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CLAUSE TYPE AND WORD SALIENCY IN SECOND LANGUAGE INCIDENTAL VOCABULARY ACQUISITION

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Abstract

The present study investigated the relationship between L2 incidental lexical gain during reading and the variables of clause type and word saliency. Lexical gain was defined as gain of grammatical class and word meaning and was compared for target items in dependent and independent clauses. Word saliency was a measurement of the learners' perception of the importance of the target items in an L2 text (Brown, 1993). One hundred fifty L2 learners of Spanish, divided into two groups according to level of L2 experience (Lee, 1991), read a Spanish language text with 10 target items and completed assessment measures for word saliency and gain of grammatical class and word meaning. A cumulative logistic regression test was used for data analysis. Results demonstrated that word saliency was significantly related to gain of grammatical class and word meaning, with increases in word saliency associated with greater levels of lexical gain, while clause type was significantly related only to gain of grammatical class, with greater gains present for target words in independent clauses. The findings indicate that saliency and clause type are both related to L2 lexical gain, but that they may play separate roles in L2 lexical acquisition and processing.

Introduction

The present study investigated the relationship between the variables of clause type, word saliency, and second language (L2) incidental vocabulary acquisition during reading. Previous research in incidental vocabulary learning provided limited information about text-based and learner-based factors which contributed to the incidental acquisition of lexical information (Horst & Meara, 1999; Meara, 1997). The present study attempted to address two factors, clause type and word saliency, and to describe how they are connected to the incidental acquisition of lexical information (lexical gain). It assessed lexical gain in independent and dependent clauses based upon the proposed differences in the processing of information in main and subordinate clauses (Baker & Wagner, 1987; Bybee, 2002; Sanford, 2002). The study also measured lexical gain with regard to word saliency and assessed whether an increase in lexical gain would be associated with an increase in saliency. Saliency was defined as the learners' perception of the importance of target words in an L2 text. While results of previous studies of L2 vocabulary

acquisition have indicated that saliency positively contributed to lexical gain (Brown, 1993; Sternberg, 1987), they did not provide a measure of learners' perception of word saliency. The present study also considered the relationship of learners' level of L2 experience (Lee, 1991) with lexical gain, and if level of L2 experience was connected to the variables of clause type and word saliency with regard to lexical gain.

Literature Review

Incidental Vocabulary Acquisition

Incidental vocabulary acquisition was defined in the present study as the acquisition of lexical information that occurs as a by-product of reading a text for comprehension; learners were focused on understanding the content of the text rather than on learning unknown vocabulary items they encountered in that text (Ellis, 1994; Hulstijn, 2001; Schmidt, 1994). Furthermore, learners' vocabulary acquisition was operationalized as incidental in that they were not told prior to reading that they would be tested on the vocabulary in the text (Hulstijn, 2005). A discussion of the variables of clause type and word saliency follows, including how they were operationalized in the present study and how they have been described in previous research.

Clause Type

In the present study, the effect of clause type on the acquisition of lexical information was investigated, with clause type referring to the position of a word in an independent or dependent clause. An independent clause is one that "is capable of constituting a single sentence" and a dependent clause is one that "makes up a grammatical sentence only if subordinate to a further clause" (Quirk, Greenbaum, Leech, & Svartik, 1972, p. 721). Previous research in the processing of main and subordinate clauses will provide a theoretical background for a discussion of the processing and acquisition of lexical information in independent and dependent clauses.

Subordinate clauses have been hypothesized to be more difficult to process than main clauses due to their syntactic and semantic complexity. That is, subordinate clauses may place a heavier load on learners' working memory due to the amount of information they contain (Lord, 2002).¹ Bybee (2002) hypothesized that while the constructions that produce main and subordinate clauses contain shared categories of information, such as having open slots that can be filled by the same kinds of word classes (i.e. noun, verb), the constructions for subordinate clauses maintain unique classes of information over time. The constructions for subordinate clauses do not change as rapidly as those for main clauses, and in order to maintain the information stored in subordinate clause constructions, longer and more complex sequences of language often must be processed and stored in memory. Therefore, the processing of subordinate clauses could be influenced by the amount of detailed information contained in subordinate clause constructions, ranging from information about word order to the maintenance of specific morphological forms no longer utilized in main clauses (Bybee, 2002).²

The processing of subordinate and main clauses may also differ in terms of depth. Sanford (2002) concluded that text in main clauses may be more deeply processed than text in subordinate clauses, based upon findings from several studies. A study by Baker and Wagner (1987) demonstrated that L1 learners had a greater probability of detecting false information placed in main clauses (80% probability) than in subordinate clauses (69% probability). Sanford, Sturt, Stewart and Archambault (n.d.), cited in Sanford, demonstrated that L1 learners were more likely to notice semantic changes, both small and large, to single words in sentence

sets when those changes were in main clauses, and less likely to notice them in subordinate clauses.³ Given the results of the aforementioned studies, one reason for the proposed difference in the depth of processing of subordinate and main clauses may be the greater amount of detailed information in subordinate clauses. If subordinate clauses do contain more detail, they would create a greater load on learners' working memory and not be processed as deeply as main clauses, which are not as detailed and thereby would impose a lesser load on working memory.

