Fluctuation in the functions of language learner strategies

Andrew D. Cohen a, *, Isobel Kai-Hui Wang b

a University of Minnesota, 1555 Lakeside Drive #182, Oakland, CA, 94612, USA
b Nankai University, English Department, College of Foreign Languages, No. 94, Weijin Road, Nankai District, Tianjin, 300017, China

ABSTRACT

This study focused on the assumption that language learner strategies are monolithic with regard to their function (i.e. metacognitive, cognitive, social, or affective). Three ESL and three EFL Chinese-speaking university students individually performed an English vocabulary task (i.e. making fine-tuned semantic distinctions) to explore the extent that the use of a given strategy involves more than one function. Introspective and retrospective verbal report data and a measure of vocabulary depth were obtained from the students. The results showed fluctuation in strategy functions when strategies were used either alone, in sequence, or in pairs or clusters. In addition, there was not only one-way, linear progression from one function to another, but also two-way micro-fluctuation both for the same strategy and across strategies.

© 2018 Published by Elsevier Ltd.

1. Introduction

For more than four decades, the field of language learner strategies (LLS) has received considerable attention in the research literature (e.g. Cohen & Griffiths, 2015; Dornyei & Ryan, 2015; Oxford, 2017). This fascination with strategies is undoubtedly predicated on the notion that language learners can achieve greater success in their language learning and use if they are more strategic in their efforts. Based on an extensive survey of the LLS literature, Oxford arrived at a definition of strategies as contextually-specific thoughts and actions that can be both mental and physical. They are combinable in clusters or chains and have cognitive, emotional, and social roles. In addition, their use in self-regulation is complex in nature (Oxford, 2017: 48).

LLS have been categorized in various ways, such as in terms of language learning vs. language use; in terms of the skill area that they deal with (i.e. the receptive or the productive skills); and in terms of age, proficiency level, gender, and specific language or culture. However, the most popular way to classify strategies has been according to their function (i.e. purpose or role) in a specific situation (Cohen, 2011; Oxford, 2017). In fact, it has been popular over the years to label strategies according two their function, as metacognitive (e.g. planning how to use a strategy, monitoring how it is going, or evaluating how it went), cognitive (e.g. dealing with the language material mentally), social (e.g. engaging in interaction with others), and affective (e.g. channelling positive or negative reactions into strategic action).

What typifies this manner of labeling is that it has been done in a relatively monolithic way, with the tacit understanding that however else a strategy may be classified, it possesses just one function. So, for example, the strategy of “guessing a word from context” would be labeled metacognitive if the learners were ostensibly focusing on the planning side and cognitive in nature if the learners were ostensibly using cognition in looking for clues in the specific context. This approach has yielded
huge amounts of data from thousands of studies worldwide whereby learners have self-reported their use of relative percentages of metacognitive, cognitive, social, and affective strategies, in a rather immutable fashion. The question that we would ask is whether this monolithic approach is, at least to some extent, producing data that do not accurately represent the actual functions that given strategies or combinations of strategies play in the completion of a given language task.

This paper takes the stand that the functions of any given strategy are more “fluid” in nature. A strategy may certainly entail the activation of a single function, such as a metacognitive one if its function is simply to plan, monitor, or evaluate; or a cognitive one if it is exclusively focused on the cognitive processing of language forms. However, it would appear that there are moments (i.e. seconds or minutes) where more than one function might be activated when a given strategy such as “requesting directions from a stranger on the street” is used:

- the metacognitive function during the moment that learners are monitoring the appropriateness in making a request to a stranger;
- the cognitive function a moment later when learners are selecting the actual language term to use in referring to this person (e.g. “sir” or “you”), as well as the appropriate tone of voice, facial expressions, or gestures;
- the social function while learners are actually engaged in the interaction;
- the affective function if a moment of frustration while using the strategy motivates them to, say, return to the metacognitive function for more planning in the use of this same strategy.

All of these functions may take place within just a minute or two and would, in our view, involve the shifting of functions for the same strategy, namely, “requesting directions from a stranger on the street”.

This paper reports on a study which performed a micro-analysis to investigate the extent to which the fluidity-of-function approach is plausible, given our misgivings as to whether the prevailing form of strategy labelling provides an accurate description of strategic behavior. The study was limited in nature expressly for the purpose of this micro-analysis and looked at the performance of a small group of Chinese learners of English on a vocabulary task.

2. Review of the literature

In the early development of the LLS field, researchers like O’Malley and Chamot (1990) and Oxford (1990) classified language learner strategies into essentially the four main categories defined above — metacognitive, cognitive, social, and affective. Oxford’s Strategy Inventory of Language Learning (SILL), for example, was an outgrowth of research involving the systematized linking of strategies with these strategy categories in strategy lists and questionnaires.

For some years, LLS researchers have then relied on these function labels as fully representing the given strategy in order to make statements about higher- and lower-performing students. Numerous studies have appeared reporting their findings by labelling strategies according to these four functions (see, for example, Plonsky’s 2011’s meta-analysis). While as indicated above other systems of classification have been utilized for describing strategies, the focus of this study is just on the labeling of strategy functions.

While the SILL moved the LLS field along dramatically, Oxford cautioned even in her early work about the potential confusion of strategy types and how conflicts in categorization could arise. She noted that the complexity of language learning might render it impossible to classify a given strategy (e.g. “planning”) as though it fit into one and only one functional slot — e.g. metacognitive (Oxford, 1990: 17). In fact, in the early 2000s she stopped using the SILL and encouraged others to modify it to fit their cultures and situations (Personal communication, September 28, 2016). She suggested using general strategy measures like the SILL only when using other strategy measures and interpreting the results with care given that the functions which strategies serve are more nuanced and dynamic than their categories imply. She has elaborated on this view over the years, and in her latest volume (Oxford, 2017), she takes an exhaustive look at LLSs. Cohen also questioned the workings of strategies and concluded that it was not possible to easily demarcate cognitive and metacognitive roles when learners were using a strategy for a complex task (Cohen, 2011).

