WORD ASSOCIATIONS IN L2 VOCABULARY

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L1 word association research findings indicating that there may be a shift in response types fromsyntagmatic to paradigmatic responses as a function of age led L2 researchers to study whether or not there is a similar shift as a function of proficiency among L2 learners. Using the Kent-Rosanoff list, a list of 100-word stimuli, to elicit learners' written responses, Söderman (1993) observed a trend towards such a shift and took it as evidence that L2 learners and children acquiring their L1 go through similar processes of lexical organization. This study elicited responses via an aural-oral version of the Kent-Rosanoff list from 25 Japanese participants using the TOEFL as a measure of proficiency. We found nosyntagmatic-paradigmatic shift: Across the proficiency levels, all learners produced more paradigmatic thansyntagmatic responses, and few clang responses. We attributed this finding to the problematic categorization of response types: the broad definition of paradigmatic responses and narrow definition of syntagmatic responses led to a natural dominance of paradigmatic responses across all levels. Word association research shows promise for examining the organization of mental lexicons, but the syntagmatic-paradigmatic categories are too simplified to offer an in-depth insight into the complexity of lexical organization. Further research is necessary with different L1 backgrounds using different lists and operationalizations of learners' proficiency.

How is vocabulary organized in the mental lexicon of the L2 learner and how does this organization develop as the learner's proficiency increases? These questions have been examined in the fields of psycholinguistics and second language acquisition (SLA) using word association tests. This study seeks to further that line of research, looking at aural/oral word associations of L2 learners across proficiency levels for evidence of patterns of response types.

Although perhaps commonly associated with psychoanalysis, word association tests have drawn a great deal of interest from language researchers as a means of examining links within the mental lexicon. Brown and Berko (1960) and Ervin (1961) led a flurry of research in the 1960s and early 1970s exploring the phenomenon of a paradigmatic- syntagmatic shift in word association response types from native speakers. In the most simplistic terms, paradigmatic responses are words which are from the same grammatical class as the stimulus word and have an obvious semantic link (Meara, 1983). For example, the stimulus *dog* might elicit the paradigmatic responses *cat* or *puppy*. Syntagmatic responses are those which form

University of Hawai'i Working Papers in ESL, Vol. 17, No. 2, Spring 1999, pp. 75-105.

an obvious sequential link with the stimulus. In such a case, the stimulus *dog* would produce the response *barks* or perhaps *walk* (walk the dog). However, responses often do not fit cleanly into one category or the other.

According to past research, adult native speakers tend to produce paradigmatic responses more than syntagmatic responses, with those two categories accounting for the bulk of their responses (Brown & Berko, 1960; Ervin, 1961; Entwistle, Forsyth, & Muss, 1964). Children under seven, however, tend to produce more syntagmatic associations than paradigmatic, as well as producing many *clang* responses (responses prompted by phonological similarities with the stimuli). Several theories have been proposed to explain the shift phenomenon, but no general consensus has been reached. (See Nelson, 1977 for a thorough review of L1 research on the syntagmatic-paradigmatic shift).

In 1978, Meara began advocate word association research on the L2 lexicon. He stated:

> ...the work on syntactic aspects of a foreign language has suggested that there are a number of interesting parallels between learners and children acquiring their first language. It would be interesting to know whether there is any tendency for learners to produce the syntagmatic responses and clang associates that are characteristic of young children, or whether they produce typically adult responses from very early in the learning process. (p. 194).

To this end, Meara conducted French word association tests with 76 English speaking learners of French. Participants gave written responses to the Kent-Rosanoff word list which was originally developed to elicit word associations from mentally ill people, yet has been widely used for general linguistic inquiry, and for which there are established adult norms in several languages. The proficiency of the group was not clearly stated except to say that they were all studying for the same level French examination. The three most common responses for each stimulus word were compared to French native speaker norms. Meara found that learners made many associations unlike any responses of native French speakers. Even when learners made associations that were consistent with French norms, Meara posited that these corresponded with English native speaker norms as well, and may have simply been translations of English rather than true French-like associations, although no evidence was given to support such an explanation (there were no interviews with the subjects during/after the test). What was clear was that learners produced a large number of clang responses. However, while Meara prefaced his study with a description of the syntagmatic, paradigmatic, and clang categories, no mention was made of syntagmatic or paradigmatic responses by the learners. He simply categorized the responses as like French, unlike French, or *other*.

Söderman (1993) took the high number of clang associates and associations atypical to native French speakers as evidence that L2 learners and children acquiring their mother

tongue go through similar processes of lexical organization. To that end, she carried out word association tests on four levels of English L2 learners, looking for evidence of a syntagmatic-paradigmatic shift in Finnish EFL learners. The four levels were made up of students at different grade levels: 7th graders (13-14 years old), second form "gymnasium" students (17-18 years old), first year university students (average age of 20), and advanced English majors at university with an average of 4.5 years of intensive English study. One problem with these groupings was the lack of any true English proficiency measure. Although it may be assumed that students in their seventh year of English study ("gymnasium" students) will be more proficient than those in their third (7th graders), there may be tremendous variation amongst the members of grade levels.

Participants were presented with a list of the 100 stimulus words from the Kent- Rosanoff list and asked to write the first English word that came to mind after reading each prompt. As was the case in Meara's study, all of the stimulus words were presented on two pages, allowing the possibility of interference for other stimuli and responses. Söderman acknowledged this drawback (p. 112), but argued that the time limit imposed (varied for each of the four levels) would reduce the likelihood of participants looking forward or back. A more definite way to reduce the chance of interference is to present the stimuli one at a time and orally, which we will do in the following study.

The associations were categorized into one of four categories: syntagmatic, paradigmatic, clang, or *other* (repetitions, unclassifiable, L1 responses, and responses showing no clear relation to the stimulus word). Söderman found that while the seventh graders produced an almost equal proportion of syntagmatic and paradigmatic responses, the next three groups showed a (non-significant) trend towards an increase in paradigmatic responses, while clang and *other* associates decreased.

