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A Study on the Psychological Mechanisms of English Error Solidification Phenomenon

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Abstract

In the course of learning, the same English errors may arise again even after the wrong answer of the exercise has been corrected. Based on the questionnaire，this paper aims to analyze the fundamental reason of this phenomenon from the perspective of schema theory and thinking structure. In the end, it indicates that teachers and students should take advantage of the positive functions of the above two theories to decrease the frequency of mistakes.

Keywords

English errors; schema theory; thinking structure.

1. Introduction

As the saying goes, a fall into the pit, a gain in your wit, which indicates that individuals gain deep insight through undergoing setbacks. Hence, it is a universally acknowledged truth that people should analyze the roots of failure, continuously summarizing and learning from lessons and experiences, in order to prevent the recurrence of similar incidents. In the course of language study, error solidification is a very common phenomenon. Many undergraduates have committed same mistakes when encountering the same question again even after the deep explanation by the teacher or after careful analysis of the answer by themselves. The study on these errors has always been a focus of attention in the field of foreign language. This paper attempts to reveal the causes of language errors in the same exercise from the perspective of psychological mechanisms.

2. Theoretical Foundations

2.1. Physiological Basis

The human brain is composed of three functional systems: the sensory system, the motor system, as well as the associative system. The function of the sensory system is to acquire external information on the basis of sensory activities, forming perceptions. The function of the motor system is to direct muscle movements controlling various organs bodily. The function of the associative system is to integrate and coordinate information. The associative areas of the human brain (i.e., regions of the cerebral cortex with associative functions) account for a vital proportion (4/5) of the cortex, exhibiting extraordinarily strong capabilities. Specifically, the tertiary cortex within the second functional associative area in the human brain (i.e., the brain's associative area which is responsible for receiving, processing, and storing information) possesses unique functions peculiar to the human brain. In other words, the higher-level analysis and synthesis of the information received is analyzed and synthesized at an advanced level, through encoding and storage, forming complex informational combinations[1]. The aforementioned evidence suggests that the human brain already possesses the objective conditions for analysis and synthesis when dealing with specific problems.

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2.2. Psycholinguistic Foundations

2.2.1. Schemata

In 1932, Bartlett, the British psychologist, first introduced the concept of "schema" in his theory of memory to explain advanced cognitive activities in human beings. He proposed that schemata represent reflections or active organizations of past experiences. The core idea of schema theory is that when individuals comprehend new information, they should relate it to existing concepts, past experiences, or background knowledge. The understanding and interpretation of new information should rely on preexisting schemata in the mind, and the new input information should align with these schemata[2]. Bartlett attempted to prove that memory is by no means a process of rote memorization or reproduction, but rather one of preserving the essence of events and reconstructing details based on overall impressions. Hence, Bartlett conducted plenty of experiments to observe the guiding role of schemata in reconstruction. He concluded that when encountering events which are inconsistent with our usual understanding, people struggle to integrate them into existing schemata, often resulting in forgetting or "normalizing" the details until they align with preexisting schemata[3].

2.2.2. Working Memory and Long-Term Memory

The information processing in the human brain, from the perspective of psycholinguistics, is an intricate psychological process. The individual does not passively accept all external inputs without discrimination. Attention is viewed as a highly limited psychological resource[4]. While a vast amount of information enters the sensory memory, only a small fraction receives attention, and this attended information can only be stored in long-term memory after undergoing in-depth processing in the working memory. This, evidently is a selective filtering process, resulting from the interaction between current external stimuli and the internal mechanisms of the individual.

2.2.3. Spreading Activation Model

Spreading Activation Model, a network model of semantic representation, is proposed by Collins and Loftus, who propose that nodes represent concepts and connect related concepts. The shorter the distance between nodes is, the closer the conceptual connection and the easier it is to activate. Moreover, Gui Shichun once made a vivid metaphor: this model could be thought of as a large power grid: as long as a concept is activated, the current will spread to connected concepts. The more it spreads, the weaker the energy becomes[3].

