A Study on Second Language Vocabulary Acquisition Under the Categorization Theory

Ting Xiao*

Xiangtan Institute of Technology, Xiangtan 411100, Hunan Province, China

Corresponding author: Ting Xiao, xrx2843902335@126.com

Abstract: In cognitive linguistics, debates on the status and functions of categorization have been a heated issue. In semantics and second language acquisition, scholars have discussed and achieved vocabulary acquisition from different perspectives and academic levels. Vocabulary learning exerts a fundamental role in second language vocabulary acquisition (SLVA), and it is closely related to learners' cognitive competence. However, studies on second language vocabulary acquisition under the categorization theory in cognitive linguistics have received less attention from linguists when compared with other studies. This paper employs two representative dimensions, the basic-level effect and the prototype effect, under the categorization theory to further delve into the implications on second language vocabulary acquisition. This article first provides a comprehensive introduction to the nature and the approaches of the categorization theory, and then analyzes the relations and implications for second language vocabulary acquisition under the categorization theory from the perspective of the basic-level and the prototype effects. The research results showed that the basic-level effect on SLVA is mainly on the classification of word categories distinguished from the superordinate and subordinate categories, while the prototype effect is more on understanding the complexity and use of word meaning.

Keywords: Categorization; Second language vocabulary acquisition; Basic-level; Prototype

1. Introduction

The significance of categorization has long been realized and accepted, but issues on how people categorize the world are still under debate. Under the principles of cognitive economy and the perceived world structure, the theory of prototypes and basic-level categories are two representative theories in categorization that hypothesize a pattern for a categorization system vertically and horizontally.

The vertical version is closely related to the issues and effects of basic-level categorization. From an empirical standpoint, it highlights that not all levels of categorization are of the same significance for human beings. Instead, in cognitive perception, there is one optimal level of categorization that is psychologically more salient than other levels. The optimal level is termed the so-called basic level of categorization, which presents a superior status among other levels. However, the horizontal dimension focuses more on the graduality in

structure for different categories, so the prototype effect has been generally discussed and accepted. Those who are in favor of the horizontal dimension insist that optimal assumption is not correct as some members of one category are considered better but not perfect when categorizing the objective world. It is universally acknowledged that entities in different categories are distinct from one another in terms of their salience of the given conceptual category. However, the two dimensions receive heated debate as the prototypical effect is, to some extent, opposed to the basic-level effect because prototypical members are believed to receive preferential processing in cognitive processing. To fully explore the relations between categorization and vocabulary acquisition, this paper combines both the perspectives of the vertical basic-level effect and the horizontal prototype effect to investigate the relationship between second language vocabulary acquisition (SLVA) and categorization.

2. The Categorization Theory

In cognitive linguistics, the categorization theory transforms abstract notions all around the objective world into systematized categories. Under the guidance of this theory, some implications can be drawn to the SLVA.

2.1. The nature of categorization

Categorization is of great significance in the survival and progress of human life. It refers to a mental process through which various entities are classified into the same kind based on shared features. By analyzing the commonalities instead of the differences, we categorize entities into groups. For instance, though "a sofa" and "a table" are perceptually two different entities with their own shape and material, they are allotted into the category of "furniture." It is through categorization that the chaotic world can be systematically organized.

2.2. The shift from classical theory to cognitive approach

Researchers have been deeply focused on studying categorization for an extended period. As an omnipresent phenomenon in society, the exploration of categorization has been a heated issue in cognitive linguistics.

2.2.1. The classical theory of categorization

The classical theory of categorization can be traced back to the time of Aristotle who was generally believed to be the first person to consider the importance of essential attributes in categorization and making a systematic analysis about categorization. The classical theory posits, from its inception, that the decomposition of vocabularies into distinct semantic features forms the basis of categorization. This theory asserts that conceptual categories are defined by distinctive attributes. However, the classical theory fails to account for levels of categorization. It is universally accepted that "furniture," "chair," and "wooden chair" are simply three levels of categorization symbolizing the extent of their concreteness. However, people tend to resort to their empirical experience when defining their levels, that is, they are more likely to cognize the entity "chair" at the level of "chair" instead of at the levels of "furniture" or "wooden chair."