In the early 2000s, several scholars suggested means for adding rigor to strategy classifications. One such effort by Gu (2004, republished in 2012) problematized a series of issues regarding the classification of strategies for research and for teacher development. Gu suggested that as a concept the notion of strategy involved a dynamic process: selective attention, analysis of the task, choice of decisions, the execution of a plan, monitoring progress and modifying the plan, and evaluating the results. His analysis of the central dimensions of a strategy was aimed at identifying possible problems in learners’ strategic behaviors and at helping the learners to modify their strategy choices if necessary. Macaro (2006) proposed a revised theoretical framework, identifying four features essential in describing strategies: the location of strategies in working memory; their size, abstractness, and relationship to other strategies; the explicit learning goals; and the learning tasks. Dornyei, a critic of LLS who had gone so far as to suggest that strategies did not exist (2005), recently wrote that in the new individual differences landscape, self-regulation and LLS could both be viewed as significant players (Dornyei & Ryan, 2015). He considered his change of opinion a testament to the vitality and enduring appeal of LLS in the eyes of scholars, despite ambiguities associated with efforts to define them.

Ironically, while some experts may be calling for analyzing the complexity involved in strategy use (see, for example, Oxford, 2017, Chapter 3), researchers and practitioners have gravitated towards categorizations that treat strategies as
relatively monolithic structures in terms of their function so that they can be fit into pre-defined slots. It makes them easier to report on as findings in studies involving LLS questionnaires. Yet this approach is inconsistent with the view that LLSs are theoretically multifaceted. Moreover, this oversimplification serves to reduce the richness and predictive potential of what, by its very nature, is highly complex behavior (Griffiths & Oxford, 2014).

Whereas the LLS literature abounds with statements like “I use inference” intended to represent a strategy, such statements actually are more suggestive of skills than of strategies. In the L1 literature, a skilled language user is referred to as someone who can orchestrate a wide array of processes (like those involved in making inferences) to successfully accomplish language tasks. A strategic language user is flexible and adaptable to particular circumstances, and can select just the right strategy to overcome roadblocks that they may encounter. In reality, the ability to use inference effectively calls for the skilful orchestration of numerous strategies — Hu and Nassaji (2014) identified twelve.

Along with the issue of strategy classifications is that of strategy combinations, since learners often do not use strategies in isolation. For a strategy to be effective in enhancing language performance, it often appears in combination with other strategies, whether in a pair, cluster, or sequence (Macaro, 2001, 2004, 2006; Graham, Santos, & Vanderplank, 2010). A study by Wang (2015) drew on both cognitive and sociocultural approaches to explore strategy combinations which two ESL learners generated and the complex interplay among vocabulary-related strategies. The study also looked at the issue of agency, namely, choices made by the learners as to how much they wished to explore and personalize vocabulary strategies in order to maximize their language learning in a study-abroad context. The study revealed that strategies were less likely to be used in isolation than in combination, and tended to appear in one of four patterns:

(1) strategy clusters in which more than two strategies occurred almost simultaneously and complemented each other,
(2) strategy sequences in which the strategies appeared consecutively,
(3) circular use of strategies whereby learners used them in sequence and also returned to them in the same order,
(4) strategy sequences in combination with clusters.

Furthermore, the two learners combined strategies which assumed the same as well as different functions (i.e. cognitive, metacognitive, social, and affective) for more effective vocabulary learning.

So, the take-away from the review of literature is that there are at least two areas with regard to LLS that have been largely overlooked. The first is the possible fluidity of functions that the use of given strategies activates, and the second is how strategies may be combined in the completion of language tasks.

3. The aim of the study

The current study was designed both to observe the way that strategies are combined in the performance of given tasks, and to examine the moment-to-moment functions that are activated in the use of the same strategy and across strategies. For example, the strategy “verifying with a more knowledgeable speaker of a language the meaning of a word” could take on a metacognitive function at the moment when learners are planning to implement this strategy, a social function the next moment when engaging with this speaker in verification of the word meaning, and then a cognitive function in dealing with the speaker’s oral explanation. Learners could also experience an affective moment of frustration at not coming away with a meaning that works for the specific context, which activates an affective function if it prompts further strategic action to arrive at clarification, say, by them asking the speaker to further clarify the meaning of the word.

For the sake of this study, the focus of analysis regarding verification strategies will only be on the mental part of planning, interacting socially, sorting cognitive material, in dealing with emotions. It is true that strategies may also take on a physical component, such as when choosing how to position the lips and tongue in order to pronounce certain sounds.

In order to explore the extent to which language learner strategies — whether used alone, in sequences, in pairs, or in clusters — take on more than one function and fluctuate from function to function while the strategy is being used, the following research questions were posed:

1. How do target-language (TL) learners select and combine strategies in the completion of a vocabulary fine-tuning task?
2. What is the patterning of functions that are activated when TL learners are using strategies to do a vocabulary task?

The first research question concerns itself with how strategies may be used in combination in the performance of a given task. The research question is being posed in order not to overlook the complexity of strategy use. Even if a primary interest is in the fluidity of functions activated by a single strategy, it is likely that this strategy is not used in isolation, but rather in combination. So we start by determining how many strategies are used in performing a given task, and then move to the second research question, the actual functions that any one of these strategies might activate on a fluid, moment-to-moment basis. Our investigation explores the possible fluctuation of functions within a given strategy and across two or more strategies used for the very same task.

