The Role of Learning Styles in Vocabulary Learning Strategies

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Abstract: 本研究は日本人大学生英語学習者が持つ学習スタイルと語彙学習スタイルの関係を調査することを目的とした。まず、語彙学習方略の質問紙が作成され、その信頼性、妥当性の検証が行われた。学習スタイルの調査には Style Analysis Survey (Oxford, 1993) が使用された。これら2つの質問紙を実施し、分析した結果、学習スタイルと語彙学習方略では、特に多角的な方法で語彙を記憶にとどめておこうとする体制化方略の間に相関が見られた。また、視覚、聴覚などの学習スタイルと、それに対応する語彙学習方略である、音声リハーサル方略や視覚反復との間に弱いながらも相関が見られた。さらに英語習熟度を測定するテストにおける下位群と上位群での相関の違いを比べてみたところ、下位群では学習スタイルと語彙学習方略の相関がほとんど見られなかったが、上位群では相関が強く表れていることが明らかになった。これらの結果から、学習スタイルは語彙学習方略に直接の影響を及ぼすわけではないという可能性が示唆された。

1. Introduction

Even though studies on learning strategies date back only a few decades, they have been vigorously conducted since the late 1980's (See Cohen, 1998; McDonough, 1995; O'Malley & Chamot, 1990; Oxford, 1990; Takeuchi, 2003, for a comprehensive review). Now that the research field of learning strategies has become rather mature, it is now widely recognized that the use of learning strategies is influenced by a large number of individual and context-dependent factors such as motivation, learning aptitude, learning

style, personality type, gender, self-efficacy, anxiety, culture or national origin, the language learning environment, career orientation, age, and the nature of the language task (Cohen & Dörnyei, 2002; Ehrman et al., 2003; Oxford, 2001; Oxford & Nyikos, 1989).

Among such variables affecting the use of learning strategies, learning styles[1] are often considered "interrelated" and are manifested by learning strategies, i.e., overt learning behaviors/actions (Ehrman et al., 2003; Reid, 1998). Regarding learning styles, Reid (1998) elaborately defines them as:

> Learning styles are internally based characteristics, often not perceived or consciously used by learners, for the intake and comprehension of new information. In general, students retain these preferred learning styles despite the teaching styles and classroom atmospheres they encounter, although the students may, over time, acquire additional styles. Research indicates that highly successful students often have multistyle preferences, and some research suggests that students adapt their learning styles with experimentation and practice. (p. ix)

As one of the most widely cited definition of learning strategies, Oxford and Nam (1998) refer to their relationship with learning styles as:

> "Learning strategy" is a technical phrase that means any specific conscious action or behavior a student takes to improve his or her own learning. Learning strategy choices are often related to preferred learning styles. (p. 53)

These two definitions appear to be more or less overlapping in that both learning styles and strategies come into play when learners take up a specific learning task.[2]

Putting these definitions into one perspective, Figure 1 illustrates the relationship among learning styles, learning strategies, and a specific task. As can be seen in the figure, the only difference being used, consciously or not (and of course as innate or acquired behaviors), both learning styles and learning strategies bear a striking resemblance to each other (the dotted line in the figure represents an indirect influence). It should be therefore noted

that from the definition above we might presume that if learners are not consciously employing learning strategies, there is a possibility that how they deal with a specific task strongly reflects their learning styles.
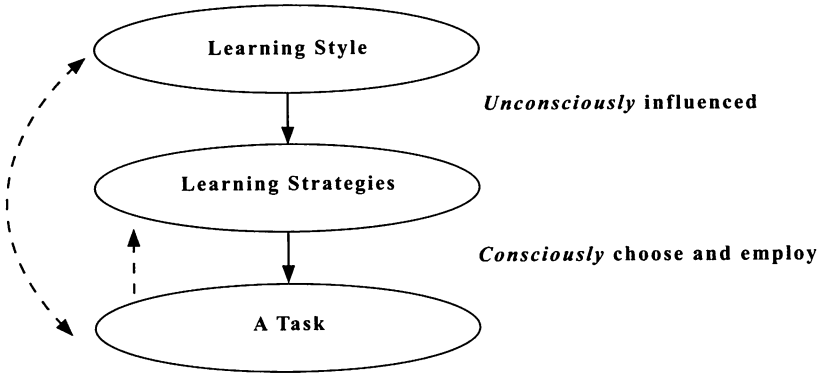

