

Analysis of English Prepositions based on Cognitive Linguistics

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Abstract: Based on the theory of cognitive linguistics, this paper conducts an in-depth analysis of the polysemy of English prepositions. Through the prototype theory, image schema and metaphorical mechanism, it reveals the cognitive process of the meaning expansion of English prepositions in different contexts. The research shows that the spatial prototype meaning of English prepositions is the foundation of their multiple meanings, and it extends to abstract domains such as time, quantity and state through the metaphorical mechanism. Image schema provides an intuitive framework for the construction and understanding of preposition meanings. These theories offer a new perspective for English preposition teaching, which helps improve learners' ability to understand and master the polysemy of prepositions and further promotes the all-round development of language ability and cognitive ability.

Keywords: Cognitive Linguistics, English Prepositions, Image Schema, Metaphorical Mechanism, Prototype Theory.

1. Research Background

English prepositions, as one of the most active word classes with a relatively small number in the English language, are of self-evident importance. Although there are a limited number of prepositions, most of them possess multiple meanings and can flexibly combine with different types of words to express complex relationships in terms of space, time, direction, manner and so on. This phenomenon of polysemy not only increases the difficulty of learning English (Li, 2018), but also has become the focus of attention among linguistics researchers.

In recent years, with the rise and development of cognitive linguistics, researchers have begun to examine the polysemy of English prepositions from new perspectives. All the meanings of English prepositions form a polysemous network (Feng, 2015). Cognitive linguistics emphasizes the close connection between language and cognition, believing that language is the product and reflection of human cognitive activities (Hu, 2022). As a highly abstract category of words in language, the polysemy of prepositions precisely reflects the complexity and creativity of human cognition. Tyler and Evans (2001) put forward a new model for analyzing the polysemy of English prepositions, namely the Principled Polysemy Network. They hold that the prototype meaning of an English preposition can extend to more meanings through image schema and metaphorical mechanism, and finally form a polysemous network rich in meanings.

Therefore, from the perspective of cognitive linguistics, especially by using the metaphor theory and image schema theory therein to conduct an in-depth analysis of English prepositions, it will not only help to reveal the cognitive mechanism behind the polysemy phenomenon of prepositions but also provide useful references and inspirations for fields such as English teaching and language translation (Sun, 2021).

2. The Value of the Prototype Category Theory to English Prepositions

2.1. An Overview of the Prototype Category Theory

The prototype category theory was originally derived from the theories in the philosophical field and contemporary linguistics, emerging on the basis of the critical cognition of Aristotle's classical category theory. As one of the earliest linguists who introduced the theory into China, Wang (2006) first systematically introduced cognitive linguistics, especially the prototype category theory, in his book "Cognitive Linguistics", laying a solid foundation for the dissemination and application of this theory in China. He emphasized the importance of cognition in linguistic research and how categories are constructed through human cognitive processes rather than simply based on a fixed set of sufficient and necessary conditions. Lan (2005) concisely summarized the key points of the prototype category theory, pointing out that category members do not fully meet a fixed set of conditions but are judged for their membership according to the degree of their similarity to the prototype. This similarity presents a radial structure, that is, some members represent the category more typically than others. In addition, she also pointed out the multi-centered nature of category structures, meaning that a category may be composed of multiple prototypes rather than having a single center. Liu (2006) further emphasized the close connection between family resemblance and the prototype theory, believing that they are essentially the same. He proposed that the prototype theory has three core characteristics: information richness (being able to provide more detailed information about the category), stability (although there are changes, the prototype remains relatively stable over a period of time), and flexibility (being able to adapt to new members and situations). These characteristics make the prototype category theory become a powerful tool for explaining linguistic phenomena.