Word Saliency

The present study investigated the variable of word saliency, the importance of a word, in connection with lexical gain. Various factors have been shown to impact L2 word saliency in linguistic input, including phonemic distance and the position of words within an utterance (Rast & Dommergues, 2003; VanPatten, 1996, 2000). The frequency with which a word occurs in input also contributes to word saliency, in that with increased exposure to an unknown word in context, more contextual cues become available that can be applied to comprehending the meaning of that word (Sternberg, 1987). Frequency of exposure can also have a cumulative effect on word saliency. The more often an unknown word is encountered in context, the greater the amount of lexical information that is stored for that word, which in turn makes the word more familiar and more accessible for processing, and in the end more salient to the learner (Rast & Dommergues, 2003; Slobin, 1985).

Another factor which may affect word saliency is the perception of its importance in understanding context. Brown (1993) found that the strength of context salience of a word was important for its acquisition, even though the word's frequency of exposure in a given text was low. She explained that "[w]ords which are important (salient) in a specific context are more likely to be acquired regardless of frequency" (p. 281). Although the Brown study did not specifically measure learners' perception of word saliency, based upon its findings one could hypothesize that if learners perceived an unknown word as being necessary to understanding the surrounding context, they would view it as being more salient. In turn, the learners' incentive to acquire its associated lexical information would also increase (Sternberg, 1987). This agrees with the operating principles proposed by Peters (1985) connecting saliency to the construction of a language system in children. One of the principles states that salient stretches of speech are reasonable candidates for extraction, defined as the process of recognizing and remembering chunks of speech encountered in input. That is, as the perceived saliency of items in input increases, the possibility that the items will be acquired also increases.

Definition of Lexical Gain

The present study investigated the relationship between the variables of clause type and word saliency in the incidental acquisition of lexical information (lexical gain). Lexical gain was defined as the incidental acquisition of grammatical class and meaning for target words encountered in a written L2 text. These two kinds of information were included in the study to allow for more generalizable results. Grammatical class and word meaning are both involved in the building of an L2 lexical entry, according to proposed models of L2 lexical processing and representation (deBot, Paribakht, & Wesche 1997; Jiang, 2000). Results of previous studies in L2 vocabulary acquisition have shown markedly different levels of gain for grammatical class and word meaning, indicating that these categories of lexical information entail different levels of processing, with increased processing needed for word meaning (Lee & Wolf, 1997; Wolf, 1993). The results of a study by Webb (2005), focusing on receptive and productive vocabulary

learning through reading and writing, support this conclusion. The study measured the acquisition of five aspects of vocabulary knowledge—orthography, syntax, association, grammatical functions, and meaning—and found that while evidence of learning was present for all five aspects, the least amount of evidence was present for meaning. The author suggested that these results showed the need for vocabulary studies that measure the acquisition of meaning along with other aspects of vocabulary knowledge, since statistically insignificant gains in meaning may be accompanied by significant gains in other categories of lexical information.

Lexical gain was measured for learners with different levels of L2 language experience, “a quantification of the subjects’ exposure to the second or foreign language” (Lee, 1991, p. 189). More and less experienced L2 learners were included in the study to allow for more generalizable results with regard to lexical gain since L2 learners with varying levels of exposure to and experience in processing L2 linguistic input might demonstrate differences in their quantity and quality of L2 lexical gain. Moreover, differences in lexical gain accounted for by the variables of clause type and word saliency might be revealed for learners with different levels of L2 experience.

Research Questions

The research questions for this study were as follows:

- 1) Do L2 learners gain grammatical class and word meaning equally well for L2 target words in independent and dependent clauses?
- 2) Do L2 learners demonstrate greater gains of grammatical class and word meaning with increasing levels of word saliency?
- 3) Do L2 learners with varying levels of L2 experience demonstrate differences in gain of grammatical class and word meaning with regard to clause type and level of word saliency?

Method

Participants

Information about the participants in the study was gathered through a language learning history questionnaire. The participants were 150 L2 learners of Spanish who were students at an American university at the time of the study. All of the participants were native speakers of English and had not studied a foreign language other than Spanish. To better determine how L2 experience could account for lexical gain, the participants were divided into two groups based on their amount of experience with studying Spanish in a classroom setting (Lee, 1991). One group had studied Spanish for a period of 1 to 5 years, and the other for 6 years or longer; the majority of the students in each group had studied Spanish for 3 to 5 years and for 6 to 8 years, respectively. The rationale for splitting the groups at 6 years was that after having studied Spanish at the high school and university levels for that amount of time, most students would be enrolled in university Spanish classes designated for majors or minors, rather than basic Spanish language courses designed for students without coursework or with limited coursework in Spanish. This distinction between the two groups of students allowed for a more controlled grouping of learners with varied amounts of exposure to the Spanish language in a classroom setting.

