The Effects of Memorizing Thai Vocabulary Words in Semantic and Thematic Sets: A Replication

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A replication of Tinkham's (1997) experiment comparing the difficulty of learning vocabulary presented in semantic vs. unrelated sets and in thematic vs. unassociated sets was undertaken to determine whether the results could be duplicated using a natural language (Thai) rather than artificial vocabulary items. Twenty-four participants memorized 4 sets of Thai vocabulary words: (a) a semantic set (words of the same part of speech whose meanings are closely related or synonymous), (b) an unrelated set (words of the same part of speech whose meanings are not connected), (c) a thematic set (words of differing parts of speech whose meanings are related in theme), and (d) an unassociated set (words of various parts of speech whose meanings are not connected). The participants' recall and recognition of the words were then tested and recorded. The statistics (found significant at the .05 level) agreed with Tinkham's conclusion that the semantic set took longer to learn than the unrelated words. However, although Tinkham found that thematic sets were easier to learn than unassociated sets, in this study no significant difference was found. The results suggest that foreign language teachers should not present new vocabulary words in semantically related groups, because this can increase the learning burden of the words.

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This article is dedicated to Marge Terdal, who is one of the most organized, efficient and dedicated people that I know. Her enthusiasm for teaching, her knowledge of linguistics, and her devotion to her students is legendary at Portland State University and has inspired countless ESL teachers around the world. We will never forget her!

This study investigates the effects of interference on vocabulary acquisition. It explores whether the presentation of new vocabulary items in semantic sets (groups of words that are related to each other in meaning, such as *pencil, pen* and *marker) to* second language learners increases the learning burden of the new material. It also investigates whether teaching new vocabulary in thematic sets (groups of words that share a common theme but represent different parts of speech) facilitates memory and retention.

Foreign language instructors often present related vocabulary words together as one semantically related set. For example, teachers often choose to teach all the months of the year, colors, fruits and vegetables, or adjectives of emotion in one class period. From a teacher's perspective, this is a logical decision as these words fall neatly into one unit, often the same visual aids can be used to teach several of the new words, and many textbooks are arranged in this manner. For audiolingual substitution drills and functional units, these related vocabulary words can easily be plugged into the same sentence formulas. For example, an instructor could teach the vocabulary for different items of clothing—vest, *jacket, shin, turtleneck,* and *sweater—and* then teach question and answer patterns, such as *"What are you wearing?" "I'm wearing a...."*

However, for a learner, such related words can often be confusing. In every classroom there is anecdotal evidence of students who consistently confound *brother* with *sister, Tuesday with Thursday,* and *over with under* (Laufer, 1990b). Stock (1976) reports that English learners of Hebrew have special difficulty learning the two Hebrew words for *blue (kachol* and *tchelet),* presumably due to lack of distinction between the two in their own language. Understanding more about these sorts of semantic confusions is significant from both a theoretical and a pedagogical perspective. Investigating the phenomena of memory and interference can help us understand not only how new words are stored and retrieved in the mental lexicon, but also how language teachers can present vocabulary in ways that assist, rather than hinder, the learning process. If semantically related vocabulary words really are harder to learn, then language teachers should be very careful not to introduce new words in such a manner.

Review of the Literature

Research on memory and cognition has shown that recall of stored items is more efficient and successful when those stored items are unique and distinct (Higa, 1963; Hunt & Mitchell, 1982; McGeoch & McDonald, 1931; Underwood, Ekstrand, & Keppel, 1965). That is, as the distinctiveness of the material increases, so does the ease of learning. For example, Hunt and Mitchell (1982) showed that orthographically distinct words (with infrequent consonant and vowel combinations), such as *ukulele* and *llama,* are more easily memorized than words that have more orthodox spellings. Recent experiments support this research by showing that subjects have more difficulty recalling sets of semantically and phonologically similar words than they do sets of unrelated lexical items (Hunt & Mitchell, 1982; Underwood et al., 1965; Laufer, 1990a; Tinkham, 1993; Waring, 1997). For example, participants in the Tinkham (1993) study took longer to memorize sets containing words like *shirt, jacket,* and *sweater, than* they did sets like *island, beard, and potato.* These findings have led some experts in second language acquisition to claim that language teachers do their students a disservice when they teach them new vocabulary items in semantically related sets (Cohen, 1990; Nation, 1990). However, numerous textbooks present new vocabulary in this way, so that students can plug similar words into substitution patterns (Molinsky & Bliss, 1989, 1995). Rather than facilitate learning, this technique may actually increase the learning burden and make acquisition more difficult.