Ao (2006) used the prototype category theory to explain the phenomenon of polysemy, pointing out that multiple

meanings of a word can be derived from its original meaning and that these meanings have different degrees of prototype status. This view emphasizes the internal connections and dynamic changes among word meanings, that is, word meanings do not exist in isolation but constantly evolve with the use of language and changes in social culture. The prototype category theory provides a powerful theoretical framework for understanding such evolution. Zhang (2003) used the characteristic of boundary fuzziness in the prototype category theory to explain the extensibility of the English tense category. She pointed out that the boundaries of the tense category are not fixed but have a certain degree of fuzziness and variability. This fuzziness enables the tense category to accommodate more linguistic phenomena and thus express time relations more accurately. Her research revealed the complexity and diversity of the tense category and also demonstrated the applicability of the prototype category theory in grammatical research. Liu (2010) used the principle of family resemblance to explore the categorization process of taboo words and euphemisms, believing that euphemisms are the superordinate category of taboo words. This view revealed the internal connections and hierarchical relationships between taboo words and euphemisms and also demonstrated the effectiveness of the principle of family resemblance in explaining linguistic phenomena. Her research not only deepened our understanding of taboo words and euphemisms but also provided inspiration for our understanding of the broader process of language categorization. Yuan and Niu (2020) believed that the prototype category theory can well explain the problems that are difficult to classify. In linguistics, some phenomena may be difficult to define using traditional classification methods because they may simultaneously have the characteristics of multiple categories. The prototype category theory, by emphasizing the fuzziness and dynamism of categories, provides a new perspective for explaining these difficult-to-classify phenomena. This view not only broadens the application scope of the prototype category theory but also provides new ideas for our understanding of the complexity and diversity of language.

As an important part of cognitive linguistics, the prototype category theory has been widely recognized for its explanatory power in multiple aspects such as semantics, grammar, and pragmatics. However, although it has significant applications and contributions in these fields, there are relatively few studies using it to explain the polysemy of English prepositions.

2.2. The Understanding and Cognition of English Prepositions from the Perspective of the Prototype Category Theory

Although there are not many English prepositions in number, each preposition has its prototype meaning, that is, the meaning of the most basic and typical spatial relationship. For example, the prototype meaning of “in” is that “the trajector is located inside the landmark”, and the prototype meaning of “on” is that “the trajector is located on the landmark and in contact with it”.

Within the category of prepositions, members are not completely identical but have family resemblance. That is to say, they have certain similarities with prototype prepositions in terms of semantics and usage, but they are not exactly the same. For example, both “over” and “above” mean “above” in space, but “over” emphasizes more on covering or passing

through in the vertical space, while “above” emphasizes more on the position higher than something in the horizontal space.

The boundaries of the preposition category are not clear-cut but have a certain degree of fuzziness. This is mainly reflected in the polysemy and context dependence of prepositions. For example, “by” can not only mean “beside” in space but also mean “before” in time or “by means of” in terms of manner.

Based on the above characteristics, English preposition teaching should focus on helping students firmly grasp the prototype meanings of prepositions, guiding students to identify the similarities and differences among members of the preposition family, and improving the accuracy and flexibility of preposition use. When explaining prepositions, it should be combined with specific contexts to help students understand the different meanings of prepositions in different contexts. Through a large number of exercises and practices, students can consolidate and deepen their understanding of prepositions in practical application.

2.3. The Advantages of the Prototype Category Theory in the Study of English Prepositions

The prototype category theory points out that each preposition has one or more prototype meanings, and these prototype meanings are usually closely related to spatial relationships. On this basis, the meanings of prepositions extend to other fields through cognitive mechanisms such as metaphor, forming peripheral semantic items. This process of extension from the prototype to the periphery helps learners understand the polysemy of prepositions more systematically. The prototype category theory helps to construct a semantic network centered on the prototype meaning, so that the various meanings of prepositions are no longer isolated but are interrelated and influence each other. This network structure helps learners to more accurately grasp the changes in meaning when they remember and use prepositions.