2.2.2. The cognitive approach of categorization

In the 1950s, studies on categorization altered from the classical theory to the cognitive approach. For Wittgenstein's proposal of family resemblances, scholars have gradually realized the demonstration of categorization in the classical theory is much more complicated. Categorization is by no means a task of finding commonality and grouping entities which are a partial part of human categorization. Ample empirical evidence of psychological differentiation and salience of a level of categorization has blazed a new way for the study of

categorization, which is a cognitive approach to human categorization. In the cognitive approach, experience and imagination are considered the primary significant participants in categorization.

2.3. The prototype theory and basic-level categories

There are two powerful challenges in categorization. One is the representative view of Austin's discovery that vocabulary members in the same category are not equivalent in terms of their essential attributes. The other is that when compared with other levels, one level of categorization in the middle of the taxonomic hierarchy takes a more salient status. The prototype theory raises two principles: the principle of cognitive economy and the principle of perceived world structure. The principle of cognitive economy pays much attention to the function of the conceptual category system which tries to obtain as much information as possible with the least cognitive effort. Whereas the principle of perceived world structure holds that the information of the perceived world is closely correlated in structures. These two principles show different dimensions both horizontally and vertically. According to the vertical version, it is claimed that not all levels but only one is of optimal benefit to human beings with the least cost in cognition. However, the horizontal version holds that members in one category take their own characteristics only when the corresponding category is representative. The vertical dimension concerns the level of categorization in a cognitive sense in which one entity can be regarded as a member of one category, such as "vertical," "car," and "Volkswagen." Therefore, Rosch proposed that the hierarchical levels of categorization are organized in a way that the most basic category, situated in the middle level, serves as a link connecting the superordinate and subordinate levels.

3. Second language vocabulary acquisition under the Categorization Theory

Two branches of categorization, the basic-level effect and the prototype effect, indicate that in L2 (second language) vocabulary learning, vocabularies in the basic-level category and the prototypical category are psychologically salient in the L2-based categorization system, which exerts a similar role in L2 vocabulary learning as it does in L1 (first language) vocabulary learning [1].

3.1. Categorization: The cognitive foundation for vocabulary

As mentioned before, the theory of categorization implies the interaction with the whole world. From the cognitive view, the categories are mental concepts stored in human minds; while from the angle of vocabulary learning, it is a process in which people describe their understandings of the objective world in a way of categorization, and then store them in their mental world as concepts, and finally transcribe them into words and vocabulary [2]. This shows the cognitive foundation of categorization for categories and word meanings whose intrinsic relationships are discussed in human categorization, concepts, and words.

3.1.1. Categorization, concepts, and words

Words are the most basic tools to describe nearly everything. According to the referential theory, word meaning is achieved through the channel of referring to the objects and events in the world [3]. Therefore, word meaning can be regarded as a bridge connecting a word and the world. For instance, the meaning of "table" is the illustration of the entity "table" in the real world. However, people without access to tables in the real world can hardly recognize the word meaning of a table.

The categorization theory, on the other hand, provides a conceptual model for word meaning by demonstrating that there is no interconnection between a word and the world. Instead, the connection is mediated by human concepts and conceptual structures. Simply put, by mapping the linguistic forms of a word

into the conceptual structures in our mental world, the word obtains its meaning. For example, when we see a notice of the warning "A barking dog in the yard," we might get some connections between the word "barking" and the concept of "the dog may just bark but not bite" [4]. In this way, we can build a conceptual category between the word "dog" and the categorization concept of "dog." That is, the words are not ignited by entities in the real world, but the mental concepts and conceptual structures in human minds. Our cognition of all kinds of entities in the real world can be represented in our mental world via categorization. Hence, for the purpose of communication, we usually symbolize word meanings in specific contexts by associating them with conceptual structures.

3.1.2. Categorization and vocabulary learning

Drawing from the conceptual structure, vocabulary learning can be defined as establishing some kind of relationship between a word and the generalization of categorization in the learner's mental world.

Murphy has pointed out that there are two ways in which a word can be learned. The first one is based on the known information of the concept, which involves the existence of the pre-linguistic period where infants of 3–4 months would search for new stimuli when observing one object a few times. By presenting two stimuli simultaneously, with one being the familiar stimulus, and the other the new stimulus, the infants can attach a verbal label to the familiar stimulus. On the contrary, the second way contains no familiar concept which can initiate another entirely new stimulus [5]. When beginners play badminton, they may not understand the concepts of "net shot" and "push shot." Yet, if they were put in a particular situation, they would spontaneously look for the essential attributes of the two concepts and designate the relevant verbal labels for them.

