

Study on the Semantic Uncertainty in the Framework of Cognitive Linguistics*

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Abstract—Semantics is one of the core issues in the framework of cognitive linguistics, which posits that the meaning of a linguistic expression is concerned with the encyclopedic knowledge the expression exerts, meaning consists in conceptualization, and meaning is dynamic and uncertain rather than crystallized. The present paper is designated to research the mechanism behind the uncertainty of meaning, from the perspective of three cognitive categories: cognitive semantics, cognitive grammar, and cognitive context respectively. Then "Maze Stereology", a computational model of the brain for the ambiguous sentence, is proposed, which is assumed to provide a theoretical guiding for artificial intelligence.

Keywords—*cognition; the Pointview of Meaning; semantic uncertainty; "Maze Stereology"*

I. INTRODUCTION

Cognitive linguistics is a newly emerging linguistic school or research approach in the linguistic theory field since 1960s. It is based on people's psychological cognition and approaches language in a way that is compatible with what is known about the human mind, treating language as reflecting and revealing the mind. In the cognitive traditions, meaning is uncertain to some extent. How and why it is reasonable to regard meaning as uncertain and dynamic? Be that as it may, on what grounds it is possible for human beings to communicate with each other? Is there any mechanism by which people can sort out the most possible semantic computation? The present paper will give answers to these questions.

II. THE GIST OF COGNITIVE LINGUISTICS

William Croft and D. Alan Cruse see three major hypotheses as guiding the cognitive linguistic approach to language: "language is not an autonomous cognitive faculty, grammar is conceptualization, and knowledge of language emerges from language use" (Croft & Cruse, 2004:1). The three assumptions differ cognitive linguistics from other linguistic schools, making it a new research paradigm. It is claimed as one of the revolutions of anti-Chomskyan TG school. TG claims that the language system has deep structure and surface structure, and people are born with the language acquisition device (LAD) and the universal grammar (UG). The process of acquiring a language is the

realization of transformation from the deep structure to the surface one. Cognitive linguistics, however, claims that people are not endowed with the LAD, and language is the product of men's interaction with the outside world. The acquisition of language is usage-based. Besides, the two schools diverge from each other in terms of the concept of meaning. TG posits that meaning conforms to the bottom-up principle, specifically speaking, the whole is exactly the addition of the compositional parts, while CL claims that a sentence itself has a constructional sense independent of the compositional words, and the meaning of a sentence is the result of the interaction between the constructional meaning and the lexical content endowed in the compositional words. Meaning is not so much confined in the words as the interaction between human beings and the practical world. Just as Langacker holds it, meaning consists in conceptualization — the way people conceptualize the object, thus, meaning is a subjective construal.

Cognitive linguistics is based on the embodied philosophy. That is to say, cognition is based on the bodily experience, which conforms to the essence of Marxism — object is the base of spirit. Cognitive linguistics processes language within the "men-language-objective world" frame, exhibiting the essence of language. Saussure directs his attention to the symbolical relation within language, separating language from the subjective men and the outside world. He holds that language is transcendental, independent of human beings, and linguistic meaning lies in the syntagmatic and paradigmatic relation in the system of language. It emphasizes the internal and systematic nature of language, but ignores the features of language such as diversity, complexity, and uncertainty. Chomsky transforms the research paradigm from the description (what language it is and how it is?) to the explanation (why it is?) of language, which is consistent with the shift of philosophy of language from ontology to epistemology and has revolutionary significance. Chomsky regards language an innate psychological entity. Both Saussure's and Chomsky's language theories have the feature of idealism, ignoring the function of human beings during the construction of linguistic meaning. CL posits that linguistic symbols obtain meaning through people's establishment of the relationship between language and the outside world. The meaning of linguistic symbol is not so much directly related with the objective world as the result of people's cognition and

construal. No same individual knowledge background and different perspectives of construal will result in the diversity and uncertainty of meaning.