Materials

The materials used in the study consisted of a packet with a 305 word Spanish language text, a word saliency measure, and separate assessment measures for grammatical class and word

meaning. The experimental text was adapted from an authentic Spanish language text, and 10 target words were embedded in the text (Appendix B). All of the target words were nouns, in order to avoid a potential impact of the different imageability of nouns and other content words (Ellis & Beaton, 1993) on lexical gain.⁴

The length of the experimental text was necessarily short, due to time restrictions involved in data collection. In addition to the other measures described above, learners also completed a written recall of the text to assess their global text comprehension, the results of which will be discussed in a future paper. For the participants to be able to complete all of the measures in the time allotted (approximately 30 minutes), particularly those who were less proficient in the L2, the text could not be overly long. A shorter, less complex version of the text had been used in a previous research study with beginning level learners, and was revised for the present study.⁵ While the brevity of the experimental text limited the exposure that the participants had to the target words in context—each target word appeared once in the text—learners were instructed to read the text two times, which would allow them at least two exposures to the target words, and perhaps more if they re-read sentences containing the target words as they read the text. Although the small number of exposures that learners had to the target words in context most likely decreased their overall lexical gain (Horst, 2005; Horst & Meara, 1999; Pigada & Schmitt, 2006), they had sufficient exposure to the words to allow for gain of lexical information for some, if not all, of the target words.⁶ Given the limited exposure that the learners had to the target words, the present study focused on the initial acquisition of lexical information that occurred during learners' first exposures to unknown words in context, and several factors (clause type, word saliency) that might have influenced that acquisition.

The target words were changed into nonsense words (Appendix A) to ensure that the learners would not have seen the target words prior to reading the text (e.g. Chern, 1993; Homburg & Spann, 1982; Pulido, 2004; Waring & Takaki, 2003; Webb, 2005). The nonsense words conformed to Spanish orthographic, phonological, and morphological rules. Each word had two syllables, and ended in either *-a* or *-e*, with *-a* and *-e* being morphemes associated with nouns, verbs, and adjectives in Spanish. The fact that the nonsense words ended in either *-a* or *-e* would discourage learners from automatically assigning one particular grammatical class to all of the words. All words followed rules of gender and number agreement in the text; for instance, the nonsense word **cheda** (lista = list) agreed with the preceding indefinite article **una**, since both words ended in the morpheme *-a*, which indicates feminine gender and singular number. The nonsense words were piloted with a separate group of 29 advanced L2 Spanish learners to make sure that they would be processed based upon their use in context rather than their form. The learners in the pilot group saw a list of 20 nonsense words, and wrote the grammatical class (noun, verb, or adjective) and English translation equivalent for each of the words. The 10 nonsense words chosen for the study did not have a particular grammatical class or meaning assigned to them by the majority of learners in the pilot group. The piloting of the nonsense words ensured that the learners in the present study would be able to assign the correct grammatical class and meaning to the words only by reading them in the experimental text.

Word Saliency Measure

In the study, word saliency was defined as the perceived importance of a word in context (Brown, 1993). As such, it was measured with a 5-point Likert scale which ranked learners' perception of the target words' importance in the experimental text: *0 = not important, 1 = a little important, 2 = somewhat important, 3 = important, 4 = very important*. Learners also

wrote why they assigned each word a particular ranking, but these responses were not included in the calculation of the word saliency rankings (Appendix D). Two versions of the saliency measure were created by inverting the order of the items.

Vocabulary Posttests – Grammatical Class and Word Meaning

Gain of grammatical class was measured with a posttest in which learners saw a list of the 10 target words and 20 distractor items from the experimental text and wrote whether the words were nouns, verbs, or adjectives (Appendix C). Each correct answer was worth 1 point, for a total of 10 points for the target words. Gain of word meaning was measured with a separate multiple-choice posttest featuring the same 10 target words and 20 distractor items as the grammatical class posttest (Appendix C). For each word, learners were given four options: the correct answer, two distractor options (one from the immediate context surrounding the word, the other from a part of the text that was contextually distant from the word), and an “I don’t know” option.⁷ Correct answers were worth one point, for a total of 10 points for the target words. Two versions of the grammatical class and word meaning measures were created by inverting the order of the items.

Procedure

In the study, learners first signed a consent form and completed the language learning history questionnaire. They were then given a packet with the text, the text recall measure, the saliency measure, and the grammatical class and word meaning measures. Approximately half of the learners received each version of these measures. All learners had 30 minutes to read the experimental text and complete the measures in the packet.