However, the two ways mentioned here over-simplified the interconnection between word learning and categorization concepts. As in our real life, it is extremely rare that one has no impression of one concept or that the new stimulus is closely related to the familiar one [6]. The reality is that the two ways usually emerge with one another to present the dynamic interaction between vocabulary acquisition and categorization concepts. Existing concepts in one's mind will always guide the process of vocabulary learning, but we cannot deny the truth that the new drive can also bring novel information to the existing knowledge stored in human minds. Hence, the transformation of the new information into the existing knowledge system consolidates the foundation of second language vocabulary acquisition. The categorization model provides the possibility that when second language learners acquire the use of one word, they will apply it to scenes that are similar to the known word in their perception. For instance, children usually refer the word "duck" to animals that are associated with water such as swans, geese, and some other waterfowls [7]. Thus, there are inevitably over-generalization and fossilization of the appropriate use in vocabularies for second language learners due to the categorization in their perception.

3.1.3. Implications of categorization in SLVA

As mentioned before, the acquisition of SLV encompasses five parts, that is when the perception of the objective world is grouped with the guidance of the categorization theory, human beings build a conceptual category in our mental world. Then, with the stimuli and repetition of the practices of new and old words, they turn into set concepts and finally reach the stage of the acquired words for second language learners. The process is presented in **Figure 1**.
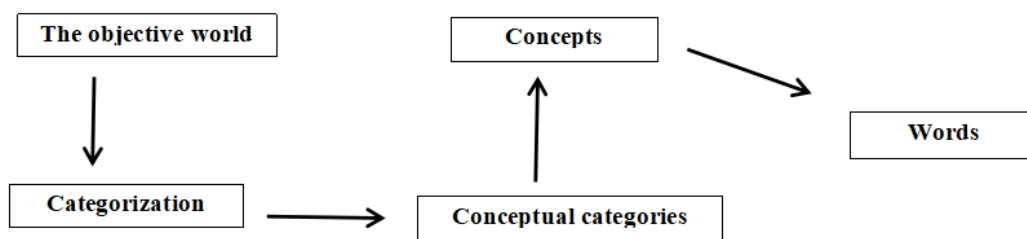
Figure 1. The procedure of second language vocabulary acquisition

According to **Figure 1**, the acquisition of a new word involves finding connections between the conceptual structure and vocabularies of different categories. Therefore, the implications of categorization in SLVA is that a language learner's competence and performance of the acquired vocabularies will be shown in the conceptual structure and categorization.

3.2. The basic-level effect and the prototype effect on SLVA

We have mentioned that there are vertical and horizontal dimensions in categorization. The vertical dimension deals with the basic-level effect, while the horizontal dimension concerns more about the prototype effect.

3.2.1. The basic-level effect on SLVA

The basic-level effect shows the most important characteristics in categorization when compared with other levels. In the cognitive process, it is psychologically salient in affecting vocabulary learning for second language learners [8]. That is, language learners would like to resort to vocabulary at the basic level to describe words at other levels. For example, upon seeing a dog, the first word that comes into language learners' minds will be "dog" but not the generalized expression "animal" or the too-specific word "Chinese Rural Dog."

Geeraerts *et al.* have conducted a series of studies to provide evidence to clarify that there is a strong correlation between the conceptual categories and the use of vocabulary at the basic level. They insist on the salience of the basic level as words in this level are named as the more particular and frequently used words than those that refer to concepts at other levels. Although their interpretation on the basic level challenges the view that cognitive taxonomies are guided by the logical principles of class inclusion, they argued to prove that daily taxonomies are distinct from the artificial and logical scientific ones, so daily taxonomies are not in charge of class inclusion.

In L1 acquisition, the basic level is acquired earlier than the superordinate and subordinate levels. This acquisition order can serve as a model for the SLVA. For instance, in reports or newspapers, the selection of official vocabularies should take categorization into consideration to distinguish the basic level and the non-basic level with the purpose of formal, official, and systematic expression with language power [9]. Thus, the basic-level effect on vocabulary acquisition is of primary significance.