The prototype category theory enables teachers to conduct targeted teaching according to the prototype meanings of English prepositions. First, let students master the basic usages of prepositions, and then gradually expand to other peripheral semantic items. This step-by-step teaching method helps to reduce the learning difficulty and improve teaching efficiency. By learning the prototype category theory, students can better understand the internal connections among preposition meanings, and thus it is easier for them to achieve knowledge transfer and flexible application. For instance, after mastering the basic usage of the preposition “in” to express spatial position, students can more easily understand its usages in other fields such as time and state.

The prototype category theory provides new perspectives and methods for the study of English prepositions, enabling researchers to explore the meaning changes and development laws of prepositions more deeply. The prototype category theory is not only involved in the field of linguistics but also closely related to cognitive science, psychology and other disciplines. Therefore, through the research of this theory, the cross-integration of linguistics and other disciplines can be promoted, and the development of interdisciplinary research can be facilitated.

The prototype category theory has multiple advantages in the study of English prepositions. It helps to deepen the understanding of the polysemy of prepositions, improve the efficiency of preposition teaching, and provide new research

perspectives. These advantages make the prototype category theory have important application value and development prospects in the study of English prepositions.

2.4. The Specific Manifestations of English Prepositions within the Category

The specific manifestations of English prepositions within the category are diverse and complex. They are mainly used to indicate the relationships between nouns, pronouns or verbs and other elements, including various relationships such as spatial, temporal, causal, and manner relationships.

Prepositions can express the specific position of something in space. For example, “in” indicates being inside something, “on” indicates being on the surface of or above something (in contact with the surface), “under” indicates being below something, “above” indicates being above something (not in contact), and “over” indicates being vertically above with a certain space and so on. Prepositions can also express the direction of movement. For example, “to” can indicate moving towards a certain place, “from” indicates starting to move from a certain place, and “across” indicates crossing something and so on. Prepositions can express the position of something within a certain range. For instance, “in” can indicate being in a large place or area, “at” can indicate being at a small place or a specific point, and “on” can indicate being adjacent or bordering and so on.

Prepositions are often used to express specific time points or time periods. For example, “at” is used to express a specific moment (such as “at six o’clock”), “on” is used to express a specific day or a specific date (such as “on Monday”, “on January 1st”), and “in” is used to express months, seasons, years or the morning, afternoon or evening periods of a day (such as “in January”, “in spring”, “in 2024”, “in the morning”). Prepositions can also express the duration of a period of time. For example, “during” indicates being within a certain period, “for” indicates the length of a period of time that lasts (such as “for six years”), and “over” indicates being distributed or continuing over a period of time and so on. Prepositions can express the sequential order of events. For instance, “before” indicates being before something, “after” indicates being after something, and “since” indicates starting from a certain time point up to now and so on.

Prepositions like “for” are often used to express reasons or purposes. For example, “I did it for you.” Prepositions such as “by”, “with”, “through” and so on can be used to express the ways or means of performing an action. For example, “by bike”, “with a pen”, “through the window” and so on. Prepositions can also express the relationship or property between one thing and another. For instance, “of” expresses the possessive relationship (the walls of the room), and “to” in some phrases indicates being directed at or being specific to something (the key to the door). Prepositions can also express relationships such as quantity, comparison, and accompaniment. For example, “about”, “around” can be used to express the approximate range of quantity, “than” is used to express the comparison relationship, and “with” can be used to express the accompaniment relationship and so on.

The specific manifestations of English prepositions within the category are multifaceted. They connect various components in a sentence by expressing multiple relationships such as spatial, temporal, causal, and manner relationships, making the meaning of the sentence more complete and clear. Understanding and mastering the usage of prepositions are crucial for improving English expression

ability and reading comprehension ability.