Purpose

While written responses have been elicited in L2 research, aural/oral word associations have yet to be examined. What results would be obtained using this mode? Would the four response types mentioned above change as proficiency becomes higher? Would the results be indicative of the organization of the mental lexicon? This paper further seeks to follow the path of L2 word association research set out by Meara and Söderman, aiming at better understanding the developing L2 lexicon. Aside from the use of the aural/oral presentation/response mode, the study presented here differs from previous L2 work in two ways: the use of the Test of English as a Foreign Language (TOEFL) as a clear measure of proficiency, and subjects non-Indo-European L1 background. The following hypotheses

were tested:

1. There will be higher percentages of paradigmatic responses as learners become more proficient.
2. There will be lower percentages of clang responses as learners become more proficient.
3. There will be higher percentages of clang responses than those in Soderman's experiment due to the aural presentation of the stimuli.
4. There will be lower percentages of *other* responses as learners become more proficient.

METHOD

Participants

Participants at three proficiency levels were chosen in April, 1998 at the University of Hawai'i at Manoa. As opposed to the operationalization of proficiency as grade level in Söderman's study, proficiency was operationalized as performance on the TOEFL, which is a more standardized and generalizable measure of proficiency. The participants were classified into one of three levels according to their TOEFL scores. First, low-level learners (LLL) were determined to be those having scores under 450 on the TOEFL. Four LLL were studying English in the Hawai'i English Language Program (HELP), an academic-skill oriented program, and one more was studying in the New Intensive Course in English (NICE) program, a conversation-oriented program. Only one of the five had a TOEFL score (400), but the other four LLL were placed into the same beginning level classes in their respective programs and thus were assumed to have similar proficiency levels. Ideally, we would have liked to have had TOEFL scores for all of the participants, but most low level HELP and NICE students have not yet taken the test. Second, intermediate-level learners (ILL) were those having scores between 450 and 550 on the TOEFL. Six out of seven ILL participants were University of Hawai'i at Manoa undergraduates enrolled in the English Language Institute (ELI). Enrollment in the ELI is required for incoming foreign students with TOEFL scores below 600 in order to prepare them for academic English. One ILL was studying in the HELP program. Third, advanced-level learners (ALL) were operationalized as students having scores above 550 on the TOEFL. A total of 13 graduate students participated as ALL.

Because the objective of this study is not "to investigate the effect of culture and language type on association behavior" (Kruse, Pankhurst, & Sharwood-Smith, 1987, p. 144), the researchers chose to limit the study to L2 learners with a common L1, Japanese. The participants' ages ranged from 18 to 41, with 9 males and 16 females.

Materials

The Kent-Rosanoff list, the standard word association test, was chosen so that results could be compared with those from previous research (see Appendix A). This list includes 100 relatively frequent words. Some of them are low-frequency words and thus possibly unfamiliar to LLL, yet they were included in order to examine the development of responses to such words over proficiency levels. Söderman eliminated 15 difficult words from analyses of the LLL in her study. However, both high- and low-frequency words need to be included across all levels in order to get a complete picture of the developing L2 lexicon. Thus, it was necessary to include such words despite the risk of increasing the clang or *other* responses by the LLL.

The stimulus words were recorded on cassette tape by a female native speaker of English. She pronounced the words clearly and loudly, one word every 10 seconds. There was about a seven-second pause between words for the participants to respond. The length of the pause was determined in a pilot test presented live, not on tape, to ten LLL. It was determined that a seven-second pause was needed to ensure that all participants would have enough time to give a response to the majority of prompts.

Procedures

The experiment was conducted in a language laboratory at the University of Hawai'i at Manoa. The researchers began by explaining the objective of the study. After subjects were told that their data would be used solely for research purposes, they were asked to sign a consent form (see Appendix B) and fill out a short personal questionnaire (see Appendix C). Written and oral instructions were given in Japanese (see Appendix D). Participants were asked to listen to the 100 words and respond to each of them as quickly as possible by saying the first word that came to mind, speaking directly into the microphone attached to their headset. Participants were spaced around the room in order to reduce the likelihood of interference from other participants' responses. After insuring that everybody understood the procedure, the researchers started the recording.

Analyses

Both of the researchers separately classified the responses into the four categories. The classifications were compared to each other and any discrepancies were discussed and resolved. This procedure was important to achieve high interrater reliability.

Following Söderman's (1993) analyses, mean percentages of the paradigmatic responses out of the total paradigmatic and syntagmatic responses were calculated for each participant in each of the three levels, and for the entire group. Percentages for clang and other responses

represent their proportion to all of the responses. Also, the frequency of each response was recorded for each stimulus to indicate the association behaviors of the learners to individual words.

RESULTS

The summary of response types and their percentages shown in Table 1 indicates, in contrast to Söderman's study, that the ILL (70.56%) and the LLL (67.16%) produced more paradigmatic responses than the ALL (65.12%) did, though the ILL produced more than the LLL. The ILL had the highest percentage of paradigmatic responses. It seems that the proficiency levels were not the determining factor of the production of the paradigmatic responses. This point is further evidenced by the fact that the TOEFL scores and the percentage of paradigmatic responses did not consistently go together within levels, either. For instance, while participant #4, whose TOEFL score was 650, produced 53.85% paradigmatic responses, participant #12, whose score was 553, produced 61.80%. The higher proficiency learner produced fewer paradigmatic responses. Participant #2 (TOEFL=623) had a paradigmatic percentage of 80%. Similar variation was found at all levels. These results lead to a rejection of Hypothesis 1. The percentage of paradigmatic responses does not appear to be tied to proficiency.

Surprising results were observed regarding the clang responses. The ALL produced seven (0.54%), the ILL produced six (0.86%) and the LLL produced five (1%). As these numbers show, the clang responses occupied a surprisingly small portion of the total responses for each group. For this reason, Hypothesis 2 should be rejected. There were no observed differences in clang responses across the levels. This issue will be examined in more depth in the discussion section. Against our expectations, the clang percentages of the three groups were all lower than those of Söderman's groups. The four groups in her study produced 3.1%, 3.5%, 3.1%, and 0.8% as the participants became more proficient. In spite of the fact that our experiment was conducted orally, our participants did not yield more clang responses than those of Söderman's groups. Therefore, Hypothesis 3 was rejected.

