

A Study on the Correlation between FOK Judgments in Metamemory Monitoring and Second Language Vocabulary Learning among Non-English Major College Students

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Abstract: The purpose of this study is to find the correlation between Feeling of Knowing (FOK) judgments in metamemory monitoring and second language vocabulary learning among non-English major college students. The participants are all from Tibet University, and there are 46 collegians from advanced class and 56 collegians from beginner class, the study aims to report the current status of their English vocabulary breadth, and the mechanism behind FOK judgments. The RJR classical paradigm was used to demonstrate the FOK mechanisms, we found that the two classes primarily use different FOK mechanisms, the beginner class tends to choose cue-familiarity, while the advanced class used both mechanisms. However, both classes showed higher utilization of cue-familiarity than item target-accessibility mechanisms, consistent with previous studies.

Key words: metamemory monitoring; FOK judgments; non-English major collegians; vocabulary learning

1. Introduction

As an essential component of second language acquisition, the importance of vocabulary knowledge is self-evident. Vocabulary acquisition serves as a central task in second language learning, and every aspect of language proficiency relies on vocabulary. It is a key element that can influence or constrain one's abilities in listening, speaking, reading, writing, and translation (Lewis, 2012). Summarizing previous research on second language vocabulary learning, many students find word memorization to be the most challenging aspect of foreign language learning. They often encounter high rates of forgetting when memorizing English vocabulary (Wang Jing, 2014; Pérez L & Alvira R, 2017), and the memory of vocabulary is closely linked to metamemory abilities. Nelson and Narens (1990) classified metamemory monitoring into four components based on different stages of the object memory process: Ease-of-Learning judgments (EOL), Judgments of Learning (JOL), Feeling of Knowing (FOK), and Judgments of Confidence (JOC). FOK, as an important form of metamemory monitoring, occurs after the failure to recall something and refers to the vague sense of knowing experienced when people cannot retrieve a specific item. Research suggests that higher FOK is associated with a greater likelihood of subsequently recalling specific information. Additionally, FOK has been widely acknowledged as an effective indicator of metamemory (Song Guangwen, Wang Shujuan, Niu Dun, 2002).

2. Literature review

The term "metamemory" was introduced by the renowned American psychologist J.H. Flavell in the early 1970s. The study of metamemory as an independent research topic originated in the early 1960s with Hart's doctoral thesis on FOK at Stanford University. FOK judgment refers to the degree of "feeling of knowing" or the level of confidence in retrieving and extracting information during the maintenance and retrieval stages of memory. It also refers to the anticipatory judgment of items that are currently not recalled but possess a certain sense of familiarity during subsequent recognition tests (Nelson, 1990). Hart (1965) proposed that FOK, similar to recall and recognition in object memory, can serve as an accurate measure of memory storage. Based on this idea, he developed the Recall-Judgment-Recognition (RJR) paradigm, which has become a classic paradigm for FOK research, and this study adopts this paradigm.

The basic procedure of this paradigm includes a recall phase, FOK judgment phase, and recognition phase. The level and accuracy of FOK judgments are commonly used indicators to measure FOK judgment levels. Regarding the accuracy of FOK judgments, researchers widely adopt the Goodman-Kruskal Gamma correlation, which involves testing the significance of the difference between the average FOK judgment level and the Gamma correlation value with recognition accuracy, along with a value of "0". If the difference is significant, it indicates that the FOK judgments made by participants in the experiment are effective and not mere random guessing, with higher Gamma values indicating greater relative accuracy.

In terms of FOK mechanism, there has always been a debate between two hypotheses, namely the cue-familiarity hypothesis and the target-accessibility hypothesis. Many studies support the cue-familiarity hypothesis. Reber (1987) found that using false cues can increase participants' sense of knowing but does not help them provide correct answers to the questions. Based on research by Matcalfe and Schwartz (1993) and others, it is believed that FOK judgments are not dependent on the strength of memory or accessibility of the target items, but rather on the familiarity level of the cues. On the other hand, studies by other metamemory researchers such as Meyer and Yaniv (1987) suggest that it is the strength of the memorized items or the activation level of the target items during retrieval that determines the level of FOK judgments.