2.3. Thinking structure

Thinking structure is defined as the consciousness system which is formed by the internalization of cognitive content in the human brain and which is capable of participating in the thinking activities of the human brain. Lenin pointed out in his *Philosophical Notes* that "Human practice has undergone millions of repetitions, and then it is fixed in human consciousness in the form of logical forms. These forms are precise and only because of millions of repetitions that they acquire the stability of preconceived notions and the character of axioms." In the continuous repetition of practice—cognition activities, external objects repeatedly act on the human brain, stimulating the human brain to repeatedly form and use a certain kind or type of cognitive content. In this way, some basic cognitive contents generated in the human brain, especially the understanding of the commonness, essence and laws of things, will inevitably leave a deeper and deeper imprint in the human brain, gradually settle and accumulate in the human brain, construct inwardly, and become fixed in the human brain, forming a consciousness system with specific content, that is, a subjective thinking framework composed of certain content, which is also known as the "logical forms" by Lenin, that is, the thinking structure[5].

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Openness and closedness are fundamental characteristics of thinking structures. On the one hand, as the thinking structure constantly engages in information exchange with the external world around it, which indicates that it is an updating and developing conscious system which supplements and refines the original knowledge structure. This process—absorbing the essence and discarding the dross—enhances their vitality and prevents mental rigidity and stagnation. On the other hand, due to the inertial effects of thinking, such information exchange typically involves absorbing and accepting new information from the perspective of its own structural interests. People, in daily life, often find themselves confined within existing frameworks, unable to extricate themselves, and tend to reject content that does not conform to their established thinking structure.

3. Research Methodology

3.1. Research subjects and method

A questionnaire survey was conducted in a university in Xi'an city, following the principle of random distribution and voluntary participation. The survey did not target specific majors or specialized groups, with the purpose to ensure the survey data could authentically reflect general trends. A sample of 100 college students engaged in self-study was surveyed. There were 37 males, 52 females, and 11 participants who omitted gender information. Among them, 36 students had passed CET-4 (College English Test Band 4), 30 students had passed CET-6 (College English Test Band 6). 34 students did not disclose English proficiency data. There are 24 freshmen, 15 sophomores, 37 juniors and 13 seniors, and the left 11 who did not specify their academic year. The majority of participants represented diverse disciplines, including Software Engineering, Accounting, Chinese Language and Literature, and so on.

3.2. Research design

Based on the aforementioned theoretical foundations, the following questions are proposed. Here, the physiological basis represents the fundamental cognitive ability which human beings employ when analyzing problems. Although it is not explicitly reflected in the questions, it runs through the entire process.

1. When encountering English exercises that you have got wrong before, will you still commit mistakes?
2. Does this phenomenon appear frequently?
3. Is the cause of English error understood after being revised?
4. Is this type of exercises pretty difficult?
5. Do you have the impression on having finished it before?
6. What is the probability of selecting the same incorrect option which you have chosen from the last time when the identical question reappears?
7. Will you exhibit hesitation between correct and incorrect options when re-encountering previous language exercises you got wrong before again?
8. Will the wrong options would leave the deeper trace than the correct answers in your mind?
9. Have you reviewed the certain exercise after you have given the wrong answer?
10. If it has been reviewed, will there still be mistakes?
11. After the teacher's explanation, if he/she prompts you that the identical exercise will be tested again, will mistakes still be made?
12. Does this English error solidification phenomenon also occur in other disciplines?
13. What are the deep roots of the error in this phenomenon?

Among above items, questions 1 and 2 are designed to assess whether students encounter specific types of error solidification and the frequency of their occurrence. Questions 3 and 4

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aim to evaluate the influence of the spreading activation model. Questions 5 and 6 seek to determine the impact of memory on students. Questions 7 and 8 are intended to evaluate the guiding role of schema theory. Questions 9 to 12 focus on examining the influence of thinking structures on students. Question 13 involves analyzing the causes of errors to further elucidate the underlying nature of incorrect responses.