Finally, steadily decreasing percentages of *other* responses were observed as the learners became more proficient. The ALL yielded 9.6%, which was lower than the ILL's 14.71%, which was in turn lower than the LLL's 30.8%. While Hypothesis 4 was confirmed, a careful interpretation of this result is necessary. As noted in the description of the materials, low frequency items were analyzed for the LLL even though they may not have known the stimuli or had a vague idea about them. Therefore, the LLL could be expected to have a high

Table 1

Response Types and Percentages

ADVANCED (13)	*NO.1 (630)*	*NO.2 (623)*	*NO.3 (583)*	*NO.4 (650)*	*NO.5 (60?)*	*NO.6 (620)*	*NO.9 (627)*	
0 (others)	6	5	15	9	11	20	13	
1 (paradigmatic)	60	76	42	49	59	66	49	
2 (syntagmatic)	34	19	42	42	29	12	37	
3 (clang)	0	0	1	0	1	2	1	
percentage of paradigmatic rps	63.80%	80%	50%	53.85%	67.04%	84.62%	56.98%	
	NO.11 (627)	*NO.12 (553)*	*NO.13 (580)*	*No.14 (560)*	*No.20 (610)*	*No.21 (630)*		***Subtotal***
0 (others)	5	11	10	3	6	12		126 (9.6%)
1 (paradigmatic)	49	55	61	50	73	71		760
2 (syntagmatic)	45	34	29	47	20	17		407
3 (clang)	1	0	0	0	1	0		7 (0.54%)
percentage of paradigmatic rps	52.13%	61.80%	67.78%	51.55%	78.49%	80.68%		65.12%
INTERMEDIATE (7)	*No.7 (547)*	*No.8 (525)*	*No.10 (530)*	*No.15 (538)*	*No.16 (520)*	*No.23 (540)*	*No.24 (457)*	***Subtotal***
0 (others)	17	16	16	8	9	6	31	103 (14.7%)
1 (paradigmatic)	46	68	59	55	68	67	54	417
2 (syntagmatic)	33	16	25	36	23	26	15	174
3 (clang)	4	0	0	1	0	1	0	6 (0.86%)
percentage of paradigmatic rps	58.22%	80.10%	70.24%	60.44%	74.73%	72.04%	78.26%	70.56%
BEGINNING (5)	*No.17*	*No.18 (400)*	*No.19*	*No.22*	*No.25*			***Subtotal***
0 (others)	30	31	41	34	18			154 (30.8%)
1 (paradigmatic)	50	47	36	44	52			229
2 (syntagmatic)	20	21	21	21	29			112
3 (clang)	0	1	2	1	1			5 (1%)
percentage of paradigmatic rps	71.42%	69.12%	63.16%	67.69%	64.20%			67.16%
TOTAL								***Total***
0 (others)								383
1 (paradigmatic)								1406
2 (syntagmatic)								693
3 (clang)								18
percentage								66.98%

number of *no* responses, which were classified as *other* responses. Had we eliminated difficult items from the analysis of LLL as Söderman did, the differences in percentages of *other* responses might have been less noticeable.

DISCUSSION

As noted above, Hypothesis 1 was rejected because it was found that proficiency was not the determining factor for the percentages of the paradigmatic responses. Why did this occur in this study but not in Söderman's research and some other studies in the literature? The quantity and quality of the input cannot explain the mysterious phenomena because although the LLL had been in the United States for an average of only one month, they produced a higher percentage of paradigmatic responses than the ALL. Nor was age a factor because there was a wide range of ages in each group.

While this question remains unanswered, it is also intriguing that the three groups all produced paradigmatic responses far more than syntagmatic responses and all individual learners consistently yielded more paradigmatic responses than syntagmatic responses. Why did these phenomena occur? The reason may be simply that the paradigmatic category is broader and can include many different types of words. It contains synonyms, antonyms, words of the same grammatical form classes, and words that do not occur in immediate sequences. Basically, any word which has some sort of relationship with the stimulus word, if not a word which would naturally connect with the stimulus in a sentence, will be classified as a paradigmatic association. It appears that the paradigmatic family is much more open and accepting than the syntagmatic family. For example, the stimulus word TABLE could elicit the responses CHAIR, FURNITURE, WOOD, LEG, KITCHEN, etc. Our data include the response APPLE to the stimulus TABLE. What is the relationship there? If it appears that there may be some sort of logical connection between the stimulus and the response, even if it is tenuous, it must be classified as paradigmatic if it does not have an obvious sequential link.

Words that do not occur in immediate sequences but aren't directly related are tricky. For the stimulus *butterfly*, one person said *sky*. It may be that the learner imaged a butterfly flying in the sky. However, since *butterfly* does not obviously appear with *sky* in an immediate sequence in a sentence, *sky* is categorized as a paradigmatic response. Many such examples were observed, all of which support the argument that there are naturally more paradigmatic responses because of the inherent nature of the classification method. As Meara (1983) put it, the distinction between paradigmatic and syntagmatic responses is "very difficult to work in practice, especially when you cannot refer back to the testee for elucidation." These problems of classification have led to revised classification schemes. For example, Moran (1974)

classified responses as iconic (red-), enactive (apple-eat), functional (table-chair), and logical (synonyms, superordinates, contrasts, coordinates). While we cannot at this time make any claims for the *appropriate* classification types, we can point out the inadequacy of such simplistic classifications as syntagmatic and paradigmatic.

In addition to having a narrow definition, the *syntagmatic response* category is questionable. Söderman stated that the response *horse* to the stimulus *black* is syntagmatic. Similarly , in our study, a learner associated *black* with *cat*. Did the learner come up with the immediate sequence *black cat*? Maybe, but is such an analysis not too simplistic? One possible alternative explanation is that the learner may have imagined something black and associated it first with *cat* because *cat* had the strongest connection with *black* in this person's mental lexicon. Hence the *syntagmatic response* category is also questionable.