1 In her study, Wang (2015) referred to these functions as “levels”.
4. Research design

4.1. Subjects

Six Chinese learners of English with fairly advanced English proficiency were selected from twenty interviewees, based on their results on a Word Associates Test (WAT) (Read, 1993, 2012). Since the vocabulary task used in the main study called for subjects to fine-tune their understanding of semantic distinctions among words (see below), the WAT was used to provide an estimate of depth of vocabulary knowledge\(^2\). The test was designed to go beyond conventional vocabulary test items (i.e. items that simply allow for a yes/no judgment on whether a word is known) by assessing the quality of word knowledge with respect to word forms, their meanings, their use in collocations, and the relations among semantically similar words. The subjects completed the WAT on their own, using the link to the source. The instrument was self-scoring. Results of the assessment are included in Table 1.

The subjects included three English-foreign-language (EFL) learners (pseudonyms Ren, Hang, and Shi) and three English-second-language (ESL) learners in study-abroad (pseudonyms Yan, Dan, and Nan). Ren and Hang were both third-year students, majoring in English at the same university in China. Shi was a fourth-year Communication and Culture major at a different Chinese university. Yan was a first-year English Literature major at a British university and had been living in the UK for 10 months. Dan, a Media major, was participating in an exchange program at an Australian university for nearly 6 months. Nan was a second-year Accounting and Finance major at a British university and had been living in the UK for three years (see Table 1).

4.2. Instrumentation

In order to prompt the use of vocabulary strategies, the task called for decision-making, problem-solving, and information-processing, which were all behaviors intended to call for both language learning and language use strategies. A preliminary study with 20 Chinese-speaking university students called for the completion of a textbook exercise involving five sets of three similar words which the students needed to distinguish one from the other. The set of words found to be the most confusing in terms of meaning and use was selected for the main study. The rationale for selecting just this one set of words was that it would provide ample data for the micro-analysis of fluctuation in the functions of strategies.

Three roughly synonymous academic vocabulary words, “verify”, “confirm”, and “substantiate” comprised the set employed in this task. The subjects were requested to fine-tune their understanding of the meaning for each word. The subjects were asked to define the words, and then distinguish aloud each from the other two, indicating their understanding of the differences.

The four resources made available to the subjects for their use during the vocabulary fine-tuning task were those which had proven to be most valuable in the research literature for discovering word meanings (see Wang, 2018), namely: (1) the Cambridge online dictionary (English to Simplified Chinese), (2) a sample sentence for each of the words, (3) access to Wang—a Chinese speaker of English knowledgeable about the words selected for the task, and (4) each subject’s own mental lexicon. The subjects were also welcome to use their own resource during the task. The task was designed to last approximately 30–40 min.

The instrumentation also included verbal report, whereby all subjects individually were requested to provide think-aloud data about their strategy use as well as to analyze it while engaging in the vocabulary task. This analysis consisted of both introspection (i.e. within 20 s of a given instance of strategic behavior) and retrospection (i.e. after 20 s, and thus a memory of the mental event) (Cohen, 2013). The retrospection was to include both immediate retrospection of mental events which had just past (i.e. beyond the 20 s introspective period) and delayed retrospection (i.e. an hour or more later) upon viewing the video-recording of their verbal report.

The intent was to obtain rigorous analysis of each mental event, with the subjects labelling the activation of functions for the same strategy and across strategies from moment to moment. Subjects were to give their verbal report on:

- the cognitive processes that they used to perform the given task,

---

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>EFL/ESL</th>
<th>Major</th>
<th>Year</th>
<th>Location</th>
<th>Vocabulary Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ren</td>
<td>F</td>
<td>EFL</td>
<td>English</td>
<td>3rd</td>
<td>China</td>
<td>96%</td>
</tr>
<tr>
<td>Hang</td>
<td>M</td>
<td>EFL</td>
<td>English</td>
<td>3rd</td>
<td>China</td>
<td>89%</td>
</tr>
<tr>
<td>Shi</td>
<td>F</td>
<td>EFL</td>
<td>Communication &amp; Culture</td>
<td>4th</td>
<td>China</td>
<td>81%</td>
</tr>
<tr>
<td>Yan</td>
<td>F</td>
<td>ESL</td>
<td>English Literature</td>
<td>1st</td>
<td>UK</td>
<td>83%</td>
</tr>
<tr>
<td>Dan</td>
<td>F</td>
<td>ESL</td>
<td>Media</td>
<td>6 months</td>
<td>Australia</td>
<td>77%</td>
</tr>
<tr>
<td>Nan</td>
<td>F</td>
<td>ESL</td>
<td>Accounting &amp; Finance</td>
<td>2nd</td>
<td>UK</td>
<td>76%</td>
</tr>
</tbody>
</table>

Chamot (1990) and Oxford (1990), the functions that a given strategy activates at a given moment were coded as follows: coded each occurrence of a function, in an effort to identify and display the patterning of functions that any given strategy consecutively was labelled a strategy sequence. 4.4. Procedures for data analysis 4.4.1. Orientation of the subjects In order to ensure the quality of the verbal report, two orientation sessions were provided over Skype before the collection of verbal report data. The aim of this orientation was facilitative — to help the subjects become familiar with the technique and ensure accurate descriptions of highly complex behavior — rather than to influence them to respond in any given manner.

In the first orientation session, Wang explained the data collection procedure. The subjects were given a sample task, and while performing this task, were asked either to introspect or to retrospect about their strategy use and to report on the functions that a given strategy had assumed. Wang asked questions such as, “Which function is being activated now?” and “How do you feel at this moment?” in order to make sure that the subjects reported any activation of a function. The intent was also to pinpoint the fluctuation in strategies. After each subject completed the task, Wang performed verbal report on the same task as a model, and then the subjects listened to their own recorded verbal report data and were, if necessary, prompted to clarify what they had provided.

In the second orientation session, Wang reviewed what the subjects had done in the first session and then gave them two new tasks to further familiarize them with the procedures.