Figure 1. Conceptualized Latent Relationship of Learning Styles, Learning Strategies, and a Task

Based on the belief that understanding individual-bound differences (i.e., learning styles) and how learners deal with a specific task (i.e., learning strategies) helps facilitate teaching and learning (Ely & Pease-Alvarez, 1996), a whole line of research has been conducted thus far (See Cohen, 2003; Dörnyei, 2005; Reid, 1998, for a review). Depending on which theory/definition of learning styles[3] and of strategies the study was based upon, the interpretation of the results may differ from one study to another; it seems that almost all research findings[4] to some extent corroborate the aforementioned Oxford and Nam's point of view that "learning strategy choices are often related to preferred learning styles." The idea that styles can be "stretched" (i.e., they cannot be completely shifted since they are relatively fixed in nature) and strategies are teachable (Cohen, 2003) has led to attempts to accommodate style and strategy training in daily classroom activities (Cohen, 1998; Ikeda, 2005; Riding & Sadler-Smith, 1997, for example). Cohen and Dörnyei (2002) especially, have proposed a teaching philosophy called "styles- and strategies-based instruction (SSBI)." In this model, they recommend explicitly integrating styles and strategies training

activities during class time in order to help learners become more conscious and aware of their styles and strategies.

Even though much of the literature has revealed that there exists a relationship between learning styles and general learning strategies, no prior study has reported how learning styles affect the use of vocabulary learning strategies manifested in a specific task. It would be fair to say from these reasons that further investigation into how (and to what extent) learning styles actually have an influence on the choice of learning strategies is worthwhile.

The aims of this study were twofold: (1) to create a questionnaire on vocabulary learning strategies of Japanese EFL university students; and with the newly developed questionnaire, (2) to examine how learning styles and vocabulary learning strategies interact with each other in a given task. Also, in order to closely investigate the relationship of learning styles and strategies, their relationships were compared among learners who have different levels of proficiency.

2. Method
2.1 Developing a questionnaire on vocabulary learning strategies
2.1.1 Developmental phase

A new vocabulary learning strategies questionnaire was developed. First, an inventory of vocabulary learning strategies was compiled based on a literature review. Next, a total of 122 university students were asked in an open-ended manner to write the strategies they use when dealing with a task which requires them to learn vocabulary in a context and in a word list in October, 2005. At the time of the survey, the inventory listing vocabulary learning strategies compiled in the process was also provided as a reference, because sometimes students cannot describe the strategies they use if they are using them unconsciously. At the same time, a specific vocabulary learning task was given because learners respond in different ways depending on whether or not the task is at hand (Ikeda & Takeuchi, 2000). After rearranging the inventory by adding vocabulary learning strategies reported by the learners, wording of the items was examined and modified if necessary by two university associate professors and a high school teacher, all of whom

have an MA in TESOL. The sum of the listed strategies came close to 90^5, in which the strategies pertaining to cognitive strategies (Dörnyei, 2005, p. 169) were chosen in line with the purpose of the current study, i.e., comparing learning strategies with learning styles. Consequently, 40 strategies in total were used for the pilot study.

2.1.2 Pilot study and data analysis

A pilot study of the new vocabulary questionnaire was conducted by administering it to 352 university EFL learners at four universities in western Japan in December, 2005. Learners at these four institutions majored in humanities, and their English proficiency was investigated via a background questionnaire that asked for their TOEIC scores ($n = 257$, $M = 473.56$, $SD = 133.01$). According to TOEIC Steering Committee (2006), the mean score of TOEIC for university humanity majors is 474. Thus, it was assumed that the participants in this pilot study had English proficiency of average Japanese university students.

In the survey, the participants were given a vocabulary learning task immediately before filling out the questionnaire for the same reason described in the developmental phase (**2.1.1**). On a 5-point scale — with 1 indicating 0%, or never, and 5 being 100%, or always — they were asked to indicate what they actually do when learning vocabulary.

Following the administration of the questionnaire, data analysis was carried out based on the following criteria: (1) checking the descriptive statistics to eliminate items with the floor or ceiling effect[6]; (2) conducting the good-poor analysis to test those who tended to endorse higher points and those with lower points; (3) examining the item-total correlations to determine whether the figures were over 0.3 (Wintergerst et al., 2001, p. 391); (4) using exploratory factor analysis to investigate both which items belong together and the construct validity of the questionnaire; and (5) scrutinizing Cronbach's alpha to verify the internal consistency of the subscales. *SPSS 14.0* was used for both exploratory factor analysis and calculation of the internal consistency. In exploratory factor analysis, maximum likelihood extraction with promax rotation was employed.