Also, paradigmatic responses have typically been associated with higher proficiency learners and adult native speakers, as though they are indicative of advanced language knowledge. However, in our data, some syntagmatic responses by advanced learners showed a linguistic sophistication not yet reached by beginning learners. For example, collocational associations, such as *afraid-of*, were made by ALL and ILL but not by LLL. Even if one accepts the paradigmatic and syntagmatic categories, one cannot claim that either type is always indicative of a higher degree of language competence.

The clang response category is also called into question by this study. It appears that due to the written nature of Söderman's study, the clang responses were influenced more by orthographic similarities with the stimuli than phonological ones (for example, *sour-pour, smooth-tooth, blossom-bottom*, etc.). While these orthographic associations are interesting, they are not representative of phonological influences. With the stimuli presented orally as in our study, it appears that few true clang responses will occur (at least for adults).

Last, a general tendency was found regarding when *other* responses were produced. They seemed to be elicited when the stimuli were low-frequency or conceptually complex words. For instance, *comfort* is a high-frequency word yet conceptually abstract: it is hard to articulate what state it refers to. In our data, eight people gave *no response*, and six people responded with a derivation . An example of a low-frequency word may be *swift*, for which 11 people produced *no response*, two people produced an unrelated word, and one person produced a derivation. It appears that *other* responses may not always be indicative of a lack of knowledge of the stimulus word, but are sometimes influenced by the conceptual complexity or relative infrequency of the word.

In analyzing the four response types (namely, paradigmatic, syntagmatic, clang, and *other* responses) in depth based on our results, the categories seem to be too simplistic and not indicative of the complex mechanisms involved in the organization of an L2 mental lexicon.

The responses gathered do offer an opportunity to view lexical organization within a connectionist framework, without classifying the L2 vocabulary into vague, misleading categories. According to Reeves, Hirsh-Pasek, and Golinkoff (1998), connectionism maintains that cognitive processes, including lexical access, are instituted in a neural network composed of nodes and connections between nodes. Aspects of words (such as their orthographic, phonological, syntactic, and semantic features) are represented by different nodes. Thus, when hearing a word, nodes representing its phonological and semantic features are activated. As these nodes are activated, so are the nodes of other words sharing the same features and words strongly connected through repeated association (such as collocations). Words may have differing strengths of semantic connection from person to person depending on each person's personal experiences. Reeves et al. state, "Connectionist models are also the only lexical access theory to, albeit implicitly, supply a theory of word organization: Organization is nothing more than the strength of connections between nodes (either word-word nodes, or word-feature nodes), based on past association" (p. 177). It follows that stimulus words for which learners have little semantic understanding will elicit words with similar orthographic features in written word association tests.

According to this model, participants in this study listened to a set of words which were represented by a series of nodes in the brain. When they heard a word, it activated all of the words with nodal connections to the stimulus. Why a specific word is chosen over another related word in a word association test is not always clear. The words that are related to the prompt word have differing strengths of association: some have stronger associations than others; many words have no relation with a particular stimulus word. Although there are many semantically or associatively related words to one stimulus word, the word produced as a response is the one that has the strongest link with the stimulus word. These links may be tenuous and may be primed by events in the participants' lives, so responses will most likely not be entirely consistent over time.

This model can better explain why certain kinds of responses were produced. All types of responses and frequencies are shown in Table 2 (see Appendix E for an alternative display of these results). Table 2 indicates that many stimuli received the same responses from more than 10 of the 25 participants (for example: *table-chair*, *black-white*, *soft-hard*, *short-long*, *girl-boy*, *bath-shower*, etc.). The stimulus *man* elicited *woman* from all participants. These predictable responses were produced simply because those nodes had the strongest link in the semantic network for many people, which means that the strengths of many sets of words are shared by many people with common knowledge of the world and similar life experiences (Kruse, Pankhurst, & Sharwood-Smith, 1987).

Table 2

All Types of Responses and Frequencies

1. chair	10		36. blue	8		67. food	9
desk	9		blood	4		eat	3
round	1		color	4		stomach	3
apple	1		black	3		full	2
flower	1		white	2		lunch	2
dinner	1		flag	1		no response	2
book	1		tomato	1		angry	1
kitchen	1		incomprehensible	1		alone	1
eat	1					now	1
			37. bed	8		chocolate	1
2. bright	6		night	4			
light	6		pillow	2		68. church	11
night	5		comforter	1		preacher	2
sky	2		deep	1		Christian	2
room	1		sleepy	1		temple	1
cap	1		morning	1		Pope	1
color	1		car	1		enjoy	1
black	1		wake up	1		station	1
animal	1		awake	1			
cat	1		relax	1		69. blue	8
			comfortable	1		sea	4
3. fun	3		no response	1		deep	3
guitar	2		incomprehensible	1		river	1
piano	2					water	1
no response	2		38. mad	6		yacht	1
song	1		no response	5		fish	1
rock'n'roll	1		angry	3		Waikiki	1
singer	1		fight	3		surf	1
symphony	1		emotion	2		big	1
violin	1		happiness	1		Hawaii	1
CD	1		drought	1		Pacific	1
instrument	1		feeling	1		mountain	1
radio	1		upset	1		view	1
listen to	1		pissed	1			
note	1		man	1		70. ache	4
singing	1					headache	4
dance	1		39. room	7		hair	3
pops	1		floor	6		body	2