4.4.2. Collection of the data The instant messaging feature on Skype or QQ Messenger was used in order to provide instructions to the subjects as to how to perform the vocabulary task. The subjects were guided to provide both introspective and immediate retrospective verbal report as they performed the given task individually. Although the subjects sometime read out loud in English the dictionary definitions or sample sentences provided by Wang, they used Chinese exclusively for their verbal reports. The pilot work had found that subjects expressed themselves more clearly and accurately in their L1 and felt more comfortable using it to talk about their mental processes and affective reactions.

During the actual task, Wang prompted the subjects as needed in order to elicit the function that a given strategy assumed, and to obtain information about how the functions fluctuated during the use of a given strategy — using questions such as, “Which function is being activated now?”, “How do you feel at this moment?”, “What are you thinking now?”, “Why did you stop?”, “Why did you say that?”, and “Why did you read this sample sentence again?” After the task, Wang played back the video recording of the subjects’ verbal report so that they could revise or clarify what they reported. The time on task ranged from 28 to 60 min, due to differences in the complexity of the subjects’ strategy use.

4.3. Procedures for data collection 4.3.1. Orientation of the subjects In order to ensure the quality of the verbal report, two orientation sessions were provided over Skype before the collection of verbal report data. The aim of this orientation was facilitative — to help the subjects become familiar with the technique and ensure accurate descriptions of highly complex behavior — rather than to influence them to respond in any given manner.

In the first orientation session, Wang explained the data collection procedure. The subjects were given a sample task, and while performing this task, were asked either to introspect or to retrospect about their strategy use and to report on the functions that a given strategy had assumed. Wang asked questions such as, “Which function is being activated now?” and “How do you feel at this moment?” in order to make sure that the subjects reported any activation of a function. The intent was also to pinpoint the fluctuation in strategies. After each subject completed the task, Wang performed verbal report on the same task as a model, and then the subjects listened to their own recorded verbal report data and were, if necessary, prompted to clarify what they had provided.

In the second orientation session, Wang reviewed what the subjects had done in the first session and then gave them two new tasks to further familiarize them with the procedures.

4.3.2. Collection of the data The instant messaging feature on Skype or QQ Messenger was used in order to provide instructions to the subjects as to how to perform the vocabulary task. The subjects were guided to provide both introspective and immediate retrospective verbal report as they performed the given task individually. Although the subjects sometime read out loud in English the dictionary definitions or sample sentences provided by Wang, they used Chinese exclusively for their verbal reports. The pilot work had found that subjects expressed themselves more clearly and accurately in their L1 and felt more comfortable using it to talk about their mental processes and affective reactions.

During the actual task, Wang prompted the subjects as needed in order to elicit the function that a given strategy assumed, and to obtain information about how the functions fluctuated during the use of a given strategy — using questions such as, “Which function is being activated now?”, “How do you feel at this moment?”, “What are you thinking now?”, “Why did you stop?”, “Why did you say that?”, and “Why did you read this sample sentence again?” After the task, Wang played back the video recording of the subjects’ verbal report so that they could revise or clarify what they reported. The time on task ranged from 28 to 60 min, due to differences in the complexity of the subjects’ strategy use.


The data were to be collected using Skype or a Chinese equivalent, QQ Messenger, since both programs provide free video communication plus text services, so that subjects can access them anywhere in the world. The subjects’ performance was video-recorded directly on Wang’s laptop, using the software Screencast-O-Matic in order to capture the verbal protocol, observable strategy behavior, and facial expressions.

The instant messaging feature on Skype or QQ Messenger was used in order to provide instructions to the subjects as to how to perform the vocabulary task. The subjects were guided to provide both introspective and immediate retrospective verbal report as they performed the given task individually. Although the subjects sometime read out loud in English the dictionary definitions or sample sentences provided by Wang, they used Chinese exclusively for their verbal reports. The pilot work had found that subjects expressed themselves more clearly and accurately in their L1 and felt more comfortable using it to talk about their mental processes and affective reactions.

During the actual task, Wang prompted the subjects as needed in order to elicit the function that a given strategy assumed, and to obtain information about how the functions fluctuated during the use of a given strategy — using questions such as, “Which function is being activated now?”, “How do you feel at this moment?”, “What are you thinking now?”, “Why did you stop?”, “Why did you say that?”, and “Why did you read this sample sentence again?” After the task, Wang played back the video recording of the subjects’ verbal report so that they could revise or clarify what they reported. The time on task ranged from 28 to 60 min, due to differences in the complexity of the subjects’ strategy use.

In the first orientation session, Wang explained the data collection procedure. The subjects were given a sample task, and while performing this task, were asked either to introspect or to retrospect about their strategy use and to report on the functions that a given strategy had assumed. Wang asked questions such as, “Which function is being activated now?” and “How do you feel at this moment?” in order to make sure that the subjects reported any activation of a function. The intent was also to pinpoint the fluctuation in strategies. After each subject completed the task, Wang performed verbal report on the same task as a model, and then the subjects listened to their own recorded verbal report data and were, if necessary, prompted to clarify what they had provided.

In the second orientation session, Wang reviewed what the subjects had done in the first session and then gave them two new tasks to further familiarize them with the procedures.

In order to ensure the quality of the verbal report, two orientation sessions were provided over Skype before the collection of verbal report data. The aim of this orientation was facilitative — to help the subjects become familiar with the technique and ensure accurate descriptions of highly complex behavior — rather than to influence them to respond in any given manner.

In the first orientation session, Wang explained the data collection procedure. The subjects were given a sample task, and while performing this task, were asked either to introspect or to retrospect about their strategy use and to report on the functions that a given strategy had assumed. Wang asked questions such as, “Which function is being activated now?” and “How do you feel at this moment?” in order to make sure that the subjects reported any activation of a function. The intent was also to pinpoint the fluctuation in strategies. After each subject completed the task, Wang performed verbal report on the same task as a model, and then the subjects listened to their own recorded verbal report data and were, if necessary, prompted to clarify what they had provided.