New research, however, indicates that teaching new vocabulary in related sets may not necessarily be detrimental to learning if the right kinds of clusters are used. In fact, evidence from research done by lexical semanticists and by psychologists indicates that presenting vocabulary words in a different kind of cluster might actually facilitate rather than impede retention. Sets of words related by theme rather than by meaning fit naturally into preexisting mental schemas or organizational frameworks. A thematic set might include words such as *eat, drink, hungry, thirsty, sandwich,* and *milk,* words of different parts of speech that are all related to the common theme of *lunch* (Tinkham, 1997). The theory states that these words would be easier to learn than a set of words that are all the same part of speech and

very close to each other in meaning, such as *plate, bowl, cup, saucer, fork,* and *spoon.* The thematic sets may be easier to retain because they form a sort of picture in the mind that corresponds with our mental schema of a particular event (in this case, lunch) (Tinkham, 1997). Brewer and Nakamura (1984) claimed that "schemers serve a crucial role in providing an account of how old knowledge interacts with new knowledge in perception, language, thought and memory" (p. 120), and they asserted that memory is enhanced when new information fits into a preexisting schema or framework.

Experiments by Ross and Bower (1981) and by Tinkham (1997) lend support to the idea that words that can be associated by a common theme are easier to recall than words that are unassociated. Tinkham's study in particular showed that participants were able to recall thematic sets of words more rapidly than sets of unassociated or semantically related words. The study was conducted with carefully controlled artificially created nonsense words.

In this study, an experiment very similar to Tinkham's (1997) was conducted to see whether his conclusions about the negative effects of teaching vocabulary in semantic sets and the possible positive effects of teaching words in thematic sets could be confirmed using a natural language. For the purposes of this study, Thai was chosen as the natural language.

There are several advantages to repeating Tinkham's (1997) experiment with a natural language. One obvious implication is that in natural languages, syllables, stems, and affixes (or bound morphemes) often carry meaning. Thus, in natural language, it is common to find semantically related words that also share a related phonology. For example, in English, the days of the week all end with the same final syllable: *day.* Furthermore, in English, certain suffixes are used to change the part of speech of a given word. Students learning adjectives to describe hair might be confronted with *curly, wavy,* and *frizzy.* This potential for shared phonology in natural language was not accounted for in the artificial stimulus words used in Tinkham's experiment. Because all of the words in his sets were carefully controlled, there was no repetition of syllables or sounds between any of the words in a given set. When natural language is learned, however, these controls are not

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in place, and the shared phonology of semantically related words might further affect their learnability.

Another potential problem with Tinkham's (1997) artificial words is that they all adhere closely to the phonological rules of English. They were deliberately designed to be easily pronounceable by the participants, and thus their pronunciation patterns were the same as those of English words. However, naturally occurring foreign languages do not share the phonological rules of English. Other languages include phonemes, tones, sound combinations, consonant clusters, and stress patterns not found in English. Natural languages are simply not as neat and easy to pronounce for native English speakers as Tinkham's artificial words are. Therefore, pronunciation difficulties inherent in natural language may further affect the learnability of the various sets in ways that were not investigated by Tinkham's study.

Research Questions

In this study, the following questions were examined. For each question, difficulty was measured by the number of trials needed for a participant to memorize and correctly repeat a set of six new vocabulary words.

1. Can the relationship between a set of newly *presented* vocabulary words either increase or decrease the learning burden of the words?