			living room	1		brain	2
4. ill(ness)	6(3)		spot	1		toe	2
hospital	5		green	1		stomach	1
disease	3		pink	1		band	1
fever	1		soft	1		tale	1
doctor	1		comfortable	1		face	1
fine	1		vacuum	1		fit	1
hot	1		house	1		camp	1
no response	1		stain	1		no response	1
health	1		comfort	1			
medicine	1		red	1		71. hot	6
clinic	1		no response	1		warm	5
						oven	4
5. woman	25		40. boy	18		winter	4
			pretty	2		fire	2
6. shallow	9		little	1		heat	2
sea	6		man	1		window	1
ocean	4		woman	1		cold	1
no response	2		young	1			
incomprehensible	2		no response	1		72. short	11
sheep	1					no response	5
inside	1		41. low	15		coat	3
night	1		temper	1		judgment	1
			deep	1		money	1
7. hard	19		tension	1		tall	1
pillow	2		building	1		river	1
mochi	1		buy	1		lonely	1
blanket	1		short	1		correct	1
skin	1		sky	1			
no response	1		mountain	1		73. church	5
			fly	1		Buddhism(st)	4(1)
8. food	8					Christian(ity)	3(1)
drinking	5		42. job	4		no response	3
breakfast	2		company	3		atheism	1
drink	2		tired	2		God	1
munching	1		sleeping	2		belief	1
too much	1		no response	2		Christ	1
no response	1		hard	1		Shinto	1
brunch	1		busy	1		junk	1
restaurant	1		condition	1		country	1
lunch	1		unemployed	1		religious	1
dog	1		women	1		Buddha	1

fat	1		suit	1			
			woman	1		74. alcohol	10
9. climb(ing)	4(1)		business	1		drink	4
river(s)	4(1)		resting	1		drunk	2
ocean	2		running	1		brandy	2
high	2		earning	1		party	1
sea	2		office	1		scotch	1
snow	2					beef	1
green	1		43. sweet	10		ice	1
deep	1		vinegar	3		gentleman	1
hill	1		no response	2		Jack Daniel	1
hiking	1		grapes	1		ice cube	1
ride	1		women	1			
tree	1		tasty	1		75. adult	4
green	1		yogurt	1		cute	4
			food	1		kid(s)	1(2)
10 . family	6		lemon	1		parent(s)	2(1)
home	5		boss	1		raise	1
window	1		cream	1		foster	1
warm	1		fresh	1		childhood	1
living	1		incomprehensible	1		too young	1
top	1					small	1
big	1		44. planet	4		charming	1
cheese	1		ground	3		mother	1
roof	1		round	3		baby	1
person	1		no response	3		kindergarten	1
carpenter	1		soil	1		boy	1
room	1		mother	2		pretty	1
mother	1		environment	1			
garden	1		peace	1		76. sweet	6
dog	1		beautiful	1		chocolate	3
door	1		universe	1		sour	3
			wall	1		good	3
11. white	18		earthquake	1		taste	2
color	2		sun	1		worse	2
red	2		moon	1		no response	2
cat	2		quake	1		bitter	1
glow	1					much	1
			45. troublesome	2		well	1
12. no response	10		troublemaker	2		more	1
meat	3		no response	2			
soup	2		problem	2		77. nail(s)	4(1)

river	2		unhappy	1		no response	4
sheep	1		nuisance	1		tool	2
beef	1		spot	1		cut	1
lamb	1		around	1		dead	1
religion	1		hard	1		jack	1
animal	1		strange	1		ham	1
ice	1		car accident	1		ache	1
climbing	1		tough	1		do it yourself	1
lake	1		world	1		home improvement	1
			Europe	1		construction	1
13. no response	8		easy	1		hit	1
uncomfortable	2		New York	1		smash	1
comfortable	2		country	1		house	1
sofa	2		worry	1		carpenter	1
relax	2		traffic	1		cut	1
sleeping	1		accident	1		wood	1
illness	1						
chair	1		46. war	8		78. drink	9
discomfort	1		military	3		water	8
get	1		army	3		hungry	2
music	1		no response	3		juice	2
bed	1		cruel	1		no response	2
cozy	1		have to	1		coke	1
difficulty	1		toy	1		quench	1
			sucks	1			
14. finger(s)	5(3)		fight(ing)	1(1)		79. New York	3
feet	4		study	1		village	3
arm	4		plane	1		town	3
foot	2					Tokyo	2
leg(s)	1(1)		47. vegetable	9		country	2
wash	1		carrot	2		live	1
writing	1		no response	2		ocean	1
hail	1		butterfly	1		Honolulu	1
body	1		round	1		citizen	1
no response	1		dolls	1		capital	1
			raw cabbage	1		traffic	1
15. long	17		trash	1		crowded	1
tall	4		okonomiyaki	1		suburb	1
skirt	3		soup	1		Los Angeles	1
circuit	1		stir fly	1		prefecture	1
			tomato	1		people	1
16. vegetable(s)	4(2)		salad	1		downtown	1

apple	3		veggie	1			
no response	3		beans	1		80. circle	7
peach	2					triangle	5
orange	2		48. soft	15		round	4
Hawaii	1		easy	4		mathematic(s)	1(1)
strawberries	1		no response	2		corner	1
grapefruit	1		exercise	1		ground	1
pit	1		past	1		eraser	1
grapes	1		surface	1		building	1
instrument	1		stone	1		dice	1
banana	1					no response	1
hand	1		49. no response	8		garden	1
fresh	1		bird	6			
			America	2		81. bread	12
17. dragonfly	3		sky	2		toast	4
no response	3		cheer leading	1		spread	1
net	2		high	1		knife	1
Mariah Carey	2		fly(ing)	1(1)		butterfly	1
beautiful	1		selfish	1		fat	1
fly	1		hawk	1		fatty	1
jar	1		car shop	1		food	1
insect(s)	1(1)					oil	1
ugly	1		50. ache	7		peanut	1
stomach	1		stomache ache	4		jelly	1
grass	1		sick	2			
children	1		head	1		82. nurse	10
swim(ming)	1(1)		hurt	1		patient(s)	7(1)
incomprehensible	1		stomach acid	1		hospital	2
bee	1		big	1		see	1
summer	1		body	1		physician	1
sky	1		food	1		ill	1
			hungry	1		medicine	1
18. rough	6		hospital	1		sick	1
soft	3		organ	1			
no response	3		swollen	1		83. quiet	4
hard	2		doctor	1		voice	3
smoothie	2		no response	1		noise	3
eat	1					soft	2
soup	1		51. no response	7		music	2
person	1		flower	2		noisy	2
ice skating	1		from	2		police	1
skin	1		plant	1		speaker	1

