (n)
street	car (30), people (20), road (11)	182
sweet	sugar (30), cake (26), candy (25)	185
beautiful	flower,-s (29), woman,-en (27), view (16)	194
heavy	light (28), weight (25), stone (12)	182
window	door (28), wind (19), glass (18)	193
ocean	sea (26), wide (15), blue (14)	187
mountain	snow (26), Mt. Fuji (22), high, river (21)	190
moon	night (25), sun (24), star (12)	180
music	rock,-'n'roll (25), listen (14), piano (13)	192
salt	sugar (25), pepper (24) sea,-water (18)	159
bread	breakfast (25), butter (24) food, milk (10)	185
city	Seattle (24), country (21), town (18)	192
yellow	paper (23), color (22), signal (10)	192
loud	noise, voice (21), music (20)	163
cheese	milk (21), mouse (16), butter (13)	184
sickness	cold (21), hospital (12), ill (10)	158
quiet	night (17), library, noisy (13)	179

4.2 Comparison to Native Speaker Responses

Next, the primary (1), secondary (2), and tertiary (3) responses were compared to the responses of approximately 1008 native-speaker college sophomores in the 1952 Minnesota Word Association Norms (Postman & Keppel, 1970). Although there was a 38-year difference, previous researchers have found that such norms are still useful since the main difference has been an increased frequency in the primary responses over time (Jenkins, 1970). Ninety percent of the stimulus words had similar popular responses to native-speaker responses. Of those, 48 percent actually shared the same primary responses. Table 5 shows the comparison between L1 and L2 responses, non-comparable responses excluded.

The results of Table 5 shed light on the question of whether native-speaker responses are similar to ESL students'. Indeed, there is a very high percentage of similarity. Because these are so similar, trends from native-speaker research could be useful when planning vocabulary teaching for ESL students.

Table 5
Comparison to Native Speaker Norms

L2= Second Language Learner
L1= Native Speaker
(1) primary responses
(2) secondary responses
(3) tertiary responses

Stimuli	L2 Responses	%	L1 Responses	%
bath	(3) water	5	(2) water	22
	(3) soap	5	(3) soap	10
bed	(1) sleep,-ing	43	(1) sleep	56
black	(1) white	38	(1) white	75
	(2) dark	10	(2) dark	5
	(3) cat	8	(3) cat	2
blue	(1) sky	46	(1) sky	17
boy	(1) girl,-s	39	(1) girl	76
bread	(2) butter	13	(1) butter	61
	(3) food	5	(2) food	9
butter	(1) bread	34	(1) bread	63
chair	(1) table	27	(1) table	49
	(2) sit,-ting	18	(2) sit	20
cheese	(2) mouse	9	(3) mouse	9
city	(3) town	9	(1) town	35
cold	(1) hot	17	(1) hot	35
	(3) snow	8	(2) snow	22
dark	(1) night	24	(2) night	6
deep	(2) water	7	(3) water	10
doctor	(3) nurse	14	(1) nurse	24
	(1) sick	13	(2) sick	15
eating	(1) food	20	(1) food	39
	(3) drink,-ing	10	(2) drinking	14
fruit	(1) apple,-s	26	(1) apple	38
	(2) orange	11	(3) orange	9
foot	(1) shoe,-s	31	(1) shoe	23
	(2) hand	10	(2) hand	20
girl	(1) boy	41	(1) boy	70
green	(2) grass,-es	14	(1) grass	26
hand	(1) foot,feet	17	(1) foot	25
	(1) finger,-s	17	(2) finger	24
hard	(1) soft	20	(1) soft	67
head	(1) hair	22	(1) hair	13
heavy	(1) light	15	(1) light	58
house	(2) home	11	(1) home	25

Table 5
Comparison to Native Speaker Norms (Continued)

L2= Second Language Learner
L1= Native Speaker
(1) primary responses
(2) secondary responses
(3) tertiary responses

Stimuli	L2 Responses	%	L1 Responses	%
hungry	(1) food,-s	23	(1) food	36
	(2) eat,-ting	20	(2) eat	17
king	(1) queen	40	(1) queen	75
long	(1) short	29	(1) short	75
loud	(1) noise	13	(2) noise	21
man	(1) woman,-en	55	(1) woman	76
moon	(1) night	14	(3) night	7
	(2) sun	13	(2) sun	17
	(3) star	6	(1) star	20
mountain	(1) snow	14	(3) snow	6
	(2) high	11	(2) high	13
ocean	(1) sea	14	(2) sea	23
	(3) blue	7	(3) blue	11
quiet	(3) noisy	7	(2) noisy	11
river	(1) water	18	(1) water	24
salt	(1) sugar	16	(2) sugar	8
	(2) pepper	15	(1) pepper	43
scissors	(1) cut,-ting	28	(1) cut	67
	(2) paper	22	(3) paper	4
	(3) sharp	4	(2) sharp	9
short	(1) long	40	(2) long	33
	(3) tall	8	(1) tall	39
slow	(1) fast	22	(1) fast	75
street	(1) car	16	(3) car	11
	(3) road	6	(2) road	13
sweet	(2) candy	14	(2) candy	16
table	(1) chair	39	(1) chair	83
	(2) desk	15	(3) desk	2
white	(1) black	25	(1) black	61
	(2) snow	14	(2) snow	13
window	(1) door	15	(1) door	19
	(3) glass	9	(2) glass	17
woman	(1) man,men	33	(1) man	64
yellow	(2) color	11	(3) color	11

4.3 Statistical Analysis of Variance by Category

When L2 speakers' word association results were analyzed with a T-test, three gender differences were found, as shown in Table 6.

