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# Further examination of the role and essence of prototypes

## —Discussion on Composite Categories

Li Heng

New Era Institute of Information Technology

**Abstract:** Prototype theory has cleared up many concepts in classical category theory that are inconsistent with human cognition, making a huge contribution to category research. But in its 40 years of development, the academic community has been constantly debating the role and essence of category prototypes. After re reading the literature on composite category prototypes, it was found that critics did not recognize that the true role of prototype theory lies in describing people's external judgments of categories rather than explaining their mental processing, so questioning is not enough to shake its scientific validity. The article reviews relevant research, clarifies the focus of debate between the positive and negative sides, and further proposes that the essence of "prototype" should be defined as a series of weighted features, rather than a single prototype instance.

**Keywords:** category; Prototype theory; Compound category; Context; Prototype features

There are several schools of thought in category research: classical category theory, represented by Aristotle, attempts to pursue the essence of categories through self reflection of the subject, but cannot dissolve the metaphysical level of speculation, capturing only the illusion of understanding the surface of categories; Although Wittgenstein's "family similarity" emphasizes the perception of experience and cognitive ability in understanding the relationships between entities, it fails to see the important role of subjective consciousness and isolates personal value. Eleanor Roche proposed the prototype theory after absorbing the reasonable core of previous theories. Through a series of experiments, she equated categorization with a deduction based on sufficient and necessary conditions, permeating it into an inductive process of finding the best match for the prototype. Prototype theory has largely broken the metaphysical misconception of ontology and also made up for the shortcomings of epistemology, placing the humanistic spirit in the first place, making category research a big step forward and ultimately becoming the driving force for the development of contemporary cognitive linguistics.

But in the study of prototype theory, there is always a hostile undercurrent. Yu Jianliang and Huang Hebin pointed out the shortcomings of prototype theory in semantic interpretation; Jiang Guiying and Li Heng questioned how to determine the prototype members; Jiang Guiying discussed the applicability of family similarity in prototype theory. Since the 1980s, many foreign scholars have engaged in heated discussions on whether prototype theory has explanatory power for composite categories, but this research has always been rarely studied in China. This article reviews the criticism of prototype theory on the explanatory power of composite categories in the academic community over the past 40 years, pointing out that many doubts have not entered the core field of prototype theory research and are therefore ineffective. On this basis, further redefining the essence and function of prototypes, proposing a revised prototype theory, in order to provide a more reasonable explanation.

### 1. Review of relevant research

The prototype theory consists of three interrelated statements: (1) there exists a prototype in the category; (2) The entire category takes the prototype as the cognitive reference point; (3) Other

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members have unequal status based on their similarity to the prototype. The falsifier believes that if certain categories cannot find a prototype or are not formed around the prototype, statement (3) naturally does not hold, and the theory is self-defeating.

This criticism originated from the discussion of the composite category by Orcheson and Smith. They pointed out that the prototype of "pet fish" and the prototypes of "pet" and "fish" are not consistent, so prototype theory as a theory of explaining categories is not sufficient. Critics argue that if a prototype wants to explain a category, it must possess two characteristics: decomposability and heritability. The role of decomposability is mainly to provide explanations for the productivity and systematicity of categories: productivity refers to the ability of categories to generate infinite concepts using limited syntactic and semantic symbols, while systematicity refers to the use of symbols to generate syntactic and semantic related expressions with different surface forms. For example, people should be able to understand both the categories of "sports are games" and "games are sports" simultaneously. Heredity refers to the ability of individuals to determine the prototype of composite categories based on their judgment of individual categories. Orcheson and Smith believe that the prototypes of the composite category "pet fish" are goldfish and peacock fish, which are neither prototypes of the pet category nor have a high degree of typicality in the fish category. From this, it can be seen that the prototype of a composite category cannot be derived by simply adding up the prototypes of individual categories, and people will not consider the prototype as a cognitive strategy to understand the composite category. Therefore, the prototype does not have decomposability and heritability.

Other researchers compared the prototype features of composite categories and individual categories. Hampton 60 found that the "coarse tire" characteristics possessed by "beach bikes" cannot be inferred from the prototype features of the bike. Patty proved through concepts such as toy ducks and former presidents that the prototypes of these compound categories do not conform to the prototypes of the central noun category. Because toy ducks are not real ducks, and the former president is not a real president either. Fudo and Ripley 260 first assumed that composite categories have decomposability and heritability. A typical "pet" has characteristics such as "fuzz" and "stickiness"; The prototype features of "fish" are "gray" and "medium volume". Based on this inference, "pet fish" should also have these characteristics. But in fact, the prototype features of pet fish are orange and small size. They declared the complete bankruptcy of prototype theory in the composite category. Smith et al. proposed the "selective correction model" to attempt to explain new features in composite category prototypes. They believe that for composite categories, the weight values of their features are always fixed. For example, in "brown apples", with the addition of the modifier "brown", the weight values related to color features will increase. If the total number of features is fixed, then the proportion of other features such as "circular in shape" will naturally decrease. This is also why people believe that "apples are round" are more realistic than "brown apples are round". But they still cannot explain the reason why the prototype of pet fish is different from that of pets or fish.