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Exploring Cognitive Linguistics

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Abstract: In recent years, cognitive linguistics has gained significant traction and recognition among researchers and individuals with a vested interest in the fields of linguistics and cognitive science. This paper serves the purpose of shedding light on some of the most current and pioneering research endeavors in this domain, while also assessing their contributions towards unraveling the intricate nuances of cognitive language processing. Cognitive linguistics represents a paradigm shift in the study of language and cognition, departing from the traditional structuralist and generative approaches. It posits that language is deeply intertwined with human cognitive processes, and therefore, understanding the cognitive aspects of language use is paramount. The contemporary studies explored in this paper have played a pivotal role in advancing this perspective. These studies employ an array of methodologies and approaches, such as neuroimaging, psycholinguistics, and corpus analysis, to investigate how humans conceptualize and process language. One notable study may delve into the neural mechanisms involved in metaphor comprehension, revealing that metaphors are not mere linguistic embellishments but rooted in the perceptual and experiential systems. Another cutting-edge research area might involve examining the influence of linguistic relativity on thought, challenging the idea that language is a neutral medium for thought and instead highlighting how language structures shape the cognitive experiences. These investigations are revolutionizing the understanding of linguistic diversity and the extent to which it influences cognition. In sum, this paper aims to provide a comprehensive overview of recent research endeavors within cognitive linguistics and to underscore their significance in unveiling the intricate processes of cognitive language comprehension. These studies have collectively contributed to the growing body of knowledge surrounding how language and thought are inherently entwined, reshaping the landscape of linguistic and cognitive inquiry.

Keywords: cognitive linguistics, language, cognition

1. Introduction

Cognitive linguistics is an interdisciplinary research area that aims to investigate the cognitive processing behind linguistic communications in humans. The complexity of human language is beyond the signs and vocal signals that animals use for communication [1]. The underlying brain systems that underlie this talent, which is only seen in humans, have not yet been definitively organized by researchers. The inferior frontal gyrus, also referred to as the Broca's Area, has been implicated in several neurological investigations as being essential for language processing [2–3]. However, the ability of language is not entirely localized to this region, and how this area interacts

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with different parts of the brain has remained a question [2]. During the study a language, different parts of the brain are activated in different stages depending on the familiarity of the learner to the language [3].

2. Cognitive Linguistics and Recent Findings in This Area

2.1. The Concept of Cognitive Linguistics

The cognitive approaches to understanding linguistics takes on three major perspectives: how the content of a sentence is processed, how the sentence is formulated, and how the sentence is affected by its cultural and social background [4]. It is proposed that the common experiences are embodied in the words that people use, which means the consensus that people form is dependent on the social experiences that people within similar cultural and social contexts recognize [5].

Although cognitive linguistics encloses a broad range of topics and perspectives, it has its problems of not being able to tell the difference between cognition and pure linguistic processing [6]. It is hard to separate conceptual processing of language from language itself. However, because language is a sophisticated and significant collection of thoughts, cognitive linguistics, as a research field primarily focusing on the process of language, differs from cognition itself [4]. The neural processes that support language generation in the brain have received a lot of attention from cognitive linguists. This article reviews recent advancements in the field of cognitive linguistics by examining a number of recent works in that discipline.

2.2. Related Experiments on Cognitive Linguistics

2.2.1. Linguistics Communication and Expressions

Language is one of the most common ways of communication. Apart from language, people also use gestures and movements such as pointing to aid their speeches and relay information. The spoken language allows us to make reference to things not presented in the scenario and even abstract concepts not existed in the real world. The ability of language to allow for inference from basic statements is one of its major characteristics. The knowledge conveyed by language that is explicitly articulated is referred to as inference. For instance, if someone says, "My dog barks a lot," the listener would assume that they only have one dog. The inferential trait was previously thought to only be present in linguistic processes. Researchers doubt, nevertheless, that gestures and body language might be added to this.

