

The Significance of Image Schema in Embodied Cognition

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As a recurring pattern of sensory-motor-affective experience, image schema is not only a concept discussed in linguistics and psychology, but also a significant one in the study of embodied cognition. Through analyzing the features of image schema considered by the authors as embodiment, recessiveness, sedimentation, logicity, scientificity, and dependency to cognitive metaphors and reviewing the definition of embodied cognition, the paper argues that image schema is an integration of bodily property and mental property, and accordingly a core and inseparable concept of embodied cognition by bridging body and mind. Image schema can help to explain how abstraction and inference generate from body-environment interactions, thus making the theory of embodied cognition more persuasive and reliable.

Keywords: image schema, embodied cognition, significance, body, mind

1. Introduction to Image Schema and Embodied Cognition

1.1. The Origin of Image Schema

Image schema is constituted by two separate concepts: image and schema. In Kant's age, the two concepts were put forward and discussed. Kant is the one who first comes up with the terminology of "schema" in philosophical works and recruits it to explain the imagination. In *Critique of Pure Reason*, Kant gives image and schema an elaboration,

The image is a product of the empirical faculty of productive imagination, the schema of sensible concepts (such as figures in space) is a product and as it were a monogram of pure a priori imagination, through which and in accordance with which the images first become possible, but which must be connected with the concept, to which they are in themselves never fully congruent, always only by means of the schema that they designate. ... Now this representation of a general procedure of the imagination for providing a concept with its image is what I call the schema for this concept. (Kant 1998, 273-4)

Take an example to understand Kant's image and schema. When we see a tree, we form a concept about the tree in my mind, and this "tree concept" is the so-called "image" by Kant; soon afterwards, we are asked that what a tree looks like, we would imagine and construct an image of tree in the brain according to the previous concept of tree. This imagining process is "schema" in Kant's sense.

After Kant, the terms of "image" and "schema" are recruited in embodied study to explain some cognitive problems and widely used in the fields like neuroscience, linguistics, and psychology as "body image" and "body schema." However, many scholars confuse the meanings of "body image" and "body schema," blurring the boundary between them. In 1986, Shaun Gallagher published a paper entitled "Body Image and Body

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Schema: A Conceptual Clarification,” in which Gallagher makes an explicit distinction between body image and body schema. Gallagher points out:

Body image and body schema are two distinct concepts. In the body image there is a perceptual, cognitive, or emotional awareness of the body. The body appears as owned, abstract, and disintegrated, seeming to be something in-itself. In contrast, the body schema operates in a non-conscious manner. It is unowned or anonymous; it functions holistically, and is not in itself apart from its environment. (Gallagher 1986, 552)

Here, we can see that image and schema have developed to a different direction from Kant’s age.

1.2. *The Embodied Definition of Image Schema*

Mark Johnson (in *The Body in the Mind*, 1987) and George Lakoff (in *Women, Fire, and Dangerous Things*, 1987) first create the terminology of “image schema” by combining “image” and “schema” together to explain linguistic problems such as metaphorical projection. Mark Johnson argues that “an image schema is a recurring, dynamic pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience” (Johnson 1987, xiv).

In *Embodied Mind, Meaning, and Reason: How Our Bodies Give Rise to Understanding*, Mark Johnson redefines “image schema” from the perspective of philosophy as “the recurring patterns of our sensory-motor-affective experience by means of which we can make sense of that experience and reason about it, and they can also be recruited to structure abstract concepts and to carry out inferences about abstract domains of thought” (Johnson 2017, 127).

Mark Johnson’s “image schema” is inspired and influenced by Kant’s “schema” theory, but there is an intrinsic distinction between them. Kant recruits “schema” as the imaginary process of constructing images according to concepts to account for the process of imagination. Kant’s argument is based on the ontological and methodological dichotomy, splitting experience from thinking and then trying to combine them together, which is unpersuasive and untenable. Whereas Mark Johnson, based on embodied thought, deepens and enlarges the role image schema plays, believing that the image schema generating from body experience not only shows its importance in linguistic development, but also can be used to bridge body and mind, and accordingly helps to explain abstract conception and reasoning. Therefore, image schema is of crucial philosophical significance, especially in embodied cognitive philosophy. Based on the “image schema” theory of Mark Johnson, the paper devotes to discuss the importance of image schema in embodied cognition.