Results

The study measured the variance within learners’ gain scores for grammatical class and word meaning and how much of that variance was accounted for by the independent variables of clause type, word saliency, and learners’ level of L2 experience. Lexical gain was assessed according to an incidental learning research paradigm, in that learners were not told prior to reading that they would be tested on their knowledge of lexical items in the experimental text.

The data for lexical gain, based on learners’ scores on the grammatical class and word meaning measures, and for the independent variables of clause type, word saliency, and level of L2 experience were analyzed using a cumulative logistic regression procedure. A regression analysis was utilized to determine which of the independent variables, and/or which combination of those variables, would best account for learners’ gain of grammatical class and word meaning (Hatch & Lazaraton, 1991). A logistic regression analysis was utilized because the dependent variable of lexical gain was dichotomous, given that the gain scores for grammatical class and word meaning for each target word were either 0 (no gain) or 1 (gain). In this analysis, statistical significance was evaluated by a chi-square test, and the likelihood (the odds ratio) of a particular result for lexical gain with a given independent variable was calculated.

Research Question 1: Clause Type and Lexical Gain

Clause type was found to have a significant relationship with the gain of grammatical class, but not with the gain of word meaning. The descriptive statistics for total gain of grammatical class and word meaning in each clause type are reported in Table 1. Descriptive statistics for

each target word are reported in Table 2. The reported scores in both tables are frequencies and percentages of correct responses for the target words across all 150 participants.

Table 1

Lexical Gain Scores According to Clause Type

Gain category	Clause type			
	Independent		Dependent	
	<i>f</i>	%	<i>f</i>	%
Grammatical class	401	53%	274	37%
Word meaning	98	13%	81	11%

Note. $n = 750$ responses for grammatical class and word meaning in each clause type.

Table 2

Lexical Gain Scores for Individual Target Words

Target word	Grammatical class		Word meaning	
	<i>f</i>	%	<i>f</i>	%
treda (diet)	61	41%	14	9%
colle (step)	87	58%	11	7%
chole (heart)	83	55%	10	7%
rasma (energy)	78	52%	30	20%
cheda (list)	92	61%	33	22%
tonsa (solution)	64	43%	15	10%
selta (quantity)	61	41%	25	17%
deste (hope)	33	22%	8	5%
sutre (control)	57	38%	12	8%
meste (task)	59	39%	21	14%

Note. $n = 150$ responses for each target word.

The first five words (treda – cheda) were in independent clauses, and the last five words (tonsa – meste) were in dependent clauses.

The percentage of correct responses for grammatical class was greater for target words in independent clauses than for target words in dependent clauses, as demonstrated by the data reported in Tables 1 and 2. This result was supported by the regression analysis for grammatical class and clause type, $\chi^2(1, N = 1500) = 43.00, p < .0001$. The odds of gaining grammatical class for target words in independent clauses were calculated to be 46% greater than for target words in dependent clauses. As for word meaning, the percentage of correct responses was only slightly greater for target words in independent clauses than for those in dependent clauses. The results of the regression analysis showed that the relationship between clause type and gain of word meaning was not significant, $\chi^2(1, N = 1500) = 1.83, p = 0.18, ns$.

Research Question 2: Word Saliency and Lexical Gain

Word saliency was found to have a significant relationship with gain of grammatical class and word meaning. The descriptive statistics presented in Table 3 detail the frequencies and percentages of correct and incorrect responses for grammatical class and word meaning for each saliency ranking. The frequencies and percentages were calculated for all the target words across the 150 participants.

Table 3

Gain of Grammatical Class and Word Meaning According to Saliency Ranking

Saliency ranking	Grammatical Class				Word Meaning			
	Correct		Incorrect		Correct		Incorrect	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Not important ^a	255	37%	435	63%	61	9%	629	91%
A little important ^b	190	52%	175	48%	49	13%	316	87%
Somewhat important ^c	148	51%	141	49%	36	12%	253	88%
Important ^d	55	52%	51	48%	23	22%	83	78%
Very important ^e	27	54%	23	46%	10	20%	40	80%

Note. $N = 1500$ saliency rankings.

^a $n = 690$ responses. ^b $n = 365$ responses. ^c $n = 289$ responses. ^d $n = 106$ responses.

^e $n = 50$ responses.

As seen in Table 3, a noticeable increase in the percentage of correct answers for gain of grammatical class and word meaning appears between the saliency rankings of *not important* and *a little important*, with an even greater increase for gain of word meaning between the rankings of *somewhat important* and *important*. The regression analysis showed a significant association between gain of grammatical class and saliency ranking, $\chi^2(1, N = 1500) = 22.86, p < .0001$. For a unit increase on the saliency scale, the odds of gaining grammatical class increased by 25.8%. The results for gain of word meaning and saliency ranking were: $\chi^2(1, N = 1500) = 15.93, p < .0001$. The odds of gaining word meaning increased by 30.1% for a unit increase on the saliency scale and were slightly better than the odds of gaining grammatical class with a similar increase on the scale.