The significance of the basic-level effect has been observed not only in SLA (second language acquisition) but also in FLA (first language acquisition). In FLA, children of 15–18 months acquire the majority of the early vocabularies encoded in the basic-level conceptual categories. When a child utters noun-like vocabularies, he or she is, to a great extent, labeling overwhelmingly at the basic level of categorization. Admittedly, this kind of basic-level salience can be accounted for by the atmosphere created by parents who tend to talk to children with basic-level words. The same is true in SLVA. The underlying reason for that might be the difficulty in understanding words at other levels. Specifically, for second language learners, words are the

fundamental vocabulary for learning a completely new language, so the words at the basic level are the most easily comprehended [10]. Additionally, Callanan performed an experiment to prove the importance of the basic-level category in SLVA. Among the familiar objects, Callanan changed the label into a new one for an object. Subsequently, he presented to language learners accordingly from the subordinate, basic, and superordinate categories as performed with the familiar objects, and he asked whether they noticed the difference. The research results showed that without other clues and the basic-level information, one will automatically classify that kind of vocabulary into the basic-level category. Whereas with the basic-level conceptual information, language learners will be more likely to acquire words that are closely related to the vocabulary at the basic level both in the external form and the grammatical use.

In the Categorization Theory, categorizing an entity at the basic level is relatively less complicated than at other levels. Therefore, in the process of SLVA, second language learners will naturally associate the linguistic terms with conceptual categories at the basic level. It is found that language teachers' vocabularies at the basic level are usually used when teaching superordinate or subordinates. Generally, a superordinate word covers a variety of objects, teachers often make direct reference to the entities or words at the basic level to facilitate students' understanding. However, the linguistic input of the basic-level vocabularies will not refer to the corresponding subordinates.

Besides, the basic-level effect can also be proved in sign language. It has been reported that studies on American Sign Language of the Deaf show that the basic-level categories are most often coded by single signs, while superordinate and subordinate categories are always denoted by multiple sign sequences. The complexity of sign sequences implies that vocabularies at the basic-level categories are invented prior to words for categories at other levels as it is a natural linguistic phenomenon that vocabulary acquisition develops from the simpler to the more complex extent.

To sum up, the basic-level effect is fully presented in the process of the grammatical use and learning of L2 vocabulary. In the context of second language acquisition, vocabularies at the basic level of categorization are psychologically salient when they are denoted in conceptual categories. The basic-level effect on SLVA is proposed to be invented the earliest, the most readily learned, and the most frequently used.

3.2.2. The prototype effect in SLVA

The prototype theory in categorization is another important characteristic, which insists that some vocabularies or entities in the world are attributed with more representative features of the corresponding category than other categories. The cognitive processes of language learners in the conceptual category also make strong evidence for the truth that in comparison with the less prototypical ones, the more prototypical words or vocabularies receive preferential processing. Variations in the prototype effect of category members in vocabulary acquisition also exert influences on language learners' L2 vocabulary learning and use.

In SLVA, the prototype effect has been largely applied by language learners not only in their use of words to label entities or situations in another language, but also in a way of acquiring more words with correlation with the more representative one. For example, Rosch had done related research and proposed that words that demonstrate each color can also be used to describe a variety of color chips on a spectrum. However, with studies going on, she revised that not all color terms can be applied to describe one another, but there is one chip that is prototypically salient among the given color term while other chips are considered less prototypical referents of the term. Clues on color terms can be drawn in the study of SLA. Once language learners grasp the basic use and meaning of one word, they will be more confident in other vocabularies that enjoy the prototypical features but are less sure about the peripheral words or phrases. For example, when second language learners

acquired the words that can describe color chips in general and they were then asked to describe a periphery color chip, they would respond like "It is something between color A and color B."