1.3. *Embodied Cognition*

The study of embodiment in cognitive science emerges in the late 1980s and early 1990s. The advocates of embodied cognition claim that “mind is embodied” so as to distinguish from the Computational-Representational View of Mind of early cognitive science. Embodied cognition is radically different from early cognitive science in theoretical standpoint and core gist. Therefore, embodied cognition not only challenges early cognitive science, but can also replace early cognitive science to be an effective approach for human mind research (Li 2018, 104). Although many controversies arise surrounding the comprehension of embodied cognition, a majority of researchers agree on the fundamental propositions of embodied cognition: Cognitive processing is influenced by the body containing the brain. In other words, the form and structure, sensory system and motor system of the body, as well as the neural system representing the body can all influence human’s cognitive processing (Goldman & de Vignemont 2009, 154-9).

The core ideas of embodied cognition should include three aspects: (1) The characteristics of body like physiological structures and bodily movements influence the emergence and development of cognition; (2) the environment and situation where the body locates influences the emergence and development of cognition; (3) the special sensory-motor neural system of the body and the brain influences the emergence and development of cognition (Chen et al. 2014, 483). Embodied cognition emphasizes that body is both the origin and the approach of cognition, enhancing the importance of body and body's movements in accounting for cognition (Chen et al. 2014, 485). It can be seen from the above introduction that, the same as image schema, embodied cognition is also tightly bound to "body." As to the relations between embodied cognition and image schema and the way body connects with mind, the paper will discuss in the following parts.

2. The Interrelation of Image Schema With Embodied Cognition

2.1. The Embodiment Attribute of Image Schema

Image schema generates from the body and body-environment interactions and is grounded in the body. If we inspect our action patterns in a phenomenological way, we can see that most abstract conceptions in life are closely interrelated with embodiment. Take symmetry as an example. Because our body is bilaterally symmetric, we know well the concept of symmetry.

As Mark Turner observes, if we were nonsymmetric creatures floating in a liquid medium with no up or down, no right or left, no front or back, the meaning of our bodily experience would be quite different from the ways we actually do make sense of things. Because of our particular embodiment, we project right and left, front and back, near and far, throughout the horizon of our perceptual interactions. (Johnson 2017, 128)

Accordingly, image schema, as the sensory-motor-affective experience structure, inevitably comes out of and changes with embodied experience.

2.2. The Recessiveness Attribute of Image Schema

Through the phenomenological analysis to sensorimotor experience structure, we can sum up the major types of basic structures of image schemas, but image schema usually runs in the subconsciousness (familiar actions is often done in unconscious state, for example, when running quickly, we won't think how the legs run, what kind of movement structures they form). Therefore, phenomenological method alone cannot help us penetrate the image schemas hidden in subconsciousness; we should resort to other disciplines such as linguistics, psychology, and cognitive neuroscience and combine them together to co-explore the role of image schema in abstract concepts and reasoning.

2.3. The Sedimentation Attribute of Image Schema

Image schema should be divided into basic image schema and complex image schema. Complex image schema is established by combining, superimposing, refining, or concreting basic image schema. The development of image schema goes through a "sedimentation" process from simple ones to complicated ones. "Sedimentation" was originally proposed by Husserl. Husserl, in the chapter of "the origin of geometry" in his book, has carried on a brief and convincing analysis, in which the term of "sedimentation" is used to represent the propositional meaning superposed or sedimented on actual action and intentionality of perception (Husserl 1970). Later, Zlatev and Blomberg, when discussing embodied intersubjectivity and the sociality of language, analyzed the concept of "sedimentation" again: "Sedimentation" is more than a concept of "geological

metaphor;” it can also be used to refer to the superposition of meaning, since meaning is essentially layered upon human experience (Zlatev & Blomberg 2016, 185-208). Thus, image schema, as the basis of meaning and abstract conceptions, is inevitably “sedimented” or superposed one by one in the process of organism-environment interactions, but not manifested completely in the beginning.