Table 1. Results of Exploratory Factor Analysis (N = 352)

Item	Factor Names	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	α
Q1		.62	.09	-.24	.02	.04	.09	
Q2		.61	.10	.02	.04	-.07	.06	
Q3		.60	.08	.02	-.05	.02	-.22	
Q4	Factor 1	.57	-.20	.01	-.01	.08	.15	
Q5	Organization/	.55	.11	-.01	.13	.02	.01	.81
Q6	Elaboration	.53	-.01	.12	-.08	-.06	.05	
Q7		.51	-.06	.31	-.07	.11	-.08	
Q8		.48	-.12	.29	.13	-.10	-.05	
Q9		.41	.00	.20	-.11	.07	.02	
Q10		.00	.93	-.05	-.08	.01	.04	
Q11	Factor 2	.03	.83	-.14	-.01	.06	.01	.66
Q12	Writing rehearsal	.12	.48	.19	.04	-.05	-.02	
Q13		-.11	.44	.29	.13	-.04	-.01	
Q14	Factor 3	.12	.02	.70	.01	.04	.01	
Q15	Imagery	.01	-.03	.68	-.17	-.03	.07	.72
Q16		.08	.05	.61	.13	-.03	.04	
Q17	Factor 4	-.12	-.07	.01	.90	.05	.06	
Q18	Word lists	.17	.02	-.17	.84	-.13	-.10	.69
Q19		-.12	.16	.22	.40	.17	.05	
Q20	Factor 5	.06	-.08	-.07	.16	.78	.10	
Q21	Visual repetition	-.04	-.02	-.01	-.04	.72	-.16	.72
Q22		.04	.14	.05	-.13	.57	.02	
Q23	Factor 6	-.05	.02	.12	-.01	.03	.79	
Q24	Oral repetition	.25	.00	-.19	-.03	-.03	.60	.66
Q25		-.12	.02	.28	.02	-.07	.48	

Interfactor correlation matrix	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	1.00					
Factor 2	.17	1.00				
Factor 3	.33	.17	1.00			
Factor 4	.25	.36	.22	1.00		
Factor 5	.03	.06	.21	.13	1.00	
Factor 6	.48	.29	.21	.21	-1.0	1.00

As for deciding the number of the factors, first looking at the scree plot, a distinctive slope between any of the two factors and factors with the eigenvalues greater than 1.0 was checked. Then, items showing factor loadings above 0.4 on only one factor were adopted. After going through such screening processes, strategies Japanese EFL learners rarely employ, such as "I draw a picture to remember the word," and "I use a gesture to remember the word," were deleted from the inventory. Table 1 summarizes

the results of exploratory factor analysis, suggested factor names, and Cronbach's alpha coefficients (See Appendix for each questionnaire item). Overall, six distinct factors accounting for 59.4% of the variance explained were gleaned from exploratory factor analysis, and their underlying factor structure was supported by moderately high reliability coefficient. Each factor was named after empirical findings proven in the research literature of vocabulary learning strategies, especially referring to those by Gu and Johnson (1996) and Maeda, Tagashira, and Miura (2003).

2.1.3 Administration of the vocabulary learning strategies questionnaire

The new vocabulary learning strategies questionnaire was administered to a total of 157 Japanese EFL university students at a private university in western Japan in January, 2006. The participants were all females majoring in humanities.

Therefore, it can be surmised that the effects caused by the differences in gender or majors were treated as controlled variables. Cronbach's alpha of the subscales for this group of learners ranged from .66 to .81, which was considered satisfactory. Confirmatory factor analysis was then conducted, and it was verified that the model fit the collected data ($\chi^2 = 408.57$, $df = 261$, $p < .01$, CFI = .849, GFI = .810, RMSEA = .065).[7]

2.2 Instrument used for assessing learning styles
2.2.1 Style Analysis Survey

For assessing the learning styles that participants of this study possess, the *Style Analysis Survey* (henceforth, SAS, Oxford, 1993) was translated into Japanese and administered to the same group of students who responded to the vocabulary learning strategies questionnaire. SAS is a 4-point Likert scale questionnaire with 0 (never) being lowest and 3 (always) highest for each item. With 110 items (10 items for each of the 11 learning style constructs), each individual's learning styles are designed to be assessed.