3. The Significance of Image Schema Theory and Metaphor Theory to English Prepositions

3.1. An Overview of Image Schema and Metaphor

Image schema is deeply rooted in the fertile soil of human interactive experiences with the objective world. Lakoff (1987) incisively pointed out that these schemas are relatively simple cognitive structures that frequently emerge in daily experiences. He further categorized these schemas into seven major types: the Container Schema, which symbolizes the distinction between boundaries and the inside and outside; the Path Schema, which depicts the trajectory of movement and direction; the Link Schema, which shows the connections and bridges between things; the Part-Whole Schema, which reveals the hierarchical relationship between the whole and its parts; the Center-Periphery Schema, which reflects the relative positions of the core and the periphery; and the Up-Down Schema and the Front-Back Schema, which respectively capture the spatial relationships in the vertical and horizontal directions. Spatial relationships are not only a direct reflection of the physical world but also a powerful tool for humans to understand abstract concepts. Metaphor, as a cognitive mechanism, allows us to map concepts from one domain (such as space) onto another seemingly unrelated domain (such as time, emotion, social structure). This mapping process not only enriches the expressive ability of language but also promotes the abstraction and complexity of human thinking.

Johnson (1987), from another perspective, emphasized the dynamic nature of image schema. He believed that these schemas are dynamic patterns that constantly recur in perceptual interactions and motor behaviors. They are like the tapestry of cognition, endowing complex experiences with a coherent thread and a solid structure. This perspective highlights the crucial role of image schema in integrating and interpreting experience.

Although the two scholars adopted different languages and emphases when elaborating on image schema, their core ideas coincided: Image schema is a perfect combination of experientiality, abstractness, and dynamism. They not only originate from our personal experiences of the world but also transcend the constraints of specific situations, capturing the universally existing cognitive laws in an abstract form. Meanwhile, these schemas demonstrate strong adaptability and flexibility in dynamic changes, ensuring that our cognitive system can flexibly respond to the challenges of complex and changeable environments.

Since the 1970s, the polysemy phenomenon of English prepositions has attracted extensive attention from scholars both at home and abroad. The research in this field has not only witnessed the gradual deepening of linguists’ understanding of the polysemy of prepositions but also demonstrated the vigorous application and development of cognitive linguistics theories, especially the image schema theory, in this research area.

Through pioneering graphic displays, Brugman (1987) first systematically revealed the complex hierarchical meanings of the word “over”, laying a solid foundation for the subsequent in-depth exploration of the polysemy of prepositions. Lakoff

(1988), based on Brugman's work, conducted a more detailed induction and organization, put forward 24 different concepts of "over", and introduced the thinking methods of image schema and image transformation, greatly promoting the research progress in this field and stimulating the academic community's strong interest in the research on the polysemy of prepositions. Langacker (2002), from the perspective of cognitive linguistics, deepened and expanded the image schema theory. In particular, by introducing three core concepts, namely TR, LM, and PATH, he constructed a more refined cognitive model, providing a powerful theoretical support for understanding the polysemy of prepositions. Scholars such as Ungerer and Schmid (2006) continued to explore the polysemy of prepositions like "over" by exploring their multiple schemas, further enriching the theoretical framework of preposition research and making the research in this field more comprehensive and in-depth.

Although the domestic research on the application of the image schema theory to English prepositions started relatively late, it has developed rapidly in recent years and achieved remarkable results. Scholars represented by Liu (1997) and Shi (2006) were among the first to conduct in-depth analyses of the polysemy of prepositions such as "over", "on", and "in" through category theory and prototype theory and explored the causes, thus opening up a path for relevant domestic research. Cao (2005) and others, based on the image schema theory, carried out extended analyses on the schemas of prepositions such as "on", "over", and "above", not only revealing the internal mechanisms of the semantic evolution of these prepositions but also enriching the application practice of the image schema theory in China. Su's (2012) research on the preposition "for" and the comprehensive discussion on the polysemy of English prepositions all demonstrated the profound accumulation and unique insights of domestic scholars in the field of preposition research, further deepening the understanding of these prepositions.