2. Is it more or less difficult to recall new vocabulary words learned in semantic sets than it is to recall the same number of new vocabulary words learned in a random set of unrelated items?

3. Is it more or less difficult to recall new vocabulary words learned in thematic sets than it is to recall the same number of new vocabulary words learned in a random set of unassociated items?

Method

This study borrows much from Tinkham's (1997) experiment but makes certain modifications in the design and implication.

Participants

Twenty-four volunteers participated in the experiment. The participants were mostly students at Portland State University or acquaintances of the researcher. They ranged in age from 18 to 36, with the mean age of 27. Only native English speakers who had not studied a foreign language for more than 2 years or lived for more than 1 year in a foreign country after the age of 10 participated because experienced language learners often develop special skills and strategies that might nullify the effects of semantic interference.

Stimulus Words

As in Tinkham's (1997) study, each set contained six words. Whereas Tinkham's stimulus words all had two syllables, the Thai words in this experiment ranged from one to three syllables. However, each set had a combined total of 14 syllables to negate the possibility that one set was easier to learn because it had shorter words. Each set consisted of one monosyllabic word, two disyllabic words, and three trisyllabic words. The words in the semantic set were all labels for different kinds of tropical fruit and were very similar to the kind of vocabulary that would be taught in an introductory Thai lesson. The words in the thematic set all had something to do with the common theme *of frogs.* The unrelated set consisted of words whose meanings had no relationship to one another and which were all nouns (to act as a control for the semantic set). The unassociated words were also unrelated to each other in meaning but were composed of two nouns, two verbs, and two adjectives (to function as a control for the thematic set).

The test words are shown in Table 1 with an English transliteration of their pronunciation in Thai. Participants performed the test orally, so they never actually saw these words.

Table 1

Word Sets

English	Thai	English	Thai
Semantically Related Set		**Unrelated Set**	
tangerine	*som*	cloud	*mayg*
pineapple	*saparote*	market	*whit*
coconut	*maprow*	ice	*namkang*
banana	*glooay*	office	*borisat*
papaya	*malagaw*	doll	*dukatda*
mango	*mamooang*	garlic	*grateeum*
Thematically Related Set		**Unassociated Set**	
frog	*gape*	dance	*denram*
hop	*gradate*	sleep	*nonlap*
slimy	*nyooneuna*	purple	*seemooang*
lily pad	*baibooa*	ugly	*naglied*
green	*seekeeyoe*	school	*rongrien*
swim	*weinam*	spoon	*chawn*

Procedure

In this experiment, participants listened to a recorded message similar to the one that Tinkham (1997) used. As in Tinkham's study, the participants heard half of the words (two sets) in English and responded with the Thai equivalent, and half of the words (two sets) in Thai and responded with the English equivalent. First the participants listened as the tape introduced the Thai words, one set at a time, followed by their English equivalents. They then heard one of the words and had 3 seconds to respond with its equivalent. After 3 seconds, the tape supplied the correct answer and continued to the next word. After presenting all six words in the set in this manner, it began the set again. Words in each set were shuffled and reordered each time the set was presented to ensure that participants memorized the actual words and not just the order in which they were said. When the

participant was able to produce all the words in a given set correctly in two consecutive trials, that set was considered completed. Participants were given the opportunity to take a short break (to minimize frustration and fatigue), and then they moved on to the next set. The researcher was present to record how many trials were *needed* for criterion.

When the participants had concluded the tested portion of the study, they were asked to complete a very short questionnaire about themselves and about their perceptions of the study (see the Appendix). This was done to collect qualitative data with which to better understand the quantitative data. The four questions that Tinkham had asked his subjects were included on the questionnaire, as well as seven additional questions related to the participants' backgrounds and learning strategies. It was hoped that the questionnaire would not only provide qualitative information, but also help account for possible discrepancies in the data. For example, participants who developed memorization strategies to help them learn the new words might be better at performing the task than those who did not.

<u>Analysis</u>

After all the data were collected, the mean scores for each condition were tallied and a MANOVA was run to test for overall effects of condition and task. Then paired i tests were used to test for differences among individual conditions.