Since there are previous studies reporting how the construct validity and reliability of an existing questionnaire can be inapplicable to other research settings (Wintergerst et al., 2001, for example), the obtained data were analyzed with the Rasch Partial Credit model[8] (Wright & Masters, 1982)

using *WINSTEPS* 3.56.1. The rationale behind utilizing Rasch analysis lies in the fact that it can change ordinal measures (raw scores) to interval measures. That is, with interval measures, we can say that a certain item in a psychological measurement is more (and how much more) difficult than others for the respondents to endorse. Another benefit is that interval scales are most suitable for subsequent statistical analyses. In addition, Rasch analysis can detect misfit items, which show a departure, if any, from unidimentionality of the construct. A conventional rule of thumb for checking acceptable items is the infit mean square ranging from 0.75 to 1.3[9] (McNamara, 1996, p. 173). Following this criterion, misfit items were thus eliminated, and Rasch analysis was conducted once again with the remaining items. Presented in Table 2 are the descriptions of SAS, mean and standard deviation for this particular group of learners, the number of questions used for this study, and person separation reliability, which is a Rasch equivalent of traditional reliability (Cronbach's alpha) for participants in this study.

2.2.2 Administration of SAS

One week after the administration of vocabulary learning strategies questionnaire (January, 2006), a total of 145 learners from the same university responded to the SAS.

The number of participants who responded to both questionnaires (i.e., the vocabulary learning strategies questionnaire and SAS) was 128 in total. The correlation of the vocabulary learning strategies and learning styles was investigated in order to reveal the relationship between them. Also, in an attempt to further examine the effect of learning styles on vocabulary learning strategies, responses of the different levels of learners were analyzed.

3. Results and discussions

Before elaborating on the results of the correlation analyses, it should be noted that the correlation of the learning styles and TOEIC, a proficiency measure used in this study, was examined. It was found that not a single learning style correlated with TOEIC scores. Correlation coefficients were less than .17 without statistical significance, and half of the learning styles showed negative correlation figures. This can be explained with the very

Table 2. Descriptions of SAS (Adapted from Oxford, 2003) and Results

Style categories	Style names	No. of items used in this study	Person separation reliability
Ways of taking in information through the physical senses	Visual style (*M*=1.71, *SD*=0.39)	9	.54
	Auditory style (*M*=1.34, *SD*=0.40)	10	.55
	Hands-on style (*M*=1.38, *SD*=0.47)	10	.55
Ways of relating to the self and others while learning	Extroverted (*M*=1.45, *SD*=0.55)	10	.77
	Introverted (*M*=1.38, *SD*=0.55)	9	.72
Ways of handling possibilities	Intuitive-random style (*M*=1.57, *SD*=0.62)	8	.82
	Concrete-sequential style (*M*=1.41, *SD*=0.38)	10	.64
Ways of approaching tasks	Closure-oriented style (*M*=1.67, *SD*=0.53)	8	.74
	Open style (*M*=1.44, *SD*=0.45)	10	.63
Ways of processing or using information	Global (holistic) style (*M*=1.56, *SD*=0.46)	10	.77
	Analytic (detail-oriented) style (*M*=1.37, *SD*=0.45)	9	68

Note: N = 145; M = Mean (possible range: 0-3); SD = Standard deviation

notion that learning styles are not only very neutral (Reid, 1998) but learners possess a variety of styles, thus making it difficult to detect any single style contributing to proficiency.

As can be seen in Table 3, relatively low but statistically significant correlations were observed in the combination of several learning styles and learning strategies. Dörnyei (2001) claims that in L2 motivation studies, "the usual strength of the meaningful relationships detected is between 0.30 and 0.50" (p. 224); therefore, in this type of study which uses questionnaires, the correlation coefficients close to these figures can be considered worth some reflection. What is clear from Table 3 is that various learning styles appear to be correlated with organization/elaboration strategies. This may be largely due to the fact that strategies included in organization/elaboration

require more manipulation of several aspects of word knowledge than just remembering meanings.