Meanwhile, the relationship between the prototype effect and the ease of word learning is considered positively related. Rosch explored the correlations between the focal colors which are psychologically salient, and the vocabulary learning of color terms. Rosch invited two groups to this comparative study. The target words designed for them were made-up color terms. Members of the two groups are all second language learners, with one group knowing eight focal color terms for the whole color category, while the other group being taught only eight non-focal colors. The outcome of the research showed that the group that learned the focal colors appeared to be more confident and competitive than the other group. Similar findings have been discovered in second language vocabulary acquisition. Anglin proposed an assumption that second language learners tend to associate words with prototypical members of a conceptual category before non-prototypical members. To enhance persuasiveness, Anglin further conducted research on second language learners under the categorization theory, and the results showed that learners could correctly and quickly label typical animals such as dogs or cats as "animal" when concerned about synonyms or other semantic relations, but they seldom or nearly did not label butterflies or ants as "animal." This assumption promotes the research into a summary that in SLVA, the preferential and salient vocabularies are more likely to be acquired by second language learners and teachers in the process of describing them as referents to express what they want to express in another language. When the participants in the experiment were encouraged by the target stimulus and the distractor stimulus side by side, with the target stimulus of vocabulary being either a prototypical or a non-prototypical example in the learners' conceptual category. The result showed that, before collecting the vocabularies into the non-prototypical members, second language learners spontaneously related the given category names to the prototypical members. Hence, the important role of the prototype effect on SLVA cannot in any other way be underestimated.

In semantic memory research, such as "cat/dog/bird" and "animal" show the fundamental influences of SLVA on the prototypical structure which is possessed by superordinate conceptual categories. For example, if the second language learners were not familiar with the categories of "bird" in their first language, when they were asked to verify sentences in another language like "A penguin is a bird " and "An eagle is a bird," they would be more likely to recognize "An eagle is a bird" as the correct sentence since an eagle's ability in flying covers the main feature in the "bird" category. However, a penguin is less prototypical of a bird as it cannot fly. Similar results of vocabulary acquisition can be further proved in studies involving sentence rating tasks. In the study of Rosch conducted in 1977, participants were asked to utter sentences that contained superordinate category names such as "bird." Subsequently, she replaced the superordinate category names in the sentences with either vocabularies like "eagle" and "robin" for prototypical members or terms like "geese" and "penguin" for non-prototypical members, and asked the participants in the experiment to judge whether the given sentences were natural. The outcome showed that sentences with the superordinate names replaced with prototypical members were rated as being more natural than sentences with the superordinate names replaced with non-prototypical members.

In the process of word production tasks, the prototypical effect exerts great influence upon the production order of vocabularies from the same category. The participants will usually present the most representative category when producing utterances, which means that learners tend to grasp a prototypical member of a conceptual category rather than a peripheral one in language production. The more representative and salient a category member is, the faster the vocabulary can be retrieved or accessed. Learners should acquire the use of vocabulary in context, so when a given context contains vocabulary in the same conceptual category, they

will always place the more prototypical item before the less prototypical one. Thus, the naturalistic output of what they have learned is sensitive to the prototype of the category members, which in turn influences the input of other vocabularies. The prototypical effect is considered to have some connections with the ability to comprehend the use of category members and the corresponding anaphors. The comprehension of anaphoric noun phrases, which is also an effective way for second language learners to acquire new words, is also influenced by the prototypicality of category members. It reveals that the comprehension of sentences to the category members implies that the anaphoric connection promotes the learners' ability for second language acquisition.

To summarize, the prototype effect is present in the comprehension, acquisition, and linguistic use of L2 vocabulary. In the L2 context, words that contain the more prototypical members of a category are observed to be more easily learned, more quickly encoded into memory, and more readily and frequently retrieved.

4. Conclusion

In this paper, the intrinsic relationship between categorization and L2 vocabulary acquisition has been discussed. The Categorization Theory is believed to be the cognitive foundation for the formation of conceptual categories, concepts, and words. Under the guidance of this assumption, word meaning is referred to be in connection with not only the single words but also their concepts and conceptual structures. Therefore, when language learners attempt to acquire one language, they should begin with the corresponding vocabulary. Thus, word meaning can function as a bridge in establishing connections between words and concepts or conceptual structures. In the process of SLVA, an implication can be derived from the assumption that categorization serves as the cognitive foundation for concepts and words, so it can be concluded that characteristics pertaining to concept categorization should have their corresponding presence in the human vocabulary system.

The status of the two characteristics in categorization, namely the basic-level effect and the prototype effect, is emphasized in L2 vocabulary learning and use. The basic-level effect in L2 vocabulary learning and use shows that vocabularies denoting conceptual categories at the basic level of categorization are observed to be the most readily learned and used in neutral contexts. The prototype effect in SLVA proves that more prototypical members of a conceptual category are found to be closely related to the ease of learning, memorizing, and retrieving.

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