Results

<u>Experimental Data</u>

Tinkham (1997) analyzed his data

employing a 4 (condition: semantic cluster, unrelated set, thematic cluster, unassociated set) x 2 (modality: oral vs. written) x 2 (task: recall vs. recognition) x 4 (order: order I , order 2, order 3, order 4) x 2 (form: form A vs. form B) mixed multiple analysis of variance (MANOVA) with

"condition" and "task" within-subject variables and "modality,"
"form" and "order" between-subject variables. (p. 156)

This revisitation of his study had only one modality (oral) and one
form. A MANOVA was first run to determine if there were any main
effects for condition, task, or order. Then t tests were run as planned
comparisons among the four conditions (semantic, thematic, unrelated,
and unassociated). In the interest of elegance and simplicity, paired t
tests were also deemed appropriate as they can be easily understood and
explained, and the steps of the process are easily isolated and analyzed.
The dependent variable was the number of trials required to reach the
criterion of two consecutive perfect trials on a given test (see Table 2).

Table 2

Means for the Four Conditions

Condition	Mean	Min.	Max.	Standard deviation
Semantic	15.08	5	30	6.2060
Unrelated	7.92	3	16	2.8729
Thematic	10.79	3	25	5.0302
Unassociated	8.96	3	20	4.5251

Nose. Values represent mean, minimum, and maximum number of
trials.

Descriptive statistics were first run to establish the means for the
four conditions. After the descriptives were run, a 4 (condition:
semantic cluster, unrelated set, thematic cluster, unassociated set) x 2
(task: recall vs. recognition) x 4 (order: order 1, order 2, order 3,
order 4) MANOVA was used, with the dependent variable being the
number of trials to criterion. Table 3 shows the results.

Table 3

Mixed Multiple Analysis of Variance

Source	SS	df	MS	F	Sig. of F
Within cells	1115.17	64	17.42		
Condition (C)	647.07	3	215.69	12.38	.000*
Task (T)	184.16	1	184.16	10.57	.002*
Order (0)	243.94	3	81.31	4.67	.005*
C x T	143.09	3	47.70	2.74	.051
C x 0	271.21	9	30.13	1.73	.100
T x 0	36.57	3	12.19	.70	.556
C x T x0	146.44	9	16.27	.93	.502
(Model)	1733.46	31	55.92	3.21	.000
(Total)	2848.62	95	29.99		

* Significant at $p < .05$.

As Table 3 shows, using a 95% confidence interval, there are significant main effects for condition, task, and order. However, no significant interactions were found between condition and any of the other independent variables.

Once the results of the MANOVA were determined, a series of paired t tests were run, using a 95% confidence interval (see Table 4). A statistically significant difference was found between the semantic set and all the other sets of words in agreement with the directionality of the hypothesis. It took a greater number of trials for the subjects to memorize the semantic set than it did to memorize any of the other sets. However, there was no significant relationship between the

thematic, the unrelated, or the unassociated sets in the directionality predicted by the researcher. It can therefore not be said statistically that the thematic set was easier to learn than either the unrelated or the unassociated set. In fact, a significant difference exists between the thematic and the unrelated set, indicating that the unrelated set was easier to learn than the thematic one.

Table 4

Results of the Paired t Tests

Pairs	Mean	Mean difference	Correlation	t	Sig.
Semantic Unrelated	15.0883 7.9167	7.1667	.376	6.078	.000*
Semantic Unassociated	15.0833 8.9583	6.1250	-.116	3.707	.001*
Semantic Thematic	15.0833 10.7917	4.2917	1.33	2.822	.010*
Unrelated Unassociated	7.9167 8.9583	-1.0417	-.258	-.857	.400
Unrelated Thematic	7.9167 10.7917	-2.8750	.318	-2.853	.009*
Unassociated Thematic	8.9583 10.7917	-1.8333	-.029	-1.309	.204

Note. There were 23 degrees of freedom for each pairing.
* Significant at $p < .05$, two-tailed.