speed	1		bug	1		whisper	1
easy	1		root	1		friend	1
slow	1		milk	1		silent	1
hand	1		stock	1		smile	1
			verb	1		siren	1
19. no response	6		leaf(ves)	1(1)		no response	1
order	3		tree	1		incomprehensible	1
officer	1		control	1			
verb	1		route	1		84. no response	6
domineering	1		post office	1		police	5
recommend	1		sit	1		robber(y)	3(1)
govern	1		place	1		money	3
a mountain	1					wicked	1
dictator	1		52. light	15		burglar	1
suicide	1		bright	3		theft	1
teacher	1		night	2		wrong	1
come	1		no response	2		bank	1
promise	1		Bob	1		steal(ing)	1(1)
order	1		blue	1			
director	1		shade	1		85. tiger	5
Spanish	1					animal	5
rude	1		53. sleep	5		king	5
computer	1		night	2		zoo	3
			future	2		no response	2
20. table	10		hope	2		orange	1
desk	9		no response	2		savanna	1
sit	3		white	1		strong	1
stool	1		true	1		Africa	1
apple	1		star	1		big	1
seat	1		sleeping	1			
			rest	1		86. happy	6
21. sugar	4		bed	1		no response	2
chocolate	3		wish	1		fun	1
ice cream	2		nightmare	1		a girl's name	1
sour	2		color	1		gladness	1
cake	2		America	1		joyful(ness)	1(1)
fruit	2		come true	1		bird	1
bitter	1		goal	1		pleasure	1
honey	1					church	1
hot	1		54. color	4		sad(ness)	1(1)
candies	1		green	3		party	1
boy friend	1		orange	2		world	1

bitter	1		sun	2		enjoy	1
milk	1		no response	2		Christmas	1
spicy	1		butterfly	1		hobby	1
strawberry	1		attention	1		happiness	1
salt	1		Asian	1		incomprehensible	1
			fish	1			
22. no response	7		banana	1		87. sleep	13
dog	2		submarine	1		good	4
singing	2		blue	1		pillow	2
coach	1		signature	1		blanket	1
kettle	1		ribbon	1		comforter	1
gymnastics	1		lemon	1		rest	1
beep	1		bright	1		comfortable	1
lips	1		incomprehensible	1		worse	1
sound	1					sheets	1
sports day	1		55. breakfast	6			
pee	1		butter	6		88. light	11
secret	1		milk	3		no response	3
song	1		eat	2		bag	2
music	1		red	2		snake	1
talk	1		no response	2		metal	1
siren	1		wheat	1		trunk	1
go out	1		blood drive	1		fat	1
			jam	1		weight	1
23. man	19		pastry	1		baggage	1
feminine	3					hard	1
girl	1		56. court	8		feather	1
sweet	1		no response	5			
female	1		judge	4		89. cigarette	6
			right(s)	3(1)		smoke(ing)	3(3)
24. hot	6		legislature	1		cancer	2
warm	5		injustice	1		chew	1
winter	4		law	1		illegal	1
snow	2		judgment	1		cigar	1
long	1		reason	1		sick	1
catch	1					industry	1
drinking	1		57. girl	20		bad	1
sick	1		girlfriend	1		fire	1
farm	1		kid	1		nicotine	1
switching	1		young	1		company	1
no response	1		small	1		Marlboro	1
disease	1		masculine	1		no response	1

25. fast	14	58. dark	5	90. cry(ing)	4(3)
speed(y)	2(1)	heavy	4	cute	3
run	1	left	4	child	3
nice	1	bright	3	soft	2
lazy	1	no response	2	little	1
Hawaii	1	warm	1	infant	1
turtle	1	lump	1	born	1
study	1	sun	1	kid	1
no response	1	yellow	1	caring	1
quickly		darkness	1	innocent	1
		right	1	milk	1
26. hope	11	room	1	pretty	1
dream	4			girl	1
star	2	59. body	3	no response	1
no response	2	illness	2		
Christmas	1	unhealthy	2	91. sun	8
make	1	hospital	2	night	4
true	1	exercise	2	star	2
birthday	1	no response	2	sky	2
dishes	1	food	1	light	2
come true	1	scream	1	round	1
		care	1	dark	1
27. mountain	8	healthy	1	bright	1
water	2	vitamin	1	shine	1
ocean	2	good	1	full	1
no response	2	care	1	space shuttle	1
fish(ing)	2(1)	sick(ness)	1(1)	beautiful	1
deep	1	disease	1		
long	1	shape	1	92. paper	9
stream	1	food	1	cut	5
flow	1			no response	3
		60. church	7	barber	2
28. black	16	Christian	6	silver	1
color	1	Christianity	2	movie	1
bright	1	religion	2	sharp	1
blue	1	book	1	knife	1
wide	1	preach	1	sled	1
paper	1	sucks	1	cutter	1
tea	1	Christ	1		
snow	1	no response	1	93. loud	7
no response	1	baseball	1	noisy(e)	4(1)
luck	1	pray	1	night	3

			Jesus	1		church	2
29. woman	7					noon	1
ugly	4		61. computer	3		silence(t)	1(1)
nice	2		memorize	2		library	1
view	2		remember	2		room	1
butterfly	1		mind	1		classroom	1
pretty	1		beautiful	1		dark	1
incomprehensible	1		good	1		sound	1
great	1		cognition	1			
flower	1		song	1		94. tree(s)	5(2)
girl	1		school	1		grass	3
snow white	1		short	1		forest	2
no response	1		old	1		vegetable	2
dirty	1		brain	1		red	2
			past	1		ham	1
30. wind	3		bad	1		purple	1
door	3		digit	1		card	1
curtain	3		photograph	1		wood	1
glass	2		short-term	1		board	1
clean	2		study	1		color	1
house	2		diary	1		blue	1
no response	2					golf	1
open	2		62. animal	5		no response	1
sky	1		sheep	3			
incomprehensible	1		cow	3		95. pepper	9
clear	1		New Zealand	2		sugar	8
house	1		sweater	1		no response	3
sunshine	1		hair	1		earth	1
sun	1		blah	1		water	1
			ba-a-ah	1		salty	1
31. smooth	7		goat	1		pillow	1
no response	3		Australian	1		sing	1
rock	2		court	1			
tough	1		weird	1		96. car	2
hard	1		soft	1		road	2
soft	1		cute	1		homeless	2
road	1		car	1		downtown	2
stone	1		incomprehensible	1		no response	2
draft	1					people	1
clothes	1		63. shower	13		straight	1
sad	1		take	3		lamp	1
smoothe	1		no response	2		Hawaiian	1