The results of the regression analysis showed that there was no significant association between the variables of word saliency and clause type, $\chi^2(1, N = 1500) = .02, p = .88, ns$. This finding was not surprising, given that the mean saliency scores for target words in independent and dependent clauses were essentially equal (M independent = .97, $SD = 1.10$, and M dependent = .97, $SD = 1.12$). Table 4 presents the frequencies and percentages of each saliency ranking as well as the average saliency ranking for individual target words across the 150 participants. Furthermore, there was no significant interaction between the variables of word saliency and clause type with regard to gain of grammatical class and word meaning, grammatical class gain $\chi^2(1, N = 1500) = .47, p = .49, ns$, and word meaning gain $\chi^2(1, N = 1500) = .41, p = .52, ns$.

Table 4

Frequency of Individual Saliency Rankings and Mean Saliency Rankings for Target Words

Target items	Individual rankings											
	0		1		2		3		4		<i>M</i>	<i>SD</i>
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%		
treda (diet)	70	47%	36	24%	34	23%	5	3%	5	3%	.93	1.06
colle (step)	69	46%	39	26%	28	19%	11	7%	3	2%	.93	1.06
chole (heart)	68	45%	36	24%	28	19%	14	9%	4	3%	1.00	1.12
rasma (energy)	64	43%	30	20%	33	22%	15	10%	8	5%	1.15	1.23
cheda (list)	71	47%	44	29%	24	16%	8	5%	3	2%	.85	1.00
tonsa (solution)	75	50%	31	21%	32	21%	6	4%	6	4%	.91	1.11
selta (quantity)	72	48%	34	23%	29	19%	9	6%	6	4%	.95	1.13
deste (hope)	70	47%	35	23%	28	19%	12	8%	5	3%	.98	1.13
sutre (control)	66	44%	35	23%	29	19%	15	10%	5	3%	1.05	1.16
meste (task)	65	43%	45	30%	24	16%	11	7%	5	3%	.97	1.09

Note. $n = 150$ saliency rankings for each target word.

The first five words (treda – cheda) were in independent clauses, and the last five words (tonsa – meste) were in dependent clauses.

Research Question 3: Relationship between Level of Language Experience, Clause Type, Word Saliency, and Lexical Gain

The scores for gain of grammatical class and word meaning were compared for learners of two different levels of L2 experience (1-5 years and 6 or more years). No significant association was found between language experience and the variables of clause type and word saliency. Furthermore, no significant interaction was present between the variables of language experience, clause type and word saliency with regard to lexical gain, gain of grammatical class $\chi^2(1, N = 1500) = .00, p = .98, ns$, and gain of word meaning $\chi^2(1, N = 1500) = 1.05, p = .31, ns$. The relationship between word saliency and lexical gain, with increased word saliency leading to greater gains in grammatical class and word meaning, was significant for learners in both levels of L2 experience. Moreover, the association between clause type and lexical gain, with greater gains present for grammatical class in independent clauses, was significant across levels of L2 experience. When analyzed separately from the variables of word saliency and clause type, level of experience was found to have a significant relationship with gain of grammatical class, but not with gain of word meaning. The descriptive statistics for gain of grammatical class and word meaning based on level of L2 experience are in Table 5, with frequencies and percentages of correct responses reported.

Table 5

Lexical Gain According to Level of L2 Experience

	1 – 5 years		6 ⁺ years	
	<i>f</i>	%	<i>f</i>	%
Grammatical class	294	39	381	51

Word meaning	98	13	81	11
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Note. $n = 760$ responses for level of 1-5 years. $n = 740$ responses for level of 6+ years.

The more experienced L2 learners demonstrated higher levels of gain of grammatical class than the learners with less L2 experience. The results of the regression analysis supported this finding, showing a significant association between level of language experience and gain of grammatical class, $\chi^2(1, N = 1500) = 27.55, p < .0001$. For the more experienced learners, the odds of gaining grammatical class were 75.9% greater than those for the less experienced learners. However, while both groups of learners had much lower gains of word meaning than of grammatical class, the less experienced group of learners had a slightly greater gain of word meaning than the more experienced group. This result was unexpected, especially since the more experienced learners showed greater gains of grammatical class. The regression analysis showed that level of L2 experience did not have a significant association with gain of word meaning, $\chi^2(1, N = 1500) = .05, p = .82, ns$.

Discussion of Results

The results of the present study indicate that clause type and word saliency are variables that are independently related to lexical gain. In other words, no significant interaction was found between clause type and word saliency with regard to the acquisition of grammatical class and word meaning. Moreover, clause type was significantly related to the gain of grammatical class, while word saliency was significantly related to the gain of not only grammatical class, but word meaning as well. The learners' level of L2 experience was not found to be associated with either clause type or word saliency with regard to lexical gain; however, it was shown to be significantly related to the gain of grammatical class. The more experienced L2 learners demonstrated significantly greater gains of grammatical class than the less experienced L2 learners.