In a study done by Tieu et al., researchers looked into whether linguistic inferences could be transferred to understanding gestures and animations [7]. They hypothesized that gestures and animations can provide equivalent information as language did to people for inferring additional information. They tested on four types of linguistic inferences: implicatures, presuppositions, supplements, and homogeneity inferences. Scalar implicatures refer to people’s tendency of choosing more informative statements. Presuppositions are often inherited in further discussions of the same topic. Supplements provide additional information for the conversation, just like nonrestrictive relative clauses. Homogeneity inferences behave vaguely different in different contexts, as they are more universal in positive sentences while being more existential in negative sentences.

The participants were provided videos and asked to judge how strongly the videos could lead them to make certain conclusions. Researchers found that participants showed similar capability of analyzing information based on provided information through linguistic cues, gestures, and animations. This suggests that the gestures, body movements, and even contexts can be the source of inference during conversations, and that complicated inferences are not restricted to be only originated from linguistic cues.

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When changing something, people tend to add on details instead of simplifying or deleting things. This tendency also appears in English words such as improvement, which have a bias towards more instead of less. In a study done by Winter et al., researchers looked into some aspects of the tendency towards addition in English [8]. By using the Bayesian analysis, they were able to analyze the frequency of words appearing in daily conversations. The first criterion they investigated was the frequency of using words that bias towards addition compared with subtraction. They discovered that addition-related words were used more frequently. When two terms linked to addition and subtraction are combined, the word that refers to addition is more frequently listed before the word that refers to subtraction. The emotional bias of terms associated with addition versus words associated with subtraction was also examined by the researchers, who discovered that addition was associated with more positive circumstances. Researchers looked into words that were implicitly biased towards addition or subtraction in addition to words that express the meaning of addition and subtraction plainly. Although words like "change" seem neutral, they were found to typically lead to "addition" in the context. This implicit bias was not specific to humans. When researchers used the GPT3 from OpenAI, which was trained using the deep learning model, to generate sentences after neutral words, they found that GPT3 also generated words that were related to addition. They proposed that addition was related to positive inferences and thus were favored by people. However, they pointed out that the bias towards addition might cause redundancy while sometimes deleting or simplifying might be more efficient. Thus, when making decisions, people might need to avoid this mind bias and reconsider their ideas more neutrally.

2.2.2. Cross Cultural Studies of Cognitive Linguistics

Language is specific to humans as it contains a broad variety of changes, which makes it very different from animal vocalizations that are limited in meanings that can be converted [9]. It is believed that the origin of language is connected to the ability of gestures to visually communicate information. However, other people hold the view that only certain iconic sounds can be the source of language. Although it is debatable whether sounds or gestures communicate more information.

In a research study exploring the mechanism of cross-cultural communication, researchers looked into how people that were naive to certain languages guessed the meaning of certain words based solely on their vocalizations [1]. They asked the participants to choose from several possible options after hearing the sounds. The words included 30 different types such as humans, animals, inanimate entities, actions and so on. In the 25 languages that they tested, the audiences showed an accuracy that is higher than chance. This indicated that how humans vocalize words can be more informative than was previously thought, and that the vocalizations might contributed to early cross-cultural communications.

2.2.3. Sign Language

Humans create a variety of languages that are capable of communicating information that is similarly complex, like sign language. The same brain areas should be stimulated when using sign language as when using spoken languages, according to expectations. Researchers looked at earlier studies on the brain regions that have been discovered to be active during the use of sign language in a meta-analysis conducted by Trettenbrein et al. [2]. A general trend they found was that the use of sign language activated the left hemisphere more, just as the spoken language does. Meanwhile, the Broca's Area in the left hemisphere, which is known to be critical to language production, is found to be also important to the production of sign language. Thus, the researchers proposed that the Broca's Area could serve as a hub for language production in the brain, which corporates different types of language being used. At the same time, the superior temporal gyrus in the right hemisphere, which is the analog

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of the Wernicke's Area, is found to be activated more during the recognition of prosody. This could be a result from the complex stimuli presented during experiments. The researchers pointed out that since the Broca's Area was likely to be the language hub of the brain, it might have connection with other parts of the brain responsible for language processing. However, there was still lack of investigation into the neural circuitry that connected the Broca's Area and the temporal lobe, which was thought responsible for the understanding of language. It is needed to provide more evidence on neural connectivity to prove that the Broca's Area could serve as a hub of language in the brain.

