

Metaphors and Their Functions in Technological Discourse

GE Zhiwei

University of Shanghai for Science and Technology, Shanghai, China

This article analyzes the lexical metaphors and grammatical metaphors in scientific discourse, as well as their complementarity, to illustrate that lexical metaphors can vividly describe scientific phenomena, while grammatical metaphors can effectively express the logical beauty, overall beauty, and concise beauty of scientific language.

Keywords: metaphor, lexical metaphor, grammatical metaphor, technological discourse

Introduction

The traditional view of metaphor holds that metaphor is merely a rhetorical device. Aristotle pointed out more than two thousand years ago that metaphor is a linguistic means of expressing the same meaning by replacing one word with another, and the two belong to a comparative relationship. In 1980, Lakoff and Johnson proposed in their book *Metaphors We Live By* that metaphors are ubiquitous in our lives, and fundamentally, our thinking, actions, and the conceptual systems on which they are based are all metaphorical. The essence of metaphor is to understand and experience a class of things through another thing. The basic concepts in science are relatively abstract, obscure, and difficult to understand. Metaphors can be used to vividly express them, making it relatively easy for readers to understand and accept scientific terms and theories. People unconsciously use metaphorical concepts to express ideas, which can be attributed to the fact that metaphors arise from human experiences and become an important component of conceptual systems (Zhou, 2010). Modern metaphor studies believe that metaphor is not only a rhetorical phenomenon, but also a cognitive phenomenon, which is a way of thinking to recognize an objective existence (Chen, 2014). Cognitive linguists refer to metaphor as something we live by (Ye, 2013). This article intends to explore the role and aesthetic value of metaphor in scientific discourse by analyzing the lexical and grammatical metaphors in scientific discourse and their complementarity.

Metaphors play an important role in discourse restructuring and construction. Specifically, in scientific discourse, metaphor not only enables the expression of scientific terms and the interpretation of scientific theories, but also plays an indispensable role in the construction of scientific theories.

Lexical Metaphors in Technological Discourse

Metaphors are everywhere, and they often exist in scientific discourse as well. Fields, such as computer science, medical science, aerospace, and economics often rely on metaphors to express professional concepts. Many of these language metaphors can often be expressed in another language according to the original text or the basic idea of the original text. Although this translation method that closely resembles the original metaphor may not be the best, it is still a way for readers to understand its basic meaning. The reason why they can be understood is that the conceptual metaphors they rely on come from basic cognition without cultural differences,

GE Zhiwei, M.A., lecturer, College of Foreign Languages, University of Shanghai for Science and Technology, Shanghai, China.

such as mouse, database, computer virus, information highway, cyber space, transmission pathway, etc. in computer technology. There are also many metaphors in the field of computer science. Someone uses metaphors we calculate by to illustrate the widespread phenomenon of metaphors in the field of computer science: black hole, soft landing, moonwalk, lunar rover, etc. in aerospace; free lunch, safety net, invisible hand, etc. in economics. This type of metaphor fully reflects the metaphorical characteristics of human technological cognitive activities. Lexical metaphor is an indispensable language expression in scientific discourse, which not only vividly describes scientific phenomena, but also essentially becomes an enzyme for cognitive communication between scientists and the public (Zhu & Dong, 2001). It builds a bridge of understanding between old and new concepts, and helps readers reduce their burden, accept and understand scientific theories in a simple and clear way, and strengthens the “communication” and “affinity” between scientists and the public (Zhang & Lei, 2013).

Grammatical Metaphors in Technological Discourse

Halliday first proposed the concept of “grammatical metaphor” in his book *Introduction to Functional Grammar* in 1985. He pointed out that metaphorical expressions change the grammatical structure by using nouns to reflect process features, and use non-uniform grammatical structures to reflect meaning. This reflects the tension that exists between different language levels in functional linguistics, and it is the existence of this tension that leads to the emergence of grammatical metaphors (Sun, 2010).