t-shirt	1		bathroom	1		boy	1
fun	1		top	1		avenue	1
incomprehensible	1		hottub	1		bicycle	1
			train	1		signal	1
32. American	8		bath	1		town	1
no response	4		soap	1		blueprint	1
people	3					sidewalk	1
freedom	1		64. university	8		traffic	1
nation	1		mountain	2		dark	1
Kane	1		cabin	1			
citizenship	1		house	1		97. queen	22
vote	1		cheese	1		ocean	1
Japanese	1		club	1		lion	1
right	1		resort	1		prince	1
civic	1		good	1			
country	1		camping	1		98. butter	4
national	1		rural area	1		milk	3
			vacation	1		photograph	1
33. hand	6		education	1		eat	1
shoes	4		school	1		blue	1
feet	3		KCC	1		smile	1
leg(s)	3(2)		studying	1		cream	1
walk	2		no response	1		mouse	1
toe	2		incomprehensible	1		hamburger	1
mouth	1					bagel	1
ball	1		65. no response	11		picture	1
socks	1		fast	2		camera	1
			quick	2		cottage cheese	1
34. web	5		Gulliver	1		wine	1
no response	5		swifty	1		butter	1
insect(s)	4(1)		certain	1		cake	1
grass	1		blank	1		sandwich	1
tarantula	1		speed(y)	1(1)		alpis	1
bug	1		sweet	1		delicious	1
yuck	1		slow	1		cut	1
scary	1		swing	1			
nest	1					99. cherry	14
net	1		66. sky	9		flower	7
spiderman	1		red	5		cherry blossom	2
ouch	1		ocean	2		pink	1
man	1		white	2			
			sea	2		100. of	3

35. no response	8		out	1		scared(ry)	3(3)
thread	3		dark	1		ghost	2
hurt	2		black	1		test	1
sew(ing)	1(2)		color	1		worry	1
sting	1		wet	1		pity	1
pin	1					sweating	1
hot	1					night	1
point	1					English	1
strings	1					monster	1
well done	1					from	1
cloth	1					feel	1
incomprehensible	1					emotion	1
						good	1
						home school	1
						no response	1

Shared cultural knowledge was also observed as influencing responses in this study. The stimulus *blossom* elicited *cherry* from 16 people. Cherry blossoms are such an important part of Japan's culture that everybody shares the knowledge, and it is learned very early in English courses in Japan. This prompt-response is interesting from the viewpoint that L2 lexicon may be strongly connected to the L1 lexicon. This is very possible because all such students are likely to have learned English by the grammar-translation method in Japan in which the medium of classroom communication is not English. Thus, L2 words may have been accumulated in pairs with their L1 equivalents when there are those words at all.

As opposed to the major responses discussed above, various minor responses were not shared by many people because those words may be most strongly linked with the stimulus nodes based on their unique knowledge or experiences. Also, why many stimuli elicited *no response* must be explained. Two possibilities were considered: first, the participants are likely not to have known the stimuli, and second, they have not yet understood the concepts of the stimuli and thus they could not answer.

Accounting for the seemingly unrelated responses, participants may have misunderstood the stimulus and thus responded with a seemingly unrelated word that had the strongest link with the word which they thought they heard. Or, perhaps they heard the stimulus correctly but had an incorrect semantic understanding of it. A case in point is the fact that two participants responded to *bath* with *train* and *motor*. They are likely to have misunderstood *bath* as bus because there is no phonological distinction between *th* and *s* in Japanese, and responded with *train* and *motor* since these words had the strongest link with *bus*. Many responses of this type were observed.

CONCLUSION

In considering the complex process of language learning, the three categories paradigmatic, syntagmatic, and clang responses are too simplistic in order to describe how L2 lexicon is stored in the long-term memory. A connectionist model and spreading activation better account for the complex ways that L2 lexicon is organized in the mental lexicon. Words are connected as nodes to each other with varying strengths of links, and thus when one node is activated all connected words are also activated and the word that has the strongest relation is uttered as a response. Though people seem to share the words that are most strongly connected to many words, they also seem to have their unique links based on their different knowledge of language—both L1 and L2—and of the world and their life experiences. Thus, the building of a sophisticated vocabulary may entail making links among new and already learned words and strengthening the links by relating them to real world knowledge and experiences.

Implications

Word association research emphasizes the importance of connections between words in the lexicon. Teachers and students need to keep in mind that, in developing a sophisticated vocabulary, forming links between words and concepts is equally as important as learning new items. As Soderman (1993) states, "It is not only a question of expanding the number of words in the L2 lexicon. Attention should also be paid to the semantic relationships between words and to developing a higher level of lexical knowledge of the words" (p. 152). Since words seem to be embedded in the neural network of the long-term memory, teachers should try to relate new words to many contexts, such as textual and cultural context, and general knowledge of the world. Learners should do so, too, when they learn independently of teachers. To strengthen semantic links, teachers and learners may want to perform such activities as semantic mapping, where they make pictures or grids that represent the organization of the mental lexicon. Students and teachers may also want to try word association tasks as exercises, discussing their responses and why they feel such connections were made. These activities are expected to enable learners to make stronger associations between words and help them store them in the long-term memory.