Hypotheses of the Research

Returning to the hypotheses set forth at the start of the research, we can see that one hypothesis was confirmed by the data, but the other one was not. The semantic set took more trials for the participants to

learn than did any of the other three sets. However, the thematic set did not take fewer trials to learn than the unrelated or unassociated sets. In fact, the average number of trials taken to learn the thematic set was greater than that for either the unrelated or the unassociated set, in disagreement with the findings reported by Tinkham in his 1997 study.

Discussion

This revisitation of Tinkham's (1997) research only partially replicated his results. Although participants *did* require a longer period of time to learn the semantically related words than any other combination of vocabulary words, they did *not* take less time to learn the thematically related words than they did to learn the words that were thematically unassociated. Not only did participants not find the thematic words easiest, but they actually took a significantly greater number of trials to learn them than they did to learn the unrelated set of words. Possible explanations for these results are described below.

The Semantic Set

Of the 24 participants in the experiment, 16 found the semantic set most difficult to learn, whereas only one found it easiest. Interesting insights into the relative difficulty of this set can be gleaned from the participants' qualitative questionnaires. When asked why this set was particularly hard to learn, 5 participants said that they were confused by the similar meanings of the words. They gave responses such as "It was all fruits," "I couldn't visualize the fruits easily," "The Thai vocabulary words were similar," "It was difficult to make distinctions in my mind since they are all similar types of fruit," and "[There was a] lack of contrast between images of words." Although other participants might not have been consciously aware of this semantic interference as a cause of difficulty, it is clear that at least one fifth of the participants recognized the related meanings as a source of confusion. This is in agreement with the work on interference theory by McGeoch and McDonald (1931), Higa (1963), and Hunt and Mitchell (1982). Those studies strongly indicate that groups of items that are closely related to each other in meaning or form are more difficult to remember than items that are unrelated.

Six other participants claimed the semantic set was hardest because of the similar sounds involved in the words. Three of the six words began with the prefix *ma* (papaya, *malagaw;* mango, *mamooang;* and coconut, *maprow),* and this proved challenging for many participants. On their surveys, participants wrote answers such as "[There *were]* similar alliterations," "Lots of words start out with similar syllable," "A lot of the words sounded the same," and "[There were] several words with similar sounds." The design of Tinkham's 1997 experiment had controlled for this phenomenon because his nonsense words were carefully created in such a way that they did not have too many similar sounds repeated within sets of words. However, as explained above, this effect occurs quite naturally when real language is used. Examples of semantically related words that are also phonetically related can be found in every language. In the case of the Thai fruit labels, the initial syllable *ma is* a morpheme meaning *fruit.* As interference has been shown to operate not only on words whose meanings are similar, but also on words whose sounds are similar (Henning, 1973; Laufer, 1990a), this phenomenon may further compound the effects of semantic interference and make these kinds of words even more difficult for learners to memorize when they are taught together.

The Thematic Set

Tinkham's (1997) results showed that the thematic set took fewer trials to learn than the unassociated set, whereas this study did not find similar results. However, a close investigation of Tinkham's results shows that this discrepancy is not quite as dramatic as it first appears.

The first point to notice is that for Tinkham's (1997) results, participants were able to learn the unrelated set (all nouns) in fewer trials than they were the thematic set. This information is not highlighted in Tinkham's study because the thematic set is compared against only the unassociated set (composed of two nouns, two verbs, and two adjectives). The unassociated set was designed as a control for the thematic set, whereas the unrelated set was designed as a control for the semantic set. Tinkham's results suggest, although he does not address this issue, that the unrelated set was actually the easiest of all four of the sets, and the thematic is only easier when compared against the unassociated set. The findings of this study agree with Tinkham's

in that the unrelated set took the fewest number of trials to learn. When *t* tests were run comparing the results of the thematic set against the results of the unrelated set, the unrelated set took significantly fewer trials to learn. However, it is not really possible to draw a true comparison between these two sets because one contained only nouns, and the other contained verbs and adjectives as well. It is possible that nouns are simply easier to learn than adjectives or verbs, perhaps due to their more concrete nature (Rodgers, 1969).