Compared to research conducted abroad, there have been many studies on the mechanism of FOK judgments in China. Han Kai, Shi Xiao Shi, and Hao Xueqin (1997) conducted two experiments with middle school and college students as participants and found that the level of FOK judgments depends on the familiarity of cues rather than the memory strength of target items. Yang Zhi and Liang Du Jianzheng (2000) conducted a study using Go game patterns as experimental material, which demonstrated that participants make FOK

judgments based on cue familiarity when cues are available, but rely on target retrieval when cues are difficult to utilize. The results of two experiments conducted by Guo Chuntao (2003) using the RJR paradigm proved that FOK judgments made by participants do not solely depend on cue familiarity or target accessibility, but rather on the association between cues and targets.

In summary, although previous studies have identified various mechanisms underlying FOK generation (Kelemen, 2000; Guo Chuntao, 2003), there has been limited research comparing these mechanisms. Therefore, this study aims to compare the effects of cue familiarity and target accessibility, which are two main mechanisms, on FOK judgments. Additionally, most domestic studies on FOK judgments have focused on investigating their generation mechanisms (Han Kai, 1997; Guo Chuntao, 2003), predominantly within the field of psychology. There is a particular scarcity of research in the field of education that combines English language learning with FOK judgments, despite the close relationship between vocabulary learning and metamemory abilities. Consequently, this study aims to explore the correlation between English vocabulary learning and FOK judgments in metamemory monitoring.

3. Research design

3.1 Research questions

(1) What the breadth of vocabulary among non-English major students at Tibet University?

(2) How do the main mechanisms of cue-familiarity and target-accessibility in FOK judgments affect participants' judgments of vocabulary mastery?

3.2 Participants

This study randomly selected one class each from the beginner and advanced levels of English at Tibet University. The beginner class consisted of 55 students, including 41 males and 17 females. The advanced class consisted of 46 students, including 35 males and 11 females.

3.3 Materials

The study utilized three tests as the primary tools for assessment. Test 1 is an online vocabulary test taken from the resources provided by Paul Nation (<https://www.wgtn.ac.nz/lals/resources/paul-nations-resources>). Test 2 and Test 3 materials were selected based on the results of Test 1, using corresponding level questions from Nation & Beglar's (2007) Vocabulary Level Test. The content of Test 2 was adapted from Nation's original test questions. This test follows Hart's classic paradigm: RJR, designed to assess recall, judgment, and recognition functions. Test 2 is presented in a table format with 6 columns. Column 1 contains the items (40 sentences in total), column 2 provides the Chinese meaning (participants are required to write the meaning of the bolded word), columns 3 and 4 represent word familiarity, indicating levels (5 levels) and specific numbers (each level corresponds to a specific range: $0 \leq \text{level } 1 < 20$; $20 \leq \text{level } 2 < 40$; $40 \leq \text{level } 3 < 60$; $60 \leq \text{level } 4 < 80$; $80 \leq \text{level } 5 \leq 100$), column 5 is familiarity judgment, and column 6 is accessibility or clue accessibility judgment.

Test 3 is presented in the form of a multiple-choice questionnaire, consisting of 40 questions. The content is consistent with Test 2, but the presentation format and order are different. Each question has four options. Considering the participants' L2 proficiency and potential interference caused by reading English options, a bilingual version is used with the question stem in English and options in Chinese. Each question carries 1 point, resulting in a total score of 40. Vocabulary size is calculated by multiplying the score by 100. At the end of the paper, there is a fill-in-the-blank question ("I feel that I can get _____ points") to assess participants' retrospective judgment ability.

4. Procedures

Step 1: Prior to the formal experiment, each participant is required to complete Test 1 of their L2 vocabulary size.

Step 2: The paper version of Test 2 is used for the recall and judgment phases. In the recall phase, participants are asked to translate the bolded words into Chinese in column 2. In the judgment phase, participants are required to make corresponding judgments for the remaining items. In the recognition phase, participants are asked to complete the paper version of Test 3. Participants are not time-limited to complete both tests. Additionally, participants are asked to retrospectively judge how many points they may have obtained in Test 3.