The research on the polysemy phenomenon of English prepositions by scholars at home and abroad has not only deepened our understanding of the polysemy of prepositions but also promoted the extensive application and development of cognitive linguistics theories, especially the image schema theory, in linguistic research. The continuous exploration in this field has not only enriched the theoretical treasure house of linguistics but also provided important theoretical support for fields such as language teaching and translation practice.

3.2. The Value of Image Schema and Metaphor to English Prepositions

As an important part of cognitive linguistics, the image schema theory provides a new perspective for preposition teaching. It emphasizes the cognitive patterns formed on the basis of people's perception of and physical experiences in the objective world, which helps teachers guide students to understand the meanings and usages of prepositions from a cognitive level. Image schema displays the spatial relationships expressed by prepositions through intuitive images and dynamic processes, enabling students to understand the meanings of prepositions more intuitively. This teaching method helps stimulate students' learning interests and improve their learning enthusiasm and participation.

English prepositions are polysemous, and their meanings often change with the context. The image schema theory helps students understand the multiple meanings of prepositions by

revealing the changes in image schemas of prepositions in different contexts. For example, the preposition "on" can mean "on", "about", "rely on" and so on. Through the image schema theory, students can better understand the internal connections and change laws among these different meanings. Metaphor is an important phenomenon in language and is also the key to understanding the polysemy of prepositions. The combination of the image schema theory and the metaphor theory can help students recognize the metaphorical relationships among preposition meanings, thus promoting the development of their metaphorical thinking. For example, when the preposition "in" expresses a spatial relationship, it can be metaphorically used to mean "in a certain state" or "participate in a certain activity". By understanding this metaphorical relationship, students can use prepositions more accurately to express their thoughts and emotions.

The image schema theory helps students connect the different meanings of prepositions to form an organic meaning network. This network structure helps students be more flexible and accurate when remembering and using prepositions. For instance, students can connect the different meanings of the preposition "over" (such as "above", "more than", "cover" and so on) through image schemas to form a clear meaning network, so as to better master the usage of this word. For second language or foreign language learners, the influence of their mother tongue is often a factor that cannot be ignored. The image schema theory helps students reduce the negative transfer of their mother tongue by revealing the commonalities and differences of prepositions in different languages. For example, in Chinese, "on" and the phrase "on top of" both express spatial relationships, but their image schemas are not exactly the same. By comparing the image schemas of these two languages, students can better understand the unique usage of "on" in English and thus reduce the interference of their mother tongue.

The value of image schema and metaphor in the research on English prepositions lies in providing new teaching ideas, promoting in-depth understanding of preposition meanings, and improving the efficiency of preposition learning. These values not only help improve the current situation of English preposition teaching but also help cultivate students' language abilities and cognitive abilities.

3.3. The Content of the Research on English Prepositions Based on Image Schema and Metaphor

Most English prepositions originate from spatial concepts, and their prototype meanings are often closely related to spatial orientation relationships, such as "in", "on", "under" and so on. These spatial relationships form intuitive cognitive patterns in people's brains through image schemas. Researchers can intuitively display the image schemas of prepositions by graphically representing the spatial meanings of prepositions. For example, using arrows, lines, graphics and other elements to represent the spatial relationships described by prepositions helps students better understand and remember the meanings of prepositions.

The spatial concepts of prepositions are extended to other fields such as time, quantity, state, emotion, etc. through metaphorical mechanisms, thus generating rich metaphorical meanings. For example, "in" can mean "during" in terms of time, and "on" can mean "based on" or "about" in terms of quantity. The combination of the metaphorical mechanism and the image schema theory can systematically analyze the

meaning changes of prepositions in different contexts. By revealing the variants of image schemas of prepositions in different cognitive domains, researchers can deeply understand the polysemy of prepositions and the cognitive mechanism behind it.

The research on English prepositions based on image schema and metaphor not only reveals the cognitive mechanism of the polysemy of prepositions but also provides new ideas and methods for preposition teaching. By understanding and applying image schema and metaphor mechanism, students can understand and master the usages and meanings of English prepositions more deeply.