2.3. The Implication of Cognitive Linguistics

The use of cognitive linguistics in real life scenarios has helped researchers to elucidate the intertwining parts of neurobiology and cognitive processing. Here the article focuses on two studies done on second language acquisition and the effect of childhood reading experiences on teenage cognitive abilities.

2.3.1. Second Language Acquisition

Second language learning in the adulthood triggers different parts of the neural system. Meanwhile, the use of different brain hemispheres depends on the familiarity of the learner to the language. In a study, researchers aimed to find out the neuronal changes after learning a second language in the adulthood [3]. Twenty-four participants took a Mandarin learning course and were asked to take part in a speech discrimination fMRI task before and after the language learning. The task involved discriminating the pitch contours of Chinese words. Their brain activities during the tasks were recorded using fMRI. The researchers noticed that participants with more right inferior frontal gyrus (IFG) activation in the test before the course began showed greater language achievement after the course. Meanwhile, in the speech discrimination task after the course, the participants showed higher brain activity in IFG and superior parietal lobule in the left hemisphere. They suggested that the shift from the right to left hemisphere following language acquisition showed that unknown voice signals were processed by the right hemisphere more frequently while the familiarized words were handled by the left. IFG appeared to be the center of the brain's language processing, according to their study. Future research can be done to clarify how the IFG may be linked to other neuronal regions to promote the development of language across the entire brain.

2.3.2. Reading for Pleasure in Early Childhood and Its Effect on Language and Cognitive Development

The development of language skills in childhood parallels to the development of cognitive and intellectual abilities. Researchers have been interested in the connection between these abilities. In a large study on the behavior of reading for pleasure (RfP), researchers investigated 10,000 teenagers on their longitudinal change in cognitive ability and its relationship to their reading habits in early childhood [10]. They found that early RfP is positively associated with the core cognitive abilities in teenage. Apart from that, teenagers who spent more time in RfP at a young age had a less overall screen time in the teenage. Meanwhile, the fMRI results showed that RfP was positively related to an increase in several brain regions contributing to the processing of words, such as the superior temporal lobe and the occipital lobe. There were mild increases in some other brain areas related to general cognitive processing such as the anterior cingulate cortex. However, the researchers pointed out that it was still too early to conclude that teenagers with early RfP experiences were on average more successful in their lives, and further follow-ups were needed on their level of happiness and life achievements.

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3. Conclusions

The study of cognitive linguistics aims to uncover the basic principles of language comprehension and its practical applications. In the studies discussed above, researchers have concentrated on the inferential characteristics of language and explored whether it could exist in other forms of communication like animation and gestures [7] and how cognitive tendencies toward addition could be transferred to specific language processing [8]. The cross-cultural study allows researchers to find out common bases of language processing in people with different social contexts [1]. Meanwhile, the meta-analysis of sign language has revealed a central hub to the neural circuitry of language processing in the brain: the Broca's Area [2]. Another study using fMRI to focus on the change of a second-language learner's brain found similar results as Trettenbrein et al. [3]. Apart from that, a cohort study on reading in the childhood has found to be positively correlated with cognitive development [10]. There are still unsolved problems of cognitive linguistics. For example, how does the Broca's Area facilitate the language processing across the brain? Meanwhile, it is still unclear how conceptual and linguistic aspects of language processing can be differentiated. Future research studies are expected to dig into the area to reveal more about cognitive linguistics.

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