In the second orientation session, Wang reviewed what the subjects had done in the first session and then gave them two new tasks to further familiarize them with the procedures.

Wang transcribed the subjects’ verbal reports shortly after the data were video-recorded, and then translated the transcriptions into English. Wang also checked back with the subjects regarding any unclear points emerging from the translation of the data from Chinese into English. They were the video-recording of their verbal report to aid their recall.

In response to the first research question, Wang identified the strategies that the subjects selected in completing the given task. Double quotes were used to describe each strategy — e.g. “making use of sample sentences to understand words in context” and “recording vocabulary in a notebook for further review” — so as to distinguish them from the functions that a given strategy might assume. Strategy clusters and strategy sequences were differentiated in the same manner used previously by Wang (2015,2018). When the subjects used more than two strategies which occurred almost simultaneously and complemented each other, the strategy combination was labelled a strategy cluster. The use of more than one strategy consecutively was labelled a strategy sequence.

In response to the second research question, Wang read the data line by line and, with considerable input from Cohen, coded each occurrence of a function, in an effort to identify and display the patterning of functions that any given strategy might assume. Based on the approach to classifying strategies that focuses on their function, as popularized by O’Malley and Chamot (1990) and Oxford (1990), the functions that a given strategy activates at a given moment were coded as follows:

- **Metacognitive (M):** when the function involved planning how to use the strategy, monitoring how it was going, or evaluating how it went.
Cognitive (C): when the function was to deal with the language material mentally (e.g. checking the mental lexicon, evaluating information from a dictionary entry, or questioning the resource person).
Social (S): when the function involved engaging in interaction with the more knowledgeable Chinese English speaker.
Affective (A): when channelling positive or negative reactions (e.g. pleasure at finding an answer or displeasure at not finding one) into further strategic action.

When the subjects reported using more than one function that occurred simultaneously, the functions were linked using a plus sign (e.g. $M + C + A + M + C$). When functions that a given strategy assumed occurred in sequence, the functions were linked using an arrow $\rightarrow$. A reverse arrow $\leftarrow$ meant that the fluctuation involved reverse movement. When strategies were used in a pair or cluster, the functions of each strategy were coded in the order of appearance (i.e. S1, S2, and S3). Bold lettering was used to indicate that two or more strategies shared the same function. The intention was to illustrate the fluctuation of functions as much as necessary and to present moment-to-moment functions of strategies in a visual and intuitively recognizable format. This approach to analysis helped to uncover any fluctuational patterns in the functions prompted by the use of a given strategy, whether in isolation, in sequence, or in pairs or clusters.

The reliability of the coding was checked by having a second coder code all the data for two of the six subjects (randomly selected). The inter-coder reliability was 91%. Simple percentages were calculated in order to make quantitative comparisons among the patterns of strategy functions.

5. Results

In large part due to the rigorous orientation that they had received, all six subjects were able to report in a detailed fashion the functions assumed by the vocabulary strategies that they used in completing the assigned task. Since Hang and Shi were able to express the moment-to-moment functions of the strategies that they used without prompting, they were rarely asked probing questions. Yan, Dan, and Ren were occasionally asked probing questions if they forgot to pinpoint their positive or negative reactions activating the A function in their strategy use. While Nan mostly performed the task according to the instructions, she sometimes forgot to pinpoint the function, especially when it was an A function. In those instances, she was prompted. After a few such prompts, she generally provided a description of the moment-to-moment fluctuation of functions on her own. All the subjects indicated that they gained awareness as to the actual functions involved in their strategy use and that they enjoyed reporting their strategy use and functions verbally.

Here are excerpts translated from Chinese of the verbal report data from two of the subjects, Yan and Nan. These excerpts illustrate how the use of strategies took on more than one function. The first example is from Yan and illustrates how the use of a given strategy ("using clues that exist in the dictionary's sample sentences in order to help analyze differences across the three words in the given context") reportedly activated different functions:

I decide to use clues in the dictionary's sample sentences to help me analyze differences across these three words. I am now identifying clues (e.g. "verify" is used with "allegation") in the sample sentences in order to help me analyze their differences. Before I searched for clues from the dictionary's sample sentences, I think first I was using the M function since I did what I planned, then followed by the C function as I note that "verify" is used with "allegation" in its sample sentence. I am feeling frustrated when I see that "substantiate" is also used with "allegation" in its sample sentence. I have to encourage myself to read a few more sample sentences in order to get further clues to help me find their subtle differences. Here I am using the A function.

The second example, from Nan, illustrates how another strategy ("asking Wang to explain semantic differences across the three words") assumed different functions:

I am very feeling frustrated since the Chinese translation of the English definitions is almost the same for the three words. I remind myself that it is the time to ask you [Wang] for help in order to gain further insights. Now, could you please explain the semantic differences for me? I am using the S function. [After Wang provided an explanation] I am now dealing with your feedback and figuring out the differences in the words in light of your feedback. The C function has been activated. Asking you [Wang] for help also assumes the A function which helps me to deal with my frustration.

5.1. Selection and combination of strategies in completing the vocabulary task

There was variation in the selection and combination of strategies across the six subjects (see Table 2). We note that three of the subjects used clusters of strategies in completing the vocabulary task and the other three did not. In addition, there was a range of from 15 to 35 instances of strategy use, with a range of from 10 to 19 different strategies.