The *t* test comparing the thematic set against the unassociated set (which was the original planned comparison of the experiment design) showed no significant difference. It is therefore not possible to determine statistically whether the thematic set was easier than the control, or whether there was no difference in learnability between the two.

There is a second important item to note concerning Tinkham's (1997) findings regarding the relative ease of learning the thematic set. In his discussion of his results, he notes that the positive effects of thematic clustering did not seem as pronounced as the negative effects of semantic clustering, when looking at participants' individual performances. He wrote that "while thematic clustering appears to have been beneficial far more often than detrimental. . . it may be argued that thematic clustering was a benefit to learning only about half the time and actually a detriment about one-fifth of the time" (p. 159). He also noted in his conclusion that "the evidence that thematic clusters are learnt more easily than unassociated sets, while generally positive, was somewhat less strong and somewhat less consistent, a situation that clearly calls for further research" (p. 161).

Although the statistical analyses of the aggregated data for this study do not agree with Tinkham's findings, observations of individual performances do show that the thematic clustering was beneficial to some participants. One fourth of the participants reported that the thematic set was easiest for them to learn, whereas only one sixth claimed it was most difficult. Of the participants who found it easiest, half were consciously aware that the thematic arrangement aided memorization. In response to the question "Why do you think this set was particularly easy?" participants wrote answers such as "Similarity

in theme," "All of the words were related but different: nouns, verbs, colors," and "I could picture the situation—put it in context." Although many participants did not write about the thematic set in their questionnaires, informal discussions with them after the experiment showed that they were all aware and conscious of the thematic relationship among the *frog* words. Furthermore, a preexperiment survey of the target words had shown that students were very likely to recognize a relationship between those words. Finally, the results of Ross and Bower's (1981) study indicate that participants do not need to be told of the theme in advance in order for memory to benefit from the schematic relationship.

To date, only two known studies have been done concerning the relative ease of learning vocabulary in thematic sets: Tinkham's (1997) study and this present study. Given the differing results of the two studies, the evidence that thematic grouping aids vocabulary memorization seems equivocal at this point. It could also be the case that the positive effects of thematic grouping disappear when natural language stimulus is used. Therefore, more research is needed in order to determine the effects, if any, of presenting vocabulary in thematic sets.

Implications for Teaching English as a Second Language

The results of this experiment clearly show that participants took longer to learn the semantically related vocabulary words than they did to learn any of the other sets of words. In addition to taking longer to learn the words, they exhibited the most visible frustration during this part of the experiment. Our job as language teachers is to make language learning as easy and enjoyable as we possibly can. Based on the results of this study (as well as those of Tinkham's 1997 study), teachers of English as a Second Language (ESL) and other languages should think carefully and strategically about the order in which we present new vocabulary items. This seems particularly important in the beginning stages of language learning, when learners have a small word base in the target language. When presenting new synonyms and antonyms to students, be aware of the possible deleterious effects of interference. Teach only the most important or frequently occurring

word in the group first, and then introduce new words only when the students have mastered the first word (perhaps several lessons or days later). Vary the visual aids used to represent the new words. For instance, if a measuring tape is used to teach the word *long,* perhaps it should not also be used to later teach the word *short.* Likewise, rather than using the same picture of a market to teach all the fruits and vegetables, use separate pictures or real objects. Present the words using different collocations and different sentence examples. Increasing the difference between the words can decrease the strength of association. Such measures will help minimize the effects of interference.

In addition, be careful when teaching synforms. Synforms are words like *capital* and *capitol, principal* and *principle,* and *effect* and *affect,* whose similar forms, spellings, and pronunciations can cause interference and confusion just as semantically related words do. Perhaps the words that pose the greatest difficulty of all are those like *restrict* and *constrict,* whose meanings *and* forms are similar. If these words are taught together, learners may have trouble remembering precise meaning and usage—for instance, which word to use to describe limiting the number of people at an event (Nation, 1990). Help students distinguish between these similar words by giving them mnemonic devices. For example, *desert* and *dessert* can be remembered by telling students that *dessert* is something we usually want second helpings of (and hence, the second *s).* The direction words *west* and *east are* confused by many English learners, but when written in the order that they appear on a compass (read left to right), their initials spell the word we. Although these memory tricks make access to the words slower and less direct, they at least give learners a way to safely choose the correct word.