The present paper aims to explain the uncertainty from the perspectives of cognitive semantics, cognitive grammar, and cognitive context. It is worth noting that the cognitive context herein refers to the discourse environment, social environment and cultural environment, etc., instead of Langacker's local context. The comprehension of any linguistic expression is context-dependent, and an understanding of a concept resorts to the one at the lower level of schematization. For example, the concept [KUNCKLE] is comprehended in the concept [FINGER], likewise, [FINGER] in [HAND], [HAND] in [BODY], and lastly [BODY] in the spatial domain (Langacker, 1987:148). All of the concepts at different levels of abstraction form a hierarchical chain.

III. THE SEMANTIC UNCERTAINTY IN THE COGNITIVE CATEGORY

A. *The Semantic Uncertainty in Cognitive Semantics*

Cognitive semanticists are opposed to the traditional theory of truth-conditional (logical) semantics, and hold the semantic view of encyclopedia, experience and construal. According to the view of semantic encyclopedic knowledge, the meaning of a word contains all the features of its concept. For example, the color, shape, edibility, tropical fruit and other features of the concept [BANANA] all belong to the lexical meaning of the word "banana". The understanding of a word (profile) must resort to a domain, a frame, or even the whole concept system. However, language, as a formalized description of conceptual representation (there are other ways to represent concept, such as gesture), manifests itself in the dictionary by selecting some typical and generic features as entries. Reversely, the meaning of a dictionary only carries the typical features of the concept in a specific temporal and spatial domain. Therefore, the lexical meaning will be updated and present the dynamic feature with the change of concept and people's deeper understanding of the concept. It is noticeable that the view of semantic encyclopedic knowledge endeavors to construct a correspondent relationship between conceptual features and lexical meaning, but the question is that the former is the abstract concept, while the latter is the linguistic entity, the two is related but by no means equal.

Cognitive linguistics posits that meaning is based on the bodily experience, so meaning is subjective rather than objective. Langacker regards "meaning is not identified with concepts but with conceptualization", highlighting "its dynamic nature" (Langacker, 2008:30). The semantic value of an expression depends on not just the conceptual content but also how that content is construed, including four dimensions such as "specificity, focusing, prominence, and Perspective" (Langacker, 2008:55). The realization of meaning is the result of people's interacting with and construal of the physical world, which has no meaning innately. Langacker's view of construal greatly profiles the subjectivity in the construction of meaning, and no the same

subjective consciousness could be formed if the same object is scanned from different perspectives. An object can have different profiles from different sides just as the handle of a cup can be seen or not from different angles. The profiled is the knowledge about the thing, which can be partial and dynamic. As the increasing of people's observation angles, the established knowledge will change in quantity or even in quality. Frame semantics also emphasizes that meaning is the result of profile. A word's understanding is based on the background frame the word evokes. In people's view, different background frames will be activated by different persons as to the same word. The heterogeneity of frame illustrates that the concept designated by the same word is by no means the same in different person's brain.

It can be seen that the semantic views of encyclopedia, experience and construal reflect the essence of semantic uncertainty, which can be detected from the cognitive grammar along the similar lines.

B. *The Semantic Uncertainty in Cognitive Grammar*

Construction grammar, as a branch of cognitive grammar, posits that any linguistic form is the pairing of form and meaning. Meaning is the result of the interaction of construction and its components. Construction is abstracted out of the frequent-occurring and common experience, say, the caused-motion situation. That being said, construction has an independent meaning. The construction and the words instantiating it "negotiate" with each other, finally a unified meaning is achieved.

What is described is Goldberg's main proposal about construction (Goldberg, 1995). People are in agreement with Goldberg's statement that the meaning of construction comes from people's common experience. In terms of "semantic negotiation", however, people cannot just talk about the result of this negotiation, but have no lips to the process of it, which violates the scientific spirit of tracing origin. It is necessary to figure out the relationship between the construction and the components when talking about the "semantic negotiation". Logically speaking, there are two kinds of situations: one is that they are semantically compatible; the other is that they are semantically incompatible.