5.2. The patterning of strategy functions in doing the vocabulary task

Looking across the six subjects, almost every strategy took on more than one function and fluctuated from function to function while the strategy was being used (see Figs. 1–6). For example, in Fig. 4, the function of each of Yan's strategies shifted from M to C, from C to A, and from A to M during the use of the S6-S8 cluster ("repeated reading of dictionary definitions", "thinking of word equivalents in Chinese", and "using dictionary definitions to check inferences"). Only twice in the
study were individual strategies found to have only one function. Fig. 6 shows that for Nan the only function being activated was the M function when she deployed either S1 (“planning word lookup according to semantic features”) or S2 (“planning the information to use to check word meanings”). In addition, there was not only one-way, linear fluctuation of functions, but also bi-directional fluctuation. This explains why Figs. 1–6 are as complex as they are, with the arrows indicating the bi-directional nature of the fluctuations both within the use of a given strategy and across strategies.
5.2.1. Linear progression in functions

In 3% of the cases, there was a one-way, linear progression from one function to another (see Table 3). For example, in Fig. 1, Ren’s use of S18 (“substituting vocabulary from the task into the dictionary’s sample sentence”) activated the C function and then in sequence the A function when she experienced frustration at finding that the sample sentences provided by the online dictionary did not help her analyze the semantic differences across the target words. This negative moment proved strategic (A) in that it triggered her taking strategic action – planning the next move (M), namely, to ask Wang for assistance.

5.2.2. Simultaneous occurrence of functions

Not only did the findings reveal fluctuation of functions, but also that several functions were likely to occur simultaneously when a given strategy was being used. In particular, in 74% of the cases, the C and A functions were activated simultaneously...
When the subjects used the researcher Wang as a resource, such as in checking their inferences with her, in 7% of the cases the social function (S) and the C function occurred simultaneously (e.g. see Fig. 1 in the case of Ren). In 4% of the cases, the S, C, and A functions were activated by the learner almost at the same time (e.g. see Fig. 6 in the case of Nan).

5.2.3. Linear progression in functions + simultaneous occurrence of functions

There was both a one-way, linear progression from one function to other functions which occurred simultaneously, or from functions occurring simultaneously to one other function (see Figs. 1 and 5). For example, in Fig. 5, when Dan used S4 (“breaking substantiate into parts and relating its suffix to the meaning of substance”), the C function was activated along with an affective moment (of satisfaction about her inference) which proved strategic (A) in that it immediately led her to plan how to confirm her inference (M).

5.2.4. Bi-directional fluctuation of functions

In contrast to a linear progression, in 5% of the cases the patterning of strategy functions involved bi-directional fluctuation for the same strategy and across strategies from moment to moment as the subjects performed the given task (see Table 3). For example, in Fig. 5, Dan decided to deploy S6 (“analyzing word collocations in the sample sentences”) in order to gain...
further insights as to semantic differences (M). She identified the noun that was used with the target words in the sample sentences provided (C-1) and then analyzed their usage in the given collocation (C-2). While Dan was engaged in using that strategy, the function fluctuated from M to C-1, from C-1 to C-2, and from C-2 to M (and back again).

5.2.5. Bi-directional fluctuation + simultaneous occurrence of functions

In 8% of the cases, there was both bi-directional fluctuation of functions as well as simultaneous occurrence of functions for the same strategy and across strategies. For example, in Fig. 5, when Dan deployed S7 (“looking for differences across the three words through semantic analysis”), it activated the C function. While fine-tuning her understanding of their meaning, she was curious to know if her inferences about their semantic differences were correct. Hence, her affective reaction (i.e. curiosity) served as a motivator to plan further strategic action (A + C).

5.2.6. Simultaneous occurrence of functions + micro-fluctuation of functions

This category demonstrates how the findings revealed even more complex fluctuation patterns. The fluctuation of functions appeared to involve both simultaneous occurrence of different functions and some micro-fluctuation for the same strategy and also across strategies. For example, in Fig. 1, Ren used S11, S12, and S13 (“analyzing the three words by repeated reading of the dictionary definitions”, “interpreting the dictionary definitions thinking of equivalents in Chinese”, and “thinking of particular instances associated with the definitions”) in a cluster (M). The use of this strategy cluster first activated a C function (i.e. “analyzing semantic differences in relation to the dictionary definitions”) applying to all three of the strategies (C-1). She also channelled an affective reaction (i.e. disappointment) into further strategic action when she found the dictionary definition unhelpful (A-1, C-1). While using S12, Ren reported that the strategy assumed the C-2 function (“retrieving knowledge”). She was pleased when she found examples in her mental lexicon that related to the definitions (C-3). This positive reaction in turn served as a motivator to persevere in the task (A-2). Thus, during the use of the S11-S13 cluster, the function of each of these strategies rapidly shifted back and forth between M (i.e. planning how to use the strategies) and C-1.

There was also some micro-fluctuation – producing the most complexity in the findings. For instance, the function of S11 shifted from M to A-1+C-1 and from A-1+C-1 to M. The function of S12 shifted from M to C-1+C-2 and from C-1+C-2 to M. The function of S13 shifted from M to C-1+C-3 and from C-1+C-3+A-2 to M. In Ren’s use of the S11-S13 cluster, the C-1 and A-1 functions, the C-1 and C-2 functions, the C-1 and C-3 functions, the A-2 and C-3 functions, the C-1, C-3, and the A-2 function occurred simultaneously at certain moments. In addition, there appeared to be a rapid back and forth fluctuation among C-1, C-1+A, C-1+C-2, C-2, C-1+C-3, C-3, A-2+C-3, and C-1+C-3+A-2.

5.2.7. The order of functions

As indicated in Table 5, in 68% of the cases the sequencing of functions was from M to C because the subjects would first decide the strategy that they would use and how to use it (M), and then would deal with the vocabulary information, thus activating the C function. Only Nan engaged both the M function and the C function at almost the same time (see Fig. 6). In 30% of the cases, the function of a given strategy fluctuated between the C and M functions.

5.2.8. The frequency of occurrence of functions

The M function and the C function were the two most frequently occurring functions that strategy use activated in the vocabulary task (37% and 34% respectively; see Table 6). Subjects varied with regard to the A function, with a range from 10 to
21 occurrences (see Table 6). In 48% of the cases, the A function and the C function were activated more or less at the same time (see Table 7). In 33% of the cases, affective reactions prompted subjects to plan out their next move in using the given strategy (e.g. A→M).