Several ESL vocabulary books seem structured in such a way as to promote rather than diminish interference. Books such as *Word by Word* by Molinsky and Bliss (1995) provide units of vocabulary with lists of semantically similar nouns. One such list in the unit on construction and home repair includes words like *bulldozer, dump truck, jackhammer, lumber, plywood* and *shingle,* which could easily cause semantic interference to a student encountering them for the first time. Another vocabulary book, *Common Threads* by Sokmen (1991),

avoids the lists of vocabulary words and instead encourages teachers and students to generate "seed words" that can then be organized, expanded, and analyzed by building on new endings, creating word maps and analogies, and discussing synonyms, antonyms, and etymologies. Although this technique is beneficial in that it enables the students to direct their own learning, and it helps them associate the words in a variety of connections, it seems liable to strengthen the effects of interference by focusing on the similarities between form and meaning of related words.

This study did not show that participants learned the thematically related words in less time than they did the unassociated words. Therefore, there is no statistical evidence to support the idea that teachers should present new vocabulary words in thematic sets. However, because the thematic set was significantly easier to learn than the semantic set, it is logical to conclude that thematic presentation is a better choice than semantic presentation. Furthermore, because the thematic set was not significantly more difficult than the unassociated set, it also seems logical to advocate this method over the presentation of completely isolated and unconnected vocabulary. This method would make it much easier for teachers to plan integrated lessons and would increase their students' opportunities to practice the new vocabulary in meaningful contexts. Furthermore, although the thematic method clearly did not benefit all participants, it does seem to have aided a certain number. Half of the participants who found the thematic set easiest were able to clearly articulate that it was the thematic relationship between the words that made the set easiest for them.

Again, the careful use of visual aids as teaching tools could strengthen the thematic associations in the learners' minds, thus possibly enhancing their beneficial aspect. For example, a teacher presenting the frog-related words used in the experiment could use cut-out pictures, which would then be assembled together on the backdrop of a pond to create a unified picture. Likewise, the teacher could use the vocabulary words in a simple story so that the relationship between the words was clear.

A thematic approach to teaching vocabulary that is student centered and learner directed is practiced by Judith Wild (personal

communication, September 2000), an ESL instructor at Portland State University. First, her students choose a topic for the class to learn about, such as health care in the US or the American election system. Then each student tells the class how that particular system works in his or her own country. When a student lacks a particular word, Wild supplies it and writes it on the board. This generates a lot of new vocabulary that is thematic in nature and includes different parts of speech. The students copy the new words down for further study and can use their dictionaries to find complete definitions. As the students express themselves and share information about their own countries, they draw comparisons between the various systems. Finally, Wild uses the new vocabulary that has been generated to explain that system in the US. Student interest is ensured because they have chosen the topic themselves, have related it to their own experience, and are learning about how the system operates in their new country of residence. Wild pairs up the students and gives them assignments that enable them to use and practice the new words. These can come in the form of role plays, dialogues, and strip stories, and can make use of authentic materials such as hospital forms and doctor bills. This technique allows students great opportunity to practice and explore a set of thematically related words that they have generated themselves.

Another way to teach vocabulary thematically is to choose themes that are not necessarily apparent and to have the students discover the relationships for themselves. The idea for this approach comes from an experiment conducted by Wilson and Bransford (Gairns & Redmond, 1986). In the experiment, three groups of participants were given the same list of 30 words. Only the first group was told that their recall of the words would be tested. The second group was told to rank the items in terms of preference, and the third group was told to decide which of the items would be important or unimportant on a *desert* island. At the end of the task, all three groups were tested on their ability to recall the list of words. Interestingly, the third group scored highest on the test. This experiment shows not only that the intention to learn something is not the highest predictor of whether learning will take place, but also that vocabulary is most memorable when learners engage with it. The semantic processing that occurs in an exercise like this imprints the words in the mind, and students create their own theme to facilitate organization in the memory. This experiment could easily be adapted to a classroom activity in which

students are asked to create and defend their own thematic relationships within groups of new words.