Increased word saliency was found to have a significant relationship with the gain of grammatical class and word meaning. This result agrees with one of the operating principles proposed by Peters (1985) that more relevant (or salient) words will have a higher probability of being extracted; that is, their lexical information will have a greater likelihood of being recognized and remembered. As the target words became more salient to the learners, the probability increased that the learners would acquire the words' grammatical class and meaning. The most robust increase in gain of grammatical class occurred between the saliency rankings of *not important* and *a little important*, with minimal increases in gain for subsequent increases in the perceived saliency of target words. This result could indicate that a relatively small increase in perceived word saliency was sufficient to allow for greater gain of grammatical class. As for word meaning, greater increases in gain were present between the saliency categories of *not important* and *a little important* as well as *somewhat important* and *important*. Given that the overall gain of word meaning was less robust than the gain of grammatical class, the fact that gain of word meaning was associated with two increases of perceived word saliency, as opposed to one for grammatical class, may demonstrate that greater increases in word saliency are necessary to facilitate gain of word meaning.

The position of target words in independent or dependent clauses had a significant association with gain of grammatical class, but not with gain of word meaning. Greater gains of grammatical class occurred for words in independent clauses, which may be linked to differences in the processing of information in independent and dependent clauses. Research in the

processing of main and subordinate clauses suggests that less processing of information occurs in subordinate clauses than in main clauses (Baker & Wagner, 1987; Sanford, 2002). This difference in processing may be partly due to an increased memory load for subordinate clauses, stemming from the complex and detailed information they contain (Bybee, 2002; Lord, 2002). In the present study, a similar difference may have occurred in the processing of independent and dependent clauses, allowing for deeper processing of independent clauses and shallower processing of dependent clauses. Learners could have exhibited greater gain of grammatical class for target words in independent clauses due to the deeper processing of information contained in those clauses.

The processing differences between independent and dependent clauses might not have been evident for the gain of word meaning due to the processing demands involved in that gain. The incidental acquisition of word meaning has been described as an incremental process, with multiple exposures to a word in context, perhaps in various contexts, being necessary before that word's meaning can be acquired (Herman, Anderson, Pearson, & Nagy, 1987; Horst & Meara, 1999; Koda, 2005). In the present study, learners had two exposures to the target words in context, given that each target word appeared once in the experimental text and that they were instructed to read the text two times for comprehension. To compensate for their limited exposure to the target words in the text, learners may have utilized more cognitive resources (such as attention) in the processing of the words' meaning. Furthermore, given that they were instructed to read the text for comprehension, and that the majority of the sentences in the text contained at least one dependent clause (15 of 22 sentences, 68%, and 4 of those sentences had 2 or more dependent clauses), learners may also have devoted significant cognitive resources to the processing of the text itself. This hypothesis is reminiscent of the results of Barry & Lazarte (1995), in which increased syntactic complexity was shown to negatively impact learners' recall of essential propositions in an L2 text. One explanation given for this result was that learners engaged in processing strategies that involved distinguishing between essential and non-essential information in a text, a task complicated by the presence of complex sentences with embedded clauses. The use of such strategies would require significant cognitive resources. This explanation may be applicable to the results for clause type and acquisition of word meaning in the present study. The combination of the tasks of (a) comprehending the content of the syntactically complex experimental text and of (b) acquiring word meaning with limited exposure to the target words in context may have resulted in fewer cognitive resources being available to learners that could have been allocated to the deeper processing of semantic information for target words in independent clauses. This could have eliminated the possibility of a stronger association between clause type and gain of word meaning.

No significant association was found between saliency and clause type in connection with lexical gain. Given that both variables were related to gain of lexical information, albeit to different degrees, one explanation for this result is that saliency and clause type may be associated with different elements of lexical acquisition and processing. Saliency may be involved in the collection and storage of syntactic and semantic information in the formation of a new lexical entry, which recalls the effect of saliency on the process of extraction hypothesized by Peters (1985). Clause type may be involved in lexical acquisition in a more global way, by impacting memory load and cognitive resources that are available to learners.