6. Discussion

6.1. Summary of the study

The current study focused on the use of strategies in the completion of a vocabulary fine-tuning task by six Chinese learners of English and the activation of moment-to-moment functions when the strategies were being used during this task. Regarding the first research question, the learners tended to use their strategies in combination (i.e. strategy sequences, strategy pairs, and strategy clusters) rather than in isolation. Regarding the second research question, metacognitive, cognitive, affective, and social functions fluctuated not only during the use of a single strategy, but also when learners moved from one strategy to another in sequences, pairs, and clusters. Six distinct patterns of strategy functioning were identified:

1. a one-way linear progression from one function to the next,
2. simultaneous occurrence of two or more functions,
3. a linear progression plus simultaneous occurrence,
4. bi-directional fluctuation,
5. bi-directional fluctuation plus simultaneous occurrence of functions,
6. Simultaneous occurrence of functions plus micro-fluctuation of functions

6.2. Limitations

The sample was homogeneous, consisting of six highly-motivated volunteers, all native Mandarin Chinese speakers who were highly-proficient learners of English. Although the ESL subjects represented two different contexts (the UK and Australia) and the EFL learners represented two different Chinese universities, the sample was too small to make any statements about the impact on strategy use of the type of English language context. In addition, the study involved just one task, which elicited the social function (S) of LLS only sporadically.

Also, whereas the researchers tended to accept the subjects’ interpretations of the functions that were activated by strategy use, it may have been that the subjects’ verbal reports were not fully accurate, in spite of the rigorous orientation session and the use of delayed retrospection as a follow-up. Additionally, gender could have played a role since 5 of the 6 subjects were females. Furthermore, the WAT is not a measure of academic word associations and is still in need of more rigorous validation (Read, 2012). Finally, we note that no instrument was administered to determine whether strategy choices and their functions could have been influenced by the subjects’ individual style preferences.

Table 6
Occurrence of strategy functions.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Frequency of M functions</th>
<th>Frequency of C functions</th>
<th>Frequency of A functions</th>
<th>Frequency of S functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ren</td>
<td>31</td>
<td>27</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Hang</td>
<td>20</td>
<td>13</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Shi</td>
<td>23</td>
<td>23</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Yan</td>
<td>16</td>
<td>22</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Dan</td>
<td>16</td>
<td>16</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Nan</td>
<td>25</td>
<td>17</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>raw/%</td>
<td>131/37%</td>
<td>118/34%</td>
<td>91/26%</td>
<td>11/3%</td>
</tr>
</tbody>
</table>

Table 7
Occurrence of the affective function in connection with other functions.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Frequency of A + C functions</th>
<th>Frequency of A → M functions</th>
<th>Frequency of other patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ren</td>
<td>18</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Hang</td>
<td>10</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Shi</td>
<td>16</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Yan</td>
<td>4</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Dan</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Nan</td>
<td>11</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>raw/%</td>
<td>64/48%</td>
<td>44/33%</td>
<td>26/19%</td>
</tr>
</tbody>
</table>
6.3. Interpretations

Despite the limitations, it would appear that the study did nonetheless reveal that even on a simple vocabulary task the use of a given strategy may entail the activation of different functions, with micro-fluctuation as well. Regarding the patterns of strategy functioning that emerged, there was not just a one-way linear progression in fluctuations, but also bi-directional fluctuation involving both simultaneous occurrence of functions and micro-fluctuation. Thus, at least with regard to the given semantic fine-tuning task, the patterning of functions was not consistent with the monolithic image that has enjoyed popularity in the literature. Rather, there appeared to be complex dynamic movement from one function to another from moment to moment.

We are unaware of other strategy function studies to which we could compare these results, given the controversial nature of this inquiry. The holy grail of LLS is basically predicated on the assumption that every strategy has only one function. Perhaps a reason why this assumption has not been challenged in the past is that strategies are often described in such vague terms that the issue has not seemed relevant. If the strategy is simply “using a dictionary”, then perhaps this does not conjure up the metacognitive function of planning which dictionaries to use, the cognitive function of sorting the material contained in the dictionary entry, nor the affective function when the learner takes strategic action as a result of frustration experienced by not coming up with a viable meaning for the word in the given context.

In the present study, in 68% of the cases, the transition was from the metacognitive to the cognitive function. Hence, the metacognitive function played an important role in activating the cognitive function, and generally in orchestrating strategy use more effectively. The cognitive function was the most frequently activated function, and in nearly three-quarters of the cases, the affective function occurred while the cognitive function was being activated. In addition, subjects were more likely to engage the affective function when having negative rather than positive reactions to some aspect of the vocabulary task. This negative affective reaction in turn tended to activate the metacognitive function of thinking about other solutions and planning other strategies for the task. A positive reaction resulted when a goal was reached or a successful plan was made. It would appear that effectively regulating their negative reactions appeared to improve the subjects’ task performance.

Of late, scholars have stressed the importance of emotion in language learning and use. Pavlenko (2002, 2005), for instance, drew particular attention to emotion words in order to achieve a better understanding of the role of affect among multilinguals. Subsequently, Dewaele (2013) scrutinized the ways in which emotions were perceived and expressed in different languages by multilinguals and claimed that they faced the daunting challenge of communicating specific emotions in a foreign language. With regard to emotion in the LLS literature specifically, scholars such as Oxford (1990, 2011), Bown (2006), and others have underscored the potential value of learners managing their emotions through what they term affective strategies in support of language learning.

The present study provided insight into how the affective function was triggered during efforts to strategize on a vocabulary task, and how it helped learners manage their emotions. Affective reactions were seen to have a functional value because both positive and negative reactions served as motivators for the subjects to persevere in the task. The results showed that the learners’ strategizing involved the A function on a moment-to-moment basis during the vocabulary task. In particular, negative reactions were more likely to be experienced, which immediately activated the M and C functions. This study revealed the richness of learners’ affective behavior during the learning and use of language. To our knowledge, little research had up until now explored at a micro-functional level the functions of specific strategies. Rather, affect had been left at the macro-level, with strategies labelled “engaging in positive self-talk” and “telling oneself to persevere”.