The most straightforward case of semantic compatibility is when a verb elaborates the meaning of the construction. Taking English ditransitive construction as an example, its prototypical meaning is "X CAUSE Y TO RECEIVE Z". Verbs inherently signify acts of giving, such as "give" and "lend" are compatible with the construction meaning. Verbs metaphorically signify acts of giving, such as "tell" can also occur in the ditransitive construction. The occurrence of the word "promise" in the ditransitive construction conveys not actual but future giving, relying on the extensions of the constructional meaning. The cases of semantic compatibility in the mentioned fashions are easy to solve, but the key problem lies in the case of semantic incompatibility.

When there is a conflict between component meaning and construction meaning, it is the time when they really need to negotiate. Then, the question is: can the negotiation

succeed? If it is not successful, there will be no subsequent "cooperation" between the two. If the "word — construction pairing" is not constructed, the linguistic form will not exist, so there is no need to discuss. If it is successful, is it worth asking how do they negotiate? What is the semantic representation after the successful negotiation? Is it characterized by a "compromised" meaning, or multiple meanings (say, the polysemy of a specific construction)? The English ditransitive construction is taken as an example again. The word "refuse" is negatively related to the meaning of the ditransitive construction, but the two compromise with each other, and the final overall meaning is "refuse (fail) to transfer something to someone". The way of negotiation can be deconstructed as: ditransitive construction contributes to the meaning of transferring, and "refuse" grafts its negative meaning to the transferred meaning of ditransitive construction. Another case is that the one-argument predicate "sneeze" occurs in the three-argument caused-motion construction, the missing part and the corresponding additional arguments is attributed by the construction; this process is usually termed as constructional coercion. The constructional approach justifies the novel usage of many verbs, just as the occurrence of "sneeze" in the caused-motion construction, to present the dynamic feature of a construction.

In addition, the grasp of word meaning needs to evoke the relevant framework. The difference of individual framework knowledge will lead to the polysemy, ambiguity and uncertainty of sentences under the construction view. Moreover, in the construction grammar, construction is abstracted out of the common experience of human beings, which fails to capture the fact that semantics is not only public, but also individual and different. Different discourse environment, social culture, customs and etiquettes will affect the way of understanding discourse.

C. The Semantic Uncertainty in Cognitive Context

The very idea that meaning is uncertain is also from the aspect that a single sentence may have different discourse functions in different contexts. For example, there is a scene where a little child Tom has been playing at a neighbor's house for a long time. At this time, the neighbor wants the child to go back, but the social conventions save us from saying, "Tom, go home quickly." On the contrary, people are likely to say like this "Tom, do you got a home?" If Tom doesn't have enough social and cultural knowledge, he is likely to answer with "of course, I've got a home." Then, the child didn't understand the pragmatic meaning of the neighbor's utterance. That being said, there are some situations where the literal meaning of an utterance and the speaker's intention, or the contextual meaning are inconsistent, which is represented in various rhetorical devices, such as metaphor, metonymy and exaggeration in Chinese traditional linguistics. Thus, the semantic uncertainty lies greatly in speaker's intentionality, which is beyond the sentence's meaning. The relevance between intentionality and sentence itself is constructed by the speaker's beliefs about an event. Whether the listener can infer the speaker's intentionality from the literal meaning of

the sentence consists in whether the listener can establish the same relevance. The same belief knowledge about the event scene is a guarantee to establish the same relevance. Modern cognitive linguistics emphasizes that "semantics is on-line", which means a sentence's meaning is processed in the current dialogue and communication. To some extent, the uncertainty of context leads to the uncertainty of semantics.