In order to avoid giving readers the impression of subjective speculation as much as possible, technological language should reflect scientific phenomena as accurately and objectively as possible. Therefore, technological language typically uses the passive voice and creates a non-personified linguistic effect through nominalization structures. Nominalization metaphors can conceal the implementers of actions, while nominalization structures can also break free from the constraints of tense and modality, thus reflecting the objectivity and rigor of technological language (Mao & Fan, 2003), for example, “Biologists of China are also considering strengthening the researches on biodiversity”.

The use of nominalization structure in this sentence eliminates the executor or participant of “to strengthen”, making the discourse objective and impartial, and expressing more accurately.

Nominalization is a common expression structure in scientific discourse and a core resource of grammatical metaphor. The above examples are typical representatives of nominalization as a grammatical metaphor. Although they do not cover all types of grammatical metaphors, they are sufficient to illustrate that grammatical metaphor is not an empty term, but a common language usage phenomenon in all languages, and of course, it also widely exists in scientific language.

The Complementarity Between Lexical Metaphor and Grammatical Metaphor

Vocabulary metaphor and grammar metaphor coexist and interact in scientific discourse. They are both metaphorical strategies for us to understand experience through expanding semantics, both involving the reconstruction of one domain into another, and they respectively promote the expression of scientific concepts and the development of scientific theories. The former uses the same linguistic symbol to represent different conceptual meanings, while the latter uses different grammatical forms to represent similar conceptual meanings (Zhu & Dong, 2001). The source domain of the former is a cognitive domain that is easy for people to understand, while the latter also involves transferring knowledge from an easy to grasp source domain to a difficult to grasp destination domain. Both use relatively easy to understand concepts instead of relatively complex ones, helping

scientists use metaphors to concretize abstract and obscure scientific terms, and convey more familiar and understandable scientific knowledge to the public. Scientists express their scientific theories as coherent scientific discourse, which requires not only lexical escaping but also grammatical changes in the discourse. On the one hand, lexical metaphors build a communication bridge between scientists and readers, making it easy for readers to accept and understand obscure scientific theories. On the other hand, the extensive use of grammatical metaphors gives scientific discourse concise, objective, and formal stylistic features, reflecting its technical, logical, and rational nature.

The Beauty of Technological Language Embodied by Lexical Metaphor and Grammatical Metaphor

Alastair Fonler once said in his book *Types of Literature*, “If a scientific paper is only intended to convey information, then when the scientific content is considered outdated, the paper also goes to the grave” (Mao & Fan, 2003, p. 50). The use of lexical and grammatical metaphors in technological discourse precisely reflects the beauty of technological language. The lexical metaphor in technological discourse, which transforms complexity into simplicity and obscurity into clarity, reflects the concise beauty of technological language and highlights a major feature of technological language: refinement. This is because its scope of application limits its ability to convey the maximum information with the least number of textual symbols. Refinement and simplicity give people a clear and straightforward aesthetic (Fan, 2013).

The numerous grammatical metaphors in scientific discourse give it objective and formal stylistic features, reflecting the logical and overall beauty of scientific language. The most distinctive feature among them is the beauty of logic. As a genre that explains natural phenomena and expresses technological facts, concepts, and principles, scientific articles often exhibit rigorous reasoning and logical rigor in their exposition, making them highly persuasive. Next is overall beauty. In the entire scientific literature, whether it is various complex sentence patterns or independent sentences in scientific Chinese, they all exist to reflect the same concept. This complete presentation of the same complex concept reflects the overall beauty of technological language, which is closely related to logical beauty.

In short, lexical and grammatical metaphors in technological language can help people understand the beauty of technological language.

Conclusion

Lexical metaphor and grammatical metaphor coexist and interact with each other in scientific discourse. The lexical metaphors in scientific discourse provide the scientific community with a wealth of scientific terms, bridging communication between scientists and the public, and enabling readers to easily accept and understand obscure scientific knowledge. The extensive use of grammatical metaphors in technological discourse gives the discourse objective and formal stylistic features, highlighting its rigorous and inferential language style, and reflecting the logic and conciseness of technological language.

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