Limitations

As discussed above, the traditional classification categories (paradigmatic, syntagmatic, and clang responses) are limiting and may offer a misleading picture of lexical organization. In this study, we looked at proficiency as operationalized as TOEFL scores, but considering

different factors, such as length of time spent in an English speaking country or specific vocabulary test scores may offer more perspective on the varieties of responses. Also, because the researchers dealt only with Japanese learners of English, the results may not be generalizable to other L1 speakers learning English as a second language. One more thing to note is the effect of the word list. Some of the prompt words later became responses to stimuli which had earlier been given as responses. For example, *man* produced the response *woman*. *Woman* later produced the response *man*. It is unclear to what degree these stimuli-response relationships primed later responses, but an interaction may have occurred. While a careful interpretation of the results is necessary for these words, further research should try new word lists which take such common responses into account. Lastly, a more balanced and larger sample size for each group would have made the intergroup comparisons more interesting.

With these limitations in mind, we would like to conclude with questions for further research.

1. Are there better ways of classifying the response types and analyzing the mental organization of second language vocabulary, if they can be categorized at all?
2. Would similar results be obtained if this study were replicated, operationalizing the three levels of learners differently?
3. Would similar results be obtained if this study were replicated with learners of different languages?
4. Would similar results be obtained if this study were replicated with a different list of words?

ACKNOWLEDGEMENTS

We would like to thank Dr. Michael Long and Dr. James Dean Brown for their insightful comments and feedback on an earlier version of this paper.

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APPENDIX A
THE KENT-ROSANOFF LIST

1. table			35. needle			68. priest
2. dark			36. red			69. ocean
3. music			37. sleep			70. head
4. sickness			38. anger			71. stove
5. man			39. carpet			72. long
6. deep			40. girl			73. religion
7. soft			41. high			74. whisky
8. eating			42. working			75. child
9. mountain			43. sour			76. bitter
10. house			44. earth			77. hammer
11. black			45. trouble			78. thirsty
12. mutton			46. soldier			79. city
13. comfort			47. cabbage			80. square
14. hand			48. hard			81. butter
15. short			49. eagle			82. doctor
16. fruit			50. stomach			83. loud
17. butterfly			51. stem			84. thief
18. smooth			52. Lamp			85. lion
19.command			53. dream			86. joy
20. chair			54. yellow			87. bed
21. sweet			55. bread			88. heavy
22. whistle			56. justice			89. tobacco
23. woman			57. boy			90. baby
24. cold			58. light			91. moon
25. slow			59. health			92. scissors
26. wish			60. bible			93. quiet
27. river			61. memory			94. green
28. white			62. sheep			95. salt
29. beautiful			63. bath			96. street
30. window			64. cottage			97. king
31. rough			65. swift			98. cheese
32. citizen			66. blue			99. blossom
33. foot			67. hungry			100. afraid
34. spider						

APPENDIX B
CONSENT FORM

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This project is to investigate word association, that is, how second language vocabulary is organized in the mental lexicon. If you agree to participate, you will be asked to do two things. One is to respond orally to the stimulus words given on the tape. This will take about 20 minutes. The other is to fill out a short questionnaire in which you indicate your information about the studying of English. This will take only one minute. After you finish, you will receive two dollars.

If you agree to participate in this project, your data will be used by the researchers solely for research purpose, and your privacy will never be revealed in any fashion. If you have questions about the project or how the data will be used, please feel free to ask the researchers any questions.

Certificate of Consent:

I was informed and understand what the project is and how my data will be used. Thus, by signing below, I give my consent to participate in this project.

Signature of participant:

Date: ___/___/_____
Month /Day/ Year

APPENDIX C
QUESTIONNAIRE

Please answer the following questions.

1. What is your most recent TOEFL score, if any? _____
   When did you take it? ___/___ (year/month)
2. Age _____ years old
3. Sex (circle one) male/female (circle one)
4. How long have you been in the US? ___years and ___months
5. How long have you studied English so far? ___years and ___months

APPENDIX D
DIRECTIONS

On the following recording, you will hear 100 English words. After you hear each word, please say the first English word that come into your mind. Please say only one word. Please speak clearly to the microphone. You will have about 7 seconds to respond to each word. However, please respond as quickly as possible and always say the ***first*** word you think of. There are no right or wrong answers. If you can't respond before the next item, don't worry. Just concentrate on the next item. At the end of the recording, please wait for further instructions.

APPENDIX E
RESPONSE TYPE PERCENTAGE

LEARNER LEVELS	0 (OTHERS)	1 (PARADIGMATIC)	2 (SYNTAGMATIC)	3 (CLANG)	% PARADIGMATIC RESPONSES
Advanced (n = 13)					
No.1 (630)	6	60	34	0	63.80%
No.2 (623)	5	76	19	0	80.00%
No.3 (583)	15	42	42	1	50.00%
No.4 (650)	9	49	42	0	53.85%
No.5 (60?)	11	59	29	1	67.04%
No.6 (620)	20	66	12	2	84.62%
No.9 (627)	13	49	37	1	56.98%
No.11 (627)	5	49	45	1	52.13%
No.12 (553)	11	55	34	0	61.80%
No.13 (580)	10	61	29	0	67.78%
No.14 (560)	3	50	47	0	51.55%
No.20 (610)	6	73	20	1	78.49%
No.21 (630)	12	71	17	0	80.68%
Subtotal	126 (9.69%)	760	407	7 (0.54%)	65.12%
Intermediate (n = 7)					
No.7 (547)	17	46	33	4	58.22%
No.8 (525)	16	68	16	0	80.10%
No.10 (530)	16	59	25	0	70.24%
No.15 (538)	8	55	36	1	60.44%
No.16 (520)	9	68	23	0	74.73%
No.23 (540)	6	67	26	1	72.04%
No.24 (457)	31	54	15	0	78.26%
Subtotal	103 (14.71%)	417	174	6 (0.86%)	70.56%
Beginning (n = 5)					
No.17	30	50	20	0	71.42%
No.18 (400)	31	47	21	1	69.12%
No.19	41	36	21	2	63.16%
No.22	34	44	21	1	67.69%
No.25	18	52	29	1	64.20%
Subtotal	154 (30.8%)	229	112	5 (1%)	67.16%
Total	383(15.32%)	1406	693	18(0.72%)	66.98%

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