Table 3. Correlations Among Vocabulary Learning Strategies and Learning Styles

	Organization/ Elaboration	Writing rehearsal	Imagery	Using word lists	Visual repetition	Oral repetition
Visual	.39**	.24**	.30**	.24**	.21*	.20*
Auditory	.35**	.03	.27**	.11	-.04	.19*
Hands-on	.20*	-.06	.21*	.01	-.02	.15
Extroverted	.34**	.04	.26	.07	-.09	.13
Introverted	.04	-.11	-.02	.07	.17	.03
Intuitive-random	.39**	-.07	.19*	.08	-.06	.16
Concrete-sequential	.18*	-.02	-.06	.14	.06	-.06
Closure-oriented	.23**	.15	.15	.25**	.09	.06
Open	.08	-.16	.04	-.08	.02	.01
Global (holistic)	.23*	-.05	.13	.01	-.15	.10
Analytic (detail-oriented)	.25**	.05	.01	-.01	-.14	.19*

Note: $N = 145$; $M =$ Mean (possible range: 0-3); $SD =$ Standard deviation; $*p < .05$, $** p < .01$

Another finding is that cognitive learning styles (i.e., visual and auditory) were reflected especially in their counterparts in vocabulary learning strategies (i.e., visual repetition and oral repetition). This can be interpreted that learning styles are reflected in vocabulary learning strategies to some extent, but not to an extent in which styles directly affect strategies. The relatively low correlation coefficients may also be attributed to learner behaviors reported in past research findings that successful learners use a variety of learning strategies at the same time (Oxford & Nyikos, 1989). Given the fact that successful learners employ a variety of strategies systematically whereas less proficient ones cannot do so, it is expected that the overall correlation comes out lower. Thus, this simultaneous character of learning strategies, and of course that of learning styles, may have been observed in the results.

Next, in order to further investigate the role played by learning styles in vocabulary learning strategies, participants with low and high TOEIC scores (27% respectively) were compared in Table 4. On the grounds that learning styles are interrelated with learning strategies, the expectation was that less proficient learners demonstrate learning styles' influence on their vocabulary learning strategies because they are approaching a task without clear awareness as to which strategy they should employ. On the contrary, though, the opposite phenomenon emerged as the result. In Table 4, there seems to be a tendency that learning styles correlate more with upper proficiency level learners.

Table 4. Comparisons Between the Lower and Upper Level Learners

	Organization/ Elaboration	Writing rehearsal	Imagery	Using word lists	Visual repetition	Oral repetition
Visual	.34/.39**	.31/.16	.16/.21	.16/.21	.22/.27	-.13/.50**
Auditory	.32/.51**	.05/.12	.07/-.15	.07/-.15	.00/-.07	.01/.41*
Hands-on	.35*/.37*	.17/-.09	.07/-.11	.07/-.11	-.18/-.02	.16/.35
Extroverted	.56**/.39**	.36*/-.08	.40*/-.09	.40*/-.09	-.01/-.21	.28/.35*
Introverted	-.12/.04	-.11/-16	-.15/.02	-.15/.02	.17/.09	-.34/.04
Intuitive-random	.33/.55**	-.15/-.05	.29/-.06	.29/-.06	-.11/-.18	.02/.39*
Concrete-sequential	.31/.26*	.11/-.03	.15/.25	.15/.25	-.03/.04	-.15/-.09
Closure-oriented	.37*/.21	.22/.29	.39**/.07	.39**/.07	.21/-.01	.10/.13
Open	-.04/.13	-.19/-.18	-.08/-.21	-.08/-.21	-.02/-.10	-.22/.29
Global (holistic)	.18/.24	-.08/-.05	.00/.06	.00/.06	-.20/-.16	.02/.24
Analytic (detail-oriented)	.15/.39*	.16/-.06	.10/-.40	.10/-.40	-.36/-.08	.21/.45**

Note: Lower/Upper; n = 33/34; *p < .05, **p < .01

A hypothesis can be made based on this unexpected result: learning styles do not reveal themselves to vocabulary learning strategies until conscious maneuvering of vocabulary learning strategies takes place. For example, there may be a situation where low proficiency learners deal with vocabulary learning with strategies they were taught/told to use without any consideration to their style preferences. This finding partly corroborates the

concept proposed by Ehrman et al. (2003, p. 315) claiming that "styles are not manifested by strategies when there is a deliberate attempt to become more flexible in style by employing out-of-style strategies or when they are using strategies more-or-less at random." This finding also includes pedagogical implications. The very promising aspect is, since the participants in this study did not go through any systematic strategy instruction, by making learners aware of their learning styles, teaching of vocabulary learning strategies can be more effective than not doing so. Hence, more studies need to be conducted to clarify whether the style-strategy relationship reported in this study is just for vocabulary learning strategies or for other specific tasks as well. More importantly, empirical research should be undertaken to prove the hypothesized methodological effectiveness of the strategy instruction.