5. Results and discussion

5.1 Vocabulary breadth knowledge of non-English major students at Tibet University

In the beginner class, the average vocabulary size, after removing outliers, was 3176 words out of Test 1's total of 40 points. In the advanced class, the average vocabulary size, after removing outliers, was 3540 words out of Test 1's total of 40 points.

According to the grading standards for English proficiency at Tibet University, students with high school English scores below 90 points and students studying other minor languages are placed in the beginner class. Students with high school English scores above 90 points are placed in the advanced class. This study found that after excluding outliers, there was not a significant difference in average vocabulary size between the beginner class ($M=3176$) and the advanced class ($M=3540$). However, this study only measured and explored students' vocabulary breadth and did not assess its depth. Further research could investigate the depth of their vocabulary.

5.2 Ability to monitor vocabulary mastery

In the beginner class, 48.1% of students were able to recall the Chinese translation of words, with an accuracy rate of 30.5%. In the advanced class, 71.6% of students were able to successfully recall the Chinese translations, with an accuracy rate of 54.8%. Gamma correlation analysis was performed on the FOK judgment level values and recognition accuracy for each class. The average values were:

Gamma (beginner) = 0.81, Gamma (advanced) = 0.61.

The results of the significance test comparing the gamma correlation values to “0” were: $t(54) = 30.08$, $p < 0.01$ for the beginner class, and $t(45) = 45.38$, $p < 0.01$ for the advanced class. These results indicate that the FOK judgments made by the university students participating in this study were effective and not just random guesses. It also suggests that students have the ability to monitor their vocabulary mastery.

5.3 Mechanism’s effect on judgments of vocabulary mastery:

Regarding the mechanisms activated during the FOK judgment process, this study found that the beginner class primarily used the cue-familiarity mechanism (445 of 2200), followed by both mechanisms (416 of 2200). The advanced class predominantly used both mechanisms (571 of 1870), followed by the cue-familiarity mechanism (387 of 1870). Both classes used the target-accessibility mechanism least frequently. The frequency of the cue-familiarity mechanism was higher than that of the target-accessibility mechanism, consistent with previous research (Yang & Du, 2000; Isingrini et al., 2016).

Recognition: The test results for the recognition stage of FOK judgments showed an average accuracy rate of 50.8% for the beginner class and 65.2% for the advanced class. Goodman-Kruskal’s Gamma correlation showed significant differences between the Gamma values (0.51 for beginner and 0.61 for advanced) and “0”. The t-values were $t(54) = 30.08$, $p < 0.01$ for the beginner class, and $t(45) = 45.38$, $p < 0.01$ for the advanced class. Therefore, both beginner and advanced collegians indeed have the ability to predict their performance in recognition tests.

There could be three reasons for these results. Firstly, beginner class students have lower proficiency levels in English and may not commonly use vocabulary learning strategies, such as memorization techniques based on roots, prefixes, and suffixes. Consequently, their primary criterion for judging vocabulary is familiarity with the word, leading to a higher reliance on cue-familiarity. Secondly, most advanced class students prepare for the English CET-4 exam and might employ corresponding vocabulary learning strategies, enabling them to recognize roots and affixes more easily. Thus, they are more skilled at using both mechanisms to identify and judge vocabulary. The discrepancy between this study and Hosey et al. (2009) could be attributed to the different materials used for research. Hosey et al. focused on face recognition, while this study utilized English vocabulary, which inherently contains roots and affixes. This feature might trigger the target-accessibility mechanism when students recognize a certain root or affix. However, since some roots and affixes have multiple meanings, students may confuse them with other meanings, resulting in lower FOK judgment scores for the target-accessibility mechanism.

6. Conclusion

Regarding the FOK mechanisms, beginner-level students tend to choose the cue-familiarity mechanism, while advanced-level students are adept at using both mechanisms. However, both groups of students show a higher preference for the cue-familiarity mechanism than the target-accessibility mechanism. Future research could further explore the influence of participants’ depth of English vocabulary and different research materials on FOK judgments.

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Foundation Project: The High-Level Talent Cultivation Program for Postgraduates of Tibet University (2021- GSP-S089)