3.4. The Advantages of Image Schema and Metaphor in the Research on English Prepositions

Image schema can help students understand the basic meanings of prepositions by demonstrating their specific manifestations in spatial relationships. Meanwhile, the metaphorical mechanism further reveals the expansion process of prepositions from the spatial domain to other cognitive domains (such as time, quantity, state, etc.), enabling students to grasp the polysemy of prepositions more comprehensively. The combination of image schemas and metaphors helps students establish connections among different meanings of prepositions. By revealing the variants of image schemas of prepositions in different contexts, students can better understand the internal connections and change laws among various semantic items of prepositions.

Image schemas and metaphors provide new ideas and methods for preposition teaching. Teachers can utilize the image schema theory to display the meanings of prepositions through intuitive means such as graphics and animations, making teaching more vivid and interesting. Meanwhile, the introduction of the metaphorical mechanism also helps stimulate students' learning interests and enthusiasm. Image schemas and metaphors can assist students in forming a deep memory of preposition meanings. By constructing a meaning network of prepositions, students can organically connect the different meanings of prepositions, thus improving the efficiency of memory. In addition, the expansion of metaphors enables students to use prepositions flexibly in different contexts.

Metaphor is an important phenomenon in language and also an important way of human cognition. By learning and understanding the metaphorical usages of prepositions, students can cultivate their metaphorical thinking ability, so as to better understand and apply language. The research on image schemas and metaphors is helpful for improving students' overall cognitive ability. Through the research on prepositions, students can better understand and grasp the essence and laws of language, thereby enhancing their language ability and thinking ability.

The use of metaphor is often influenced by cultural factors. Through the research on the metaphorical usage of English prepositions, students can better understand the cultural backgrounds and thinking patterns of English-speaking countries, thus enhancing their cultural sensitivity. After mastering the metaphorical usage of English prepositions, students can express their thoughts and emotions more accurately in cross-cultural communication and avoid misunderstandings and conflicts caused by cultural differences.

In conclusion, the advantages of image schemas and

metaphors in the research on English prepositions lie in deepening the understanding of preposition meanings, improving teaching effects, promoting cognitive development, and facilitating cross-cultural communication. These advantages not only help improve students' language ability and thinking ability but also help cultivate their cross-cultural communication ability.

4. Conclusion

From the perspective of cognitive linguistics, the research on English prepositions has demonstrated rich cognitive levels and dynamic change processes. Firstly, as a key element in language, the polysemy of prepositions stems from the flexibility and complexity of human cognition. Through the prototype theory, we have learned that the basic meaning (i.e., the prototype meaning) of a preposition is the core of all its extended meanings, and these extended meanings gradually expand around the prototype, forming the diversity of preposition meanings.

Secondly, the image schema theory provides intuitive and specific cognitive models for the spatial meanings of prepositions. These schemas not only reveal the specific manifestations of prepositions in spatial relationships but also help learners build a profound understanding and memory of preposition meanings. Through image schemas, learners can intuitively grasp the usage of prepositions in different spatial relationships, thus improving their language application ability.

Moreover, the metaphorical mechanism has played a crucial role in the formation and development of the polysemy of prepositions. As an important way of human cognition, metaphor enables prepositions to map from the spatial domain to abstract domains such as time, quantity, and state, thus generating rich metaphorical meanings. This cross-domain mapping not only enriches the meaning of prepositions but also reflects the flexibility and creativity of human thinking.

In summary, the analysis of English prepositions based on cognitive linguistics provides us with a brand-new perspective to understand the polysemy and cognitive mechanism of prepositions. These theories not only help us understand the essence and usage of English prepositions more deeply but also offer new ideas and methods for preposition teaching. In future research and teaching, we can further explore and utilize these theoretical resources to promote learners' understanding and mastery of English prepositions.

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