3.3. Experimental Analysis

Data shows that the majority of students have relatively solid basic skills. Although the answers may vary in degree, they do not prevent us from understanding the nature of this phenomenon. For Questions 1 and 2, the 100 college students conducted all got the same exercise wrong before, and sometimes they kept making the same mistakes. Of course, this phenomenon does not and can not occur in every exercise; otherwise, the student' would not make any progress longer. It can be known from question 12 that many students have reflected that not only does this phenomenon occur in the English course, but also they has similar experiences in other subjects. It seems that this is a relatively common phenomenon. Question 3 mirrors plenty of students admit that they can understand the reasons for the mistakes. Then why do they still make the same mistakes when they encounter them again? If there is a problem with the recall, why are there still mistakes after reviewing? Moreover, the knowledge that has been understood belongs to the "internalized" knowledge and should not be wrong. It is puzzling that when students learn that the same exercise will reappear, their minds should be highly concentrated and focused at this time. Then why do some students also make mistakes? If it is merely explained by objective reasons such as memory, nervousness and carelessness, it seems rather far-fetched. Some mistakes are indeed caused by the above reasons, but this is obviously not the fundamental cause.

4. An In-Depth Analysis of Language Error Solidification Phenomenon

4.1. Psycholinguistic Foundations

Since reconstruction is not merely a simple process of replication rather an active and dynamic cognitive process. Given the constant influx of a large amount of new information every day, students' comprehension of understanding of concepts is continually evolving. When the prior exercises reappear, that means encountering a previously solved problem once again, students' response will not simply stay at the level of a repetition of the corrected version, but rather a reanalysis, comparison, and synthesis of existing knowledge, concepts, and theories before making a new judgment, which leads to a new understanding of things. In other words, when coping with language exercises, students need to retrieve relevant schemata (or mental frameworks as an alternative explanation) from memory. When college students are asked whether they would exhibit hesitation between correct and incorrect options when re-encountering previous language exercises they got wrong before again, 10% mentions never, 10% always, with 23% mentioning a low frequency, 30% a medium frequency and 27% a high frequency. Concerning whether the wrong options would leave the deeper trace than the correct answers in students' mind or not, 6% mentions never, 18% always, with 15% mentioning a low frequency, 27% a medium frequency and 34% a high frequency, and most of them think the wrong options leave a deeper impression than the correct answers. These are all manifestations of the guiding role of schema theory, demonstrating how deeply ingrained erroneous patterns can persist despite correction.

Making the same mistakes repeatedly in dealing with language exercises is precisely a manifestation that information has not been transferred from working memory to long-term memory. When college students encounter these questions again, the first impression that often gets activated in their minds is usually the wrong option. This is because questions that

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students repeatedly get wrong are usually more difficult, and the incorrect options are often the result of careful consideration, deliberate thinking and serious weighing by the students. These options represent choices that students believe to be correct based on their understanding of the question combined with the knowledge and experiences stored in their minds. Despite the final outcome being incorrect, these selections possess an inherent rationality, that is, throughout this process, students fully exert their subjective initiatives to ponder on the language exercises, making it easier to activate relevant nodes.

On the other hand, the correct answer often deviates from the schema in students' minds. It is either taught by the teacher or incorporated into students' minds after they check the answer themselves. In this entire process, students mainly listen or observe the English exercises, relatively speaking, which is a form of passive acceptance. Under this circumstances, since the nodes in students' minds are hidden deeper, they usually cannot be activated or are difficult to activate. Therefore, no matter how hard students intend to repeat the exercises, they still have the difficulty in retrieving the correct information from long-term memory.