It should be mentioned that although the current study shed fresh light on the relationship between learning styles and vocabulary learning strategies, there were some limitations. For one, even after going over items in the SAS by checking and deleting the misfit items using the Rasch model, reliability was rather low. This implies that caution should be exercised when interpreting the results of this type of correlational studies. Furthermore, correlations obtained in a quantative study cannot identify cause and effect. Close investigation of the findings through qualitative research may be useful to truly unveil the complex structure of style-strategy relationship. In addition, since participants of the current study were comprised of rather homogeneous in English proficiency, it is recommended that the same type of study be conducted with varying levels of learners representing the population (i.e., Japanese university EFL learners) more precisely. It may sound like an overwhelming endeavor to seek ways to better accommodate individual differences in learning; yet studies from the viewpoint of learners should be continued for better teaching practice and promoting greater understanding of complex language learning mechanisms.

Notes

1. Referring to the terminology, Ehrman et al.(2003) illustrate "the literature on learning styles uses the terms *learning style, cognitive style, personality type, sensory preference, modality,* and others rather loosely and often interchangeably" (p. 314).
2. For detailed definitions of task, see Gu (2003).
3. The elusive nature of learning styles is thoroughly discussed by Dörnyei (2005).
4. One study, conducted by Takeuchi (1999) surveying Japanese tertiary-level English learners, reported that the effect of learning styles on the choice of learning strategies is far more limited than asserted.
5. Other strategies surveyed were guessing strategies, dictionary strategies, and metacognitive strategies.
6. The floor or ceiling effect was defined as "the mean ± the standard deviation" in this analysis.
7. The ideal criteria for these indicators are χ^2 ($p < .05$), CFI $> .90$, GFI $> .90$, and RMSEA < 0.05.
8. In the Rasch models, two types of models can deal with rating scales: Rating Scale model and Partial Credit model. Regarding Partial Credit model, McNamara (1996) advocates the use of it by asserting that the model "simply allows item-by-item analysis of step structure with items involving rating scale steps of any kind" (p. 256).
9. McNamara (1996) notes, "(M)ore accurately, for n sizes of 30 or more, the range is the mean ± twice the standard deviation of the mean square statistics"(p. 181).

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Appendix: The Vocabulary Learning Strategies Questionnaire

Organization/Elaboration Strategies (9 items)
1. 自分が知っている同義語 (類語) や反意語 (対義語) に関連させて覚える。
2. その単語の同義語 (類語) や反意語 (対義語) も一緒に覚える。
3. 語の構成要素（語根、接頭辞、接尾辞）を利用して覚える。
4. 自分で例文やフレーズを作ってみて覚える。
5. 似ている単語や関連語をグループで覚える。
6. 言い換えて覚える。
7. 単語が良い（ポジティブな）意味を持つのか、悪い（ネガティブな）意味を持つのかを考えながら覚える。
8. 個人的な経験に関連させて覚える。
9. 自分が知っている語に、その語と近い意味を持つものがあるかどうか考えながら覚える。

Writing Rehearsal Strategies (4 items)
10. どこかに書いて覚える。
11. 何度も繰り返し書いて覚える。
12. 意味だけではなく、つづり（スペル）も覚える。
13. 日本語や英語を（赤シートなどで）隠して覚える。

Imagery Strategies (3 items)
14. スペルや単語の形を想像（イメージ）しながら覚える。
15. 語の意味から連想できるものなどをイメージしながら覚える。
16. キーワードやゴロあわせを使って覚える。

Word Lists Strategies (3 items)
17. カードを利用して覚える。
18. カードやノートに書き留めておいて覚える。
19. リストや単語帳を利用して覚える。

Visual Repetition Strategies (3 items)
20. 何度も繰り返し見て覚える。
21. 声には出さずに繰り返し心の中で言って覚える。
22. 頭の中でスペルを書いているつもりで繰り返し見て覚える。

Oral Repetition Strategies (3 items)
23. 何度も繰り返し声に出して覚える。
24. 例文ごと声に出して覚える。
25. 発音も覚えるつもりで声に出して覚える。