This is not to say that saliency and clause type are entirely unrelated in lexical acquisition and processing during reading, however. Results of previous research in the processing of main and subordinate clauses have suggested that content information in main clauses may be more salient

to people, since main clauses often contain information that is central to the meaning of a sentence and its surrounding context, and as such, content information in main clauses may be processed more thoroughly than in subordinate clauses (Baker & Wagner, 1987). Therefore, content information contained in main clauses, by virtue of being processed more deeply, could become more salient to learners, and be related to the lexical gain of unknown words in those clauses. In the present study, saliency was based on the learners' perception of the importance of the target words in understanding the entire text, rather than the immediate context of the words, the clause and the sentence in which they were embedded. This could have impacted the saliency rankings of the target words in general and of the target words in independent clauses in particular. The saliency rankings across the 10 target words were somewhat low, and did not exhibit a high level of variability. The saliency scores for all the target words had a mean ranking of .94, $SD = 1.09$, with the majority of the scores falling between the rankings of 0, *not important*, and 2, *somewhat important*. These results were very similar to those for the target words within independent and dependent clauses, independent $M = .94$, $SD = 1.08$, and dependent $M = .93$, $SD = 1.10$. An increase in the number of higher saliency rankings—rankings of 3 = *important* and 4 = *very important*—would have provided for greater variability within the saliency scores, which in turn might have revealed a more robust relationship between saliency and clause type. A more sensitive measure of word saliency that took into account the content information presented in the clause and the sentence in which a target word was embedded might provide greater variability in saliency rankings, which in turn could reveal a stronger relationship between word saliency and clause type in lexical gain.

Similar to the variable of clause type, learners' level of L2 experience was found to be related to the gain of grammatical class but not to the gain of word meaning. Increased L2 knowledge and experience in processing simple and complex L2 sentences (Lord, 2002) could have enhanced the learners' gain of grammatical class. The lack of an association between L2 experience and gain of word meaning could be explained by the hypothesis that the acquisition of word meaning required a deeper level of processing than the learners could attain in this study, especially given the syntactic complexity of the experimental text (Barry & Lazarte, 1995) and their limited exposure to the target words in context. The fact that both groups of learners had lower gains of word meaning than of grammatical class, and that the more experienced group had slightly lower gains of word meaning than the less experienced group (Table 5), suggests that the task of acquiring word meaning was more difficult, more taxing on the learners' cognitive resources, than the task of acquiring grammatical class. With a text that was less syntactically complex, and with more exposure to the target words in context, deeper processing of word meaning might have occurred, and higher levels of L2 experience potentially could have enhanced the gain of word meaning, as was the case for gain of grammatical class.

Conclusion

This study provided preliminary evidence for connections between clause type, word saliency, level of L2 experience, and the incidental acquisition of L2 lexical information, specifically grammatical class and word meaning. The results for clause type lend themselves to pedagogical implications, in that they indicated that the syntactic complexity of texts could play a role in the acquisition of lexical information, particularly information that requires a greater level of processing, such as word meaning. When selecting a text for L2 learners to work with, an instructor may want to consider how the syntactic complexity of the text could affect not only text comprehension (Barry & Lazarte, 1995), but also the potential acquisition of new lexical

items in that text, especially if those items are embedded in dependent clauses. Texts with a large percentage of complex sentences with independent and dependent clauses may impose a processing and memory load on learners that could negatively impact the amount and depth of their acquisition of unknown lexical items in the text. This could be true even for more experienced L2 learners, as was the case in the present study.

Several factors should be taken into consideration when examining the results of the present study. The study utilized 5 target words for each type of clause (independent and dependent); future research would need to include a greater number of target words from each type of clause in order for more definitive conclusions to be drawn about the relationship between incidental lexical acquisition and clause type. Furthermore, the kinds of sentences (subordinate, coordinate, and simple) used in the study could be controlled for more carefully to avoid any potential effect of sentence structure on lexical gain which could interact with the variable of clause type. However, it bears mentioning that the more an authentic L2 text is modified and simplified, the more artificial the text and the reading context becomes.

Although further research is needed to better determine the strength of the associations between clause type, word saliency, and incidental gain of L2 lexical information, the findings of the present study demonstrate that L2 learners can, and do, draw upon a variety of resources and cues in incidental vocabulary learning, even in the initial stages of that learning. The variables of clause type and word saliency may play different roles in lexical acquisition and processing, but both appear to have a viable connection to L2 vocabulary learning during reading.

Footnotes

¹ Working memory refers to “the temporary storage of information that is being processed in any of a range of cognitive tasks” (Baddeley, 1986, p. 34).

² Klein-Andreu (1990), also cited in Bybee (2002), described a case of the maintenance of morphological forms in subordinate clauses which are no longer utilized in main clauses: the Spanish Imperfect Subjunctive ending in *-ra*. In earlier stages of Spanish, the *-ra* verb form had the grammatical function of past anterior, meaning had + verb (*llegara* = had arrived). Through the process of grammaticalization, the *-ra* form was replaced by forms of the verb *haber* + past participle for the past anterior function, and the *-ra* forms came to occur in certain subordinate clauses and have adopted past subjunctive meaning and function.

³ An example of small semantic change in the Sanford et al. study, cited in Sanford (2002), was *finished* → *completed*, and an example of large semantic change was *finished* → *started*.

⁴ Ellis and Beaton (1993) proposed that nouns were more imageable than verbs, resulting in the greater acquisition of target nouns when utilizing the keyword strategy in vocabulary learning.