A large number of studies have focused on the impact of what are termed metacognitive strategies on learning outcomes, but the studies had not focused on the link between the metacognitive and affective functions of the same strategy. Rather, scholars have even combined the two in writing about meta-affective strategies (e.g. Oxford, 2011, 2017). This study indicated that while the affective function was closely related to the metacognitive function, it had its own separate function — namely, to motivate the learners to evaluate their strategy use and plan for further action.

According to complexity theory, language development is a complex process involving non-linear and bi-directional changes over time, with changes in language abilities emerging at an uneven pace (Larsen-Freeman to motivate the learners to evaluate their strategy use and plan for further action. According to complexity theory, language development is a complex process involving non-linear and bi-directional changes over time, with changes in language abilities emerging at an uneven pace (Larsen-Freeman, 2006; Fitzpatrick, 2012; Segalowitz & Freed, 2004).

According to complexity theory, language development is a complex process involving non-linear and bi-directional changes over time, with changes in language abilities emerging at an uneven pace (Larsen-Freeman & Cameron, 2008; de Bot, Lowie, Thorne, & Verspoor, 2013). In her most recent book, Oxford (2017, Chapter 10) explicitly relates complexity theory to LLS and recommends going beyond categories like cognitive and affective to relying more on learner narratives which help explain the cognitive and affective complexity at the heart of language learning and strategy use. It is possible that complexity theory can help explain the findings in this vocabulary study regarding the ways that strategies combine in a given task and the patterning of strategy functions.

For far too long, the field of LLS has assumed that a learner’s use of a strategy reflects the activation of one single function, namely, the one indicated by the label — e.g. “metacognitive”. So, the popular stance has been that there are metacognitive strategies which exclusively deal with the planning, monitoring, and evaluating of strategy use. A close-order analysis of one vocabulary task involving LLS would suggest that the picture is more complex than that. Hence, we would consider this study a valuable example of how complexity theory can be applied to LLS research.

With regard to the ESL-EFL distinction among the subjects, whereas having just six subjects in the current study would make it impossible to speculate as to differences in the activation of functions between ESL and EFL students, the three ESL students did appear to have greater ease at recalling everyday situations in which they used these words. Such a finding would be consistent with much of the literature which has investigated the context for TL learning (e.g. Briggs, 2015; DuFon, 2006; Fitzpatrick, 2012; Segalowitz & Freed, 2004).
6.4. Suggestions for future research

Further research could involve more subjects, perhaps including multilinguals performing tasks in various languages beyond the L1 and L2. In addition, studies could investigate similarities and differences in the patterning of strategy functions between ESL and EFL learners, and among learners with higher and lower vocabulary depth scores on instruments like the WAT. Additionally, the impact of learning styles on the fluctuation of functions could be investigated. So, for example, learners who are more concrete-sequential than abstract-intuitive might be more linear in their use of functions, whereas more abstract-intuitive ones might jump around more.

Furthermore, it would be useful to study the effects of task type — including both other vocabulary tasks, as well tasks relating to other skill areas such as speaking, listening, reading, writing, grammar, and translation. Also, the relationship between the type and frequency of strategy combinations and success at the different language skills could be studied. This study, for example, just looked at fine-tuning of semantic distinctions among vocabulary words, involving inferencing, dictionary use, and recalling from the subjects' mental lexicon. Follow-up work could investigate the relative impact of strategy clustering as opposed to strategy sequences or pairs in dealing with vocabulary learning and with other skill areas such as dealing with grammar.

Another area of investigation would be the relationship between the orchestration of strategy functions and success on a given task. Whereas the LLS literature is replete with numerous studies which laud the use of metacognitive strategies as contributing to successful language performance (e.g. Graham et al., 2010; Phakiti, 2003; Vandergrift, 2003), the findings from the current study would suggest the benefit of replicating certain task-based metacognitive strategy studies to see on a more close-order basis the functions that are actually activated by the given tasks. The research could entail looking at the extent to which learners can orchestrate their own use of functions when deploying a particular strategy.

6.5. Pedagogical implications

Being aware that strategy functions fluctuate can be a plus in that learners could diagnose their language learning problems by pinpointing where the breakdowns are occurring at the strategy function level. So, for example, when the use of the C function for the strategy “checking dictionary entries to get the meaning of a word” repeatedly fails to provide a workable meaning for a word, the learner could immediately activate another strategy function (e.g. M) — planning further strategic action.

In addition, learners could better understand the A function and especially negative reactions such as moments of frustration that could even result in a learner’s decision to quit studying a given language. With regard to cognitive functions, observing the C function in action could help learners better understand just how effectively they are operationalizing the given skill. Whereas tennis players are likely to analyze how effectively they serve a ball, it is probably far less likely that language learners analyze how they use strategies to operationalize skills. Remedial action could take the form of being coached or instructed in the use of certain C functions.

7. Conclusion

This study showed that close-order inspection of how strategies actually function in the completion of language tasks can reveal a complexity that to date has not been adequately described. The results demonstrated that the use of functions (whether metacognitive, cognitive, affective, or social) may fluctuate not only during the use of one strategy but also when learners switch from one strategy to another (and back again), given the sequential and clustering nature of strategies. Ideally, such studies will help us to understand better why certain learners are more successful at language learning than others. They can provide us insights which help dispel myths about how strategies actually work.

Acknowledgements

We would like to express our sincere gratitude to the students who participated in the research. We want furthermore to express our thanks to Peter Gu, Ernesto Macaro, Peter MacIntyre, and Rebecca Oxford for their insightful comments on earlier drafts of the manuscript.

References