Limitations

The most serious limitation of this study is that vocabulary is not commonly taught in isolated lists to be memorized, but rather is linked to some meaningful context. In this respect, the study does not mirror how language teachers really present new vocabulary or how students actually acquire new words. It is possible that using visual aids, realia, and tactile as well as visual and auditory stimulation, and also utilizing new words in appropriate situational contexts, may actually mitigate or diminish the effects of semantic interference. Certainly no teacher would be advised to introduce *new* vocabulary following the method of this experiment, and certainly the range of techniques available to language teachers does ease and facilitate the learning of new vocabulary.

A second limitation concerns the relatively small number of participants. Although 24 is a large enough number to produce statistical results, a greater number of participants might have made the results even more conclusive. Furthermore, this study used only one form for each of the four stimulus sets. If a greater number of participants had been involved, variations of the sets could have been included. This would surely have strengthened the results because there would have been multiple examples of semantic and thematic sets (as well as of unrelated and unassociated sets).

This experiment was designed to measure only immediate acquisition of the new vocabulary words. Therefore, the study gives no indication of whether semantic or thematic relatedness have any effect on the long-term retention of the words. If the participants had been tested a second time, perhaps a week later, it would have been possible to gauge their retention of the words and perhaps to draw some further conclusions about the merits and disadvantages of teaching vocabulary in semantic and thematic sets.

A further limitation concerns the fact that the semantic set contained words with similar sounds and phonologies. Although this

is a common phenomenon in semantically related words of natural language, it could also be considered a confounding variable. Because phonological interference has also been shown to affect ease of learning, it is impossible to tell whether the difficulty of the words in the semantic set lay in their similar meanings, similar sounds, or in some combination of the two.

A final limitation of the study is one that comes with any controlled experiment, namely, the difficulty of generalizing the results from an artificially contrived experiment onto the uncontrolled world at large. Tinkham's 1997 results were only partially duplicated by this study, which modified his design. We cannot assume that the results would be the same if the experiment were extended to a more naturalistic setting involving real language learners in a classroom.

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APPENDIX

Questionnaire

I. Are you male or female?

2.   How old are you?

3.   Have you ever lived abroad? If yes, when and for how long?

4.   Of the following *sets* of words, please circle the set you found the most difficult to learn:

A: dance	B: cloud	C: frog	D: pineapple
sleep	market	hop	tangerine
purple	ice	slimy	coconut
ugly	office	lily pad	banana
truck	doll	swim	papaya
spoon	garlic	green	mango

5.   Why do you think this set was particularly difficult?

6.   Of the following sets of words, please circle the set you found the easiest to learn:

A: dance	B: cloud	C: frog	D: pineapple
sleep	market	hop	tangerine
purple	ice	slimy	coconut
ugly	office	lily pad	banana
truck	doll	swim	papaya
spoon	garlic	green	mango

7.   Why do you think this set was particularly easy?

8.   What strategies did you use to help you remember the new words?

9. What memory devices do you usually employ to help you learn vocabulary in a foreign language?

10. Which second languages have you studied?

11. How would you rate your proficiency for each? (Check the line that best corresponds with your level of ability).

_____ I can exchange greetings, count, and communicate minimally with isolated words and memorized phrases.

_____ I can perform basic survival tasks such as ordering food, asking for directions, and shopping.

_____ I can participate in simple conversations on personal history, e.g., family, hometown, and present job.

_____ I can handle relatively complicated everyday situations.

_____ I can explain my opinions and support them.

_____ I can hypothesize and explain in detail.

_____ I can debate on current events and social issues.