When college students are asked whether they would review the repeated exercise which has given the wrong answer before, only 7% answers never, and 19% always, with 24% mentioning a low frequency, 29% a medium frequency and 21% a high frequency. As to whether students still commit the same mistakes again even after their reviewing, only 16% answers never, with 61% mentioning a low frequency, 18% a medium frequency and 5% a high frequency. However, no one utters they could overcome the language error solidification phenomenon. It can be concluded from these 2 questions that the majority of college students still make the same language mistakes after reviewing the same knowledge or taught by teachers, the root lies in some knowledge still stay in the superficial level, which has not been stored into the permanent memory. As for the multiple reasons why students commit repeated language mistakes, 2% mentions that phenomenon arises mainly due to nervousness, anxiety and other mental factors, 49% mentions a lack of solid knowledge, 23% mentions the relatively deep impression on the wrong items, 14% mentions they forget or could not recall the relative knowledge, and 12% mentions neglect and careless also give rise to the phenomenon. All these explanation fully indicate knowledge has not be transformed from the short-term memory to permanent memory. Errors will not occur when it comes to those students who could overcome such problems.

4.2. Thinking Structure

In fact, recurring language mistakes in the same exercise are usually not always due to carelessness, nor because the English teacher failed to cover the relevant knowledge before, nor the absence of reflection on the problem. There lies in a strong theoretical foundation behind this phenomenon, which is the thinking structure. It can be described as a person's overall grasp and comprehension of concepts about things which are accumulated over time, rather than the mere storage of any specific content. Once such comprehension is formed, it settles in the subconscious, becoming a fixed thinking pattern which guides the person to behave according to the established routines, exhibiting strong compulsiveness, automaticity as well as stability. When solving problems, the individual often reflexively thinks and processes them based on familiar methods and paths, unconsciously fitting them into specific thinking frameworks, similar to instinctive reactions.

The persistence of errors even after the review by students themselves or from the teacher's explanation, as well as similar occurrences in other subjects, all reveal this principle. On the surface, the recurring mistakes in certain exercises are due to insufficient knowledge consolidation, but in fact, it is the result of the deep-seated influence of the thinking structure. Many brain twists also frequently exploit this sort of knowledge. For example, Mary's father has five daughters. The first daughter is Nana, the second daughter is Nene, the third daughter is

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Nini, the fourth daughter is Nono. What is the name of the fifth daughter? Many respondents without hesitation， give the answer Nunu. However, if the question is read once again, it's not difficult to find that her name is Mary. This type of question utilizes people's preconceived notions.

The repeated occurrence of incorrect answers is, in essence, a comprehensive manifestation of the fundamental characteristics of one's thinking structure. Given the vast amount of information students encounter daily, even when the same questions reappear, they are compelled to reprocess and integrate their knowledge. When students are asked what the probability is that they would select the same incorrect option they chose previously when the identical question reappears, only 4% answers never, and 5% answers always, with 23% mentioning a low frequency, 38% a medium frequency and 30% a high frequency. It can be concluded that the former choices originated from judgments made on the basis of their existing cognitive frameworks, whereas the latter did not align with their internal structural paradigms. Consequently, when such exercises arise, the most readily activated memories in their minds are those of the incorrect options they have previously processed.

5. Conclusion

Experimental evidence indicates that college students indeed struggle with recurring errors in exercise problems. As the preceding analysis reveals, the repetition of certain mistakes is far from coincidental. Delving into the underlying causes, this study believes that learners' existing mental schemata and their inherent thinking structure are the root factors driving this phenomenon. Human understanding and interpretation of novel stimuli are fundamentally modeled by preexisting mental schemata. When coping with problems, schemata serve as a guiding framework, compelling individuals to integrate new challenges with their existing knowledge and experiences. Thinking structures, in turn, represent how learners apply pre-established mental models to comprehend and evaluate novel information. During the learning process, students need to harness the constructive roles of schemata and thinking structure. Simultaneously, educators should act as facilitators, leveraging these mechanisms to maximize benefits while mitigating drawbacks. By doing so, can students reduce the recurrence of errors.

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