From the three cognitive categories of cognitive semantics, cognitive grammar and cognitive context, semantic uncertainty can be said to be the essential feature of language. Quine has the same observation, claiming no proposition meaning will not be changed, once experience is changed, the core proposition will be changed. Although semantic uncertainty is a common feature of natural language, there are few cases where people's communication is affected by the semantic uncertainty. In the process of communication, people can always choose the most appropriate semantics according to knowledge background, cultural common sense, context and some grammatical and semantic features. How does this process of brain processing and selection work?

IV. QUANTITATIVE PROCESSING OF SEMANTIC UNCERTAINTY

Cognitive linguistics follows the paradigm of interaction between "bottom-up" and "top-down". Specifically speaking, the meaning of words provides the basis for the meaning of sentences, but the whole sentence has the constructional meaning. A sentence is not a simple sum of the characteristics of its components, but an integrated system formed by the interrelation of the components. In the process of figure recognition, people have Gestalt psychology; in the test of word recognition, even in the case of several spelling mistakes, the subjects can quickly recognize the whole word. These psychological phenomena provide the factual support for the "individual-whole" interactive view of cognitive linguistics. Langacker also proposed that there are two ways of mental scanning: sequential scanning and summary scanning. In the latter way, "a detailed conception is progressively built up, becoming active and available as a simultaneously accessible whole for a certain span of processing time" (Langacker, 2008:83), namely, mental scanning can be operated in a holistic way (Gestalt). So, when people encounter ambiguous sentences with uncertain meanings, can they also follow the cognitive pattern of "top-down" and "holistic scanning"?

Assumed that there is a sentence composed of M different words, each of which has N meanings, how does the human brain choose the best way to understand the meaning of this sentence? The serial model points out that language processing system is an independent module, and language processing abides by linear processing, so only one representation is activated at a time. According to this model, the brain should perform N^M times of mental operations. This hypothesis is in line with the modular theory of generative linguistics and the concept of meaning combination. However, the holistic view and the constructional view of cognitive linguistics treat this question in an opposite fashion: people have the ability to

grasp the meaning of sentences as a whole and directly start the most appropriate semantics of each word in the current language environment. This is just like when people are walking in a maze, one way is that they can only explore the way step by step from a horizontal perspective, and each step's mistake will result in a new start from the very beginning; The other way is that the brain can start each path at the same time, so as to quickly calculate the optimal path out of the maze, resorting to the assumption that human brain has a strong ability to abstract the three-dimensional maze. The latter's way to go out of a maze is just like the way of path recognition inspired by cognitive linguistics. This paper calls this way of sentence meaning processing "Maze Stereology", a kind of hypothesis that the brain, when dealing with complex sentences constructed with multiple polysemy words, does not follow the way of line processing, but a way of holistic processing. The only feasible path is operated out of the potential N^M paths holistically, so is the correct meaning of the sentence.

The two language processing modes penetrate with each other, and the brain automatically recognizes which processing mode is more desirable in different situations. This is consistent with the two epistemology of "bottom-up" and "top-down", and is also in line with Langacker's two scanning modes. In addition, the "Maze Stereology" falls in line with "the accidental enlightenment" put forward by cognitive psychology, namely, the human brain can at a certain time recognize which kind of meaning is more appropriate, without each step of computation.

V. CONCLUSION

Human's understanding of the world has followed the principle of transformation from uncertainty to certainty then to uncertainty, but the ultimate goal is to continuously recognize this kind of uncertainty, narrow the scope of uncertainty, and quantify the uncertain things. The development of linguistics also serves this ultimate goal. It is the mission of linguistics to make language more formalized, quantitative and to grasp the fuzzy world as accurately as possible.

This paper justifies the existence of semantic uncertainty, and explores the causes of semantic uncertainty from multiple dimensions of cognitive category. An attempt is made to explore the process of semantic uncertainty quantification from the perspective of human brain thinking. The semantic understanding mode of "Maze Stereology" is put forward. Of course, this is only a hypothetical thinking mode, and introspective analysis is not enough to prove its authenticity, so it's (or degree of) feasibility needs to be tested by the interdisciplinary research such as neuroscience and psychology in the future.

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