Table 6
Gender Differences Averages

Responses	males [n = 94]	females [n = 104]	*t*
Primary	10.085	11.596	2.063
Adjectives	11.149	12.894	2.534
Verbs	4.234	3.192	−2.601

[*T*-test with 1.96 or above being significant]

Women were more likely to have primary and adjective responses than men were, whereas men were more likely to answer with verbs. These results may be a reflection of the differences between women's and men's languages in English.

The next L2 analysis considered the effect of level of English on vocabulary association. As Table 7 shows, five divisions had significant results by level of English ability.

Table 7
Level Differences Averages

Responses	Beginning [n = 92]	Intermediate [n = 59]	Advanced [n = 47]	*F*
Contrast	6.641	5.966	4.106	3.590
Collocations	7.163	7.966	8.766	3.450
Nonsense	0.533	0.203	0.319	3.471
Affective	19.45	22.847	24.468	8.270
Verbs	3.293	3.627	4.532	3.075

[*F*-test ANOVA: 3.042 (significant at $p < .05$); 4.716 (significant at $p < .01$); and 7.158 (significant at $p < .001$)]

Compared to previous research, this table shows that having the greatest number of primary responses or synonyms was not of statistical significance by level. However, advanced students did have the least number of antonyms. Since they have more words in their lexicons and more detailed word clusters, it appears they are less likely to rely on a contrast association. At higher levels, clustering of vocabulary is along affective lines, using decidedly more verbs and collocations. Beginners were more likely to give responses which were contrasts or made no sense at all. They were very low in affective responses.

Predictably, intermediate students fell in the middle in all types of responses. These results support the conclusion that word webs in the lexicons of advanced students become more complex as they advance and have experiences with words which set up affective relationships, making the words more memorable. The next analysis measured language background as a factor in word association. Table 8 shows five types of responses which had significant differences according to language background.

Table 8
Native Language Response Averages

Responses	Japanese [n = 108]	Chinese [n = 16]	Arabic [n = 13]	Korean [n = 18]	*F*
Nouns	30.713	23.688	29.385	28.556	7.874
Adjectives	11.685	14.750	9.485	13.889	4.228
Verbs	3.435	5.063	5.769	3.667	3.554
Classifications	3.176	2.938	4.077	1.944	2.722
Collocations	8.380	5.000	7.923	7.722	4.724

[1-way ANOVA: 2.665 (significant at $p < .05$); 3.914 (significant at $p < .01$); and 5.705 (significant at $p < .001$).]

In particular, Chinese speakers were high in verb responses, but low in collocations and noun responses. Arabic speakers were high in classifications, high in verb responses, and low in adjective/adverb responses. Japanese and Korean speakers were low in verb responses and Korean speakers were low in classification. Why these differences are exhibited would be worthy of further study.

Finally, an analysis of age and years of education was conducted. In accordance with Riegel's (1968) research, it was found that students with more years of education and age did give fewer primary responses, but the differences were not statistically significant. However, students with the most education were more likely to give word form responses ($F = 4.81$ when 4.72 was significant at $p < .01$).

To summarize, the effects of background variables on word association, gender, ESL level, education, and language background showed differences which were noteworthy, while age did not.

5. Pedagogical Implications

The strongest implication from this research is the importance of providing experiences with words so that associative links which have some personal involvement or investment, such as an attitude, an emotional response, or a

strong memory, can be developed. The environment for fostering such an experience could be a project-oriented or a communicative activity in which new words learned become emotionally associated with each other. A local vocabulary scavenger hunt is a good example of such an activity. The class is put into teams and given a list of questions to answer outside of the classroom. For instance, students need to read signs and plaques around campus to find out for whom various buildings are named, what year the university was founded, or when a particular statue was unveiled. These words become associated with the experience of racing to get the answers and with a physical image.

A second implication is that we need to review how much of our vocabulary explanation and practice involve using synonyms and word forms. In terms of helping students store vocabulary, giving synonym or word form practice with vocabulary appears to be less useful than using classifications, coordinates, contrasts, and collocations. It would be helpful to get students involved using collocations (especially adjective + nouns and verb + noun), contrasts (especially adjectives in contrast when working with beginners), coordinates, and classifications through brainstorming and other word association activities (see Sökmen, 1991). For example, let's say the word "greasy" has come up in class. Instead of explaining with a definition, the teacher could ask, "What things can be greasy?" This would solicit collocations like greasy food, greasy hair, or greasy skin. Another on-the-spot exercise would be to ask students to brainstorm coordinates that would go with a new word, or ask them to create a classification tree for a word.

The implications for testing are important as well. Tests having students complete a classification or a coordinate cluster with words from their vocabulary list would be a good indication of their understanding of the word, as well as another reinforcement of a mental word link. Moreover, teachers should encourage interaction with native speakers to increase exposure to mainstream cultural associations.

Finally, simply having an awareness that men and women, language levels, and language groups have a penchant for certain associations may affect how we explain vocabulary. Teaching word meaning to men might be more effective by capitalizing on verb associations; for women, adjective ones. Advanced students appear to be more ready for verb associations than beginners; beginners, more responsive to contrasts. Word form practice is perhaps more useful for students with more formal education. Chinese and Arabic speakers may respond better to vocabulary taught with verb associations;

Arabic speakers, with classifications. Further research experimenting with these results in the practical teaching and testing of vocabulary could shed more light on these conclusions.

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