⁵ The revisions of the experimental text resulted in the following changes: (a) the text increased in length from 204 to 305 words, (b) the number of sentences in the text increased from 16 to 22, and (c) the number of sentences containing dependent clauses increased from 10 to 15.

⁶ Results of previous research studies in incidental vocabulary learning that featured texts in which target words appeared once have consistently shown reliable gains of lexical information for some, if not all, of the targeted items (i.e., Nagy, Herman & Anderson, 1985; Konopak et al., 1987; Diakidoy, 1998; Pulido, 2004).

⁷ The distractor options for the multiple-choice word meaning assessment measure were modeled in part after the distractors used in the multiple-choice translation recognition (L2-L1) task in Pulido (2003, 2004).

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Appendix A – Target Words**L2 target word**

1. control
2. corazón
3. paso
4. lista
5. energía
6. solución
7. trabajo
8. dieta
9. cantidad
10. esperanza

English translation equivalent

- control
- heart
- step
- list
- energy
- solution
- job/task
- diet
- quantity
- hope

Nonsense word

- sutre
- chole
- colle
- cheda
- rasma
- tonsa
- meste
- treda
- selta
- deste

Appendix B – Experimental Text

Cómo manejar el estrés

Se siente el estrés cuando un individuo experimenta un evento cambiante de la vida. Aunque el estrés es diferente para todos, hay algunos síntomas psicológicos y físicos comunes. Uno piensa que no tiene sufre sobre ningún aspecto de la vida. No puede dormir a causa del insomnio, sufre de dolores de cabeza, y el latido del chole y la presión sanguínea aumentan. Además, a veces uno tiene hábitos adictivos como fumar, beber alcohol y tomar drogas.

Aliviar el estrés le ayuda a ser una persona más sana y feliz. Para aliviarlo, es importante estar enterado de los síntomas y su causa. El próximo colle es aprender varias técnicas para manejar los efectos del estrés.

Sigue una cheda de recomendaciones para aliviar los efectos negativos del estrés.

- Hacer ejercicio: El ejercicio elimina rasma negativa. Uno debe hacer ejercicio aeróbico por lo menos tres veces a la semana por treinta minutos.
- Pensar positivamente: Es necesario luchar contra pensamientos negativos y sustituirlos con positivos.
- Hablar con alguien: Hablar con su familia o sus amigos le permite expresar sus sentimientos y encontrar una tonsa a sus problemas.
- Organizarse: Uno puede apuntar las cosas por hacer y concentrarse en terminarlas a tiempo. Es importante no esperar hasta el último momento para empezar un meste.
- Adoptar hábitos saludables: Coma una treda saludable y completa y duerma por lo menos de 7 a 8 horas cada noche. Evite comer comidas altas en calorías que contengan una gran selta de azúcar y grasa.

Estas son algunas sugerencias de cómo manejar el estrés. Cada individuo lo enfrenta de su propia manera, y todas las opciones no funcionan para todos. Es importante tener deste y ser optimista. A fin de todo, se necesita recordar que manejar el estrés es un proceso que toma tiempo y práctica.

Appendix C – Vocabulary Posttest

Grammatical Class Measure

Instructions: For each of the following words, **write whether the word functioned as a noun, verb, or adjective in the text you read.**

- | | |
|----------------|-----------------|
| 1. altas _____ | 4. gran _____ |
| 2. ayuda _____ | 5. cheda _____ |
| 3. treda _____ | 6. luchar _____ |

Word Meaning Measure

Instructions: For each of the following words, you will see three definitions in English. Read the definitions and **circle the one that corresponds to each word as it was used in the text you read.** If you do not know which definition corresponds to a particular word, circle the “**I don’t know**” option.

- | | | | | |
|------------------|----------------|---------------|--------------|-----------------|
| 1. altas | a. fatty | b. high | c. aerobic | d. I don’t know |
| 2. ayuda | a. experiences | b. alleviates | c. helps | d. I don’t know |
| 3. sutre | a. control | b. symptom | c. step | d. I don’t know |
| 4. gran | a. addictive | b. large | c. happy | d. I don’t know |
| 5. cheda | a. list | b. solution | c. technique | d. I don’t know |
| 6. luchar | a. substitute | b. suffer | c. fight | d. I don’t know |

Appendix D – Word Saliency Measure

Instructions: How important are the following words in understanding the information in the text Cómo manejar el estrés? Rate the importance of each word using the scale below. **Write the rating for each word in the space provided.**

0 = not important 1 = a little important 2 = somewhat important

3 = important 4 = very important

Beside the ranking of each word, **write in English** why you gave the word that particular ranking. **YOU MAY NOT LOOK BACK AT THE TEXTS** as you complete this exercise.

1. sufre _____
2. tonsa _____
3. treda _____
4. toma _____
5. colle _____
6. aeróbico _____