2.4. The Logicality Attribute of Image Schema

The structure of image schema is logical in itself. We can infer abstract conceptions in virtue of this logicality. Mark Johnson borrows the spatial logic of the Source-Path-Goal schema to argue the logicality of image schema’s structures: “Consider a case in which you are moving along a linear path toward a destination and at time T1 you are halfway to the destination. If you then travel farther along the path at time T2, you will be closer to your destination at T2 than you were at T1” (Johnson 2017, 130). He believes simple and unperceived image schema logics of this kind are the foundation of human inference. This paper thinks that the logicality of image schema depends on the logicality of body-environment interactions. Body-environment interactions are intrinsically logical, so the image schemas originating from them are inevitably logical.

2.5. The Scientificity Attribute of Image Schema

Image schema is not imagined from nothing, but grounded in and proved by scientific experiments. The traditional dualism dissevering mind and body trapped cognitive research into the dilemma of no solution, while contemporary embodied cognition, namely the cognitive view that abstract conceptions originate from organism-environment interactions, can be confirmed through studying the structures and interrelations of body, brain, and environment.

Before the development of cognitive science, Dewey had realized that cognitive activities were grounded in bodily perceptions and movements. Nowadays, the development of linguistics, psychology, and cognitive neuroscience further verifies the rational and scientific feature of embodied cognition and image schema. Tim Rohrer, a scholar majored in cognitive science, points out that image schema is the structure that connects sensory-motor experience to concepts and language (Rohrer 2005, 173). He believes that a large number of research results from cognitive neuroscience and evidence from physical experience can verify the constructive role and foundational position of image schema in human cognition.

2.6. The Dependency of Image Schema on Cognitive Metaphor

Image schema and cognitive metaphor are inseparable. As a bridge connecting bodily experience and abstract conceptions, image schema must realize its functions through cognitive metaphors; otherwise image schema will be static and rigid schematic concepts and cannot be converted to meaning, imagination, and abstract conceptions. Mathematical operation can explain the operation pattern of image schema in cognitive metaphor. For example, based on metaphorical projection, we can understand and infer arithmetic operations in the abstract domain by applying the structure of Source-Path-Goal schema and the logic of the motion along a path. Mark Johnson illustrated the operation structure of the “The Arithmetic Is Motion Along a Path Metaphor” (as follows) to expound the significance of image schema in rational reasoning and its operation pattern in cognitive metaphor (Johnson 2017, 134).

The Arithmetic Is Motion Along A Path Metaphor

<i>Source domain</i> (<i>motion along a path</i>)		<i>Target domain</i> (<i>arithmetic operations</i>)
Motions Along The Path	→	Arithmetic Operations
Point-Location On The Path	→	Result Of An Arithmetic Operation
Origin Point	→	Zero
A Point-Location	→	One
Further From The Origin Than	→	Greater Than
Closer To The Origin Than	→	Less Than
Moving From A Point-Location <i>A</i> Away From The Origin, A Distance That Is The Same As The Distance From The Origin To The Point-Location <i>B</i>	→	Addition Of <i>B</i> To <i>A</i>
Moving Toward The Origin From <i>A</i> , A Distance That Is The Same As The Distance From The Origin To <i>B</i>	→	Subtraction Of <i>B</i> From <i>A</i>

It shows that image schema is applied to abstract reasoning through metaphor projection. To be more specific, by the aid of cognitive metaphor, image schema derived from bodily experience is projected to the abstract domain, and abstract conceptions are generated accordingly. It can be said that the application of image schema is closely tied to metaphor projection and the two are inseparable. The image schema running in cognitive metaphor enables us to use sensory-motor experience and its logical structure to carry out higher-order cognitive activities.

3. Bridging Body and Mind by Image Schema

The fundamental problem faced by traditional philosophy is the body-mind dualism. Embodied cognitive philosophy emerges to solve the problem, arguing that body and mind originate from the same organism rather than two different entities. However, there has always been a tough problem in embodied cognition, that is, the explanation about how mind generates from body and how the two are connected. Mark Johnson believes the body-mind dualism can be conquered by studying the structure of image schema, and considers image schema as the basis of forming meaning and imagination, as well as the bridge connecting organism-environment interactional experience with abstract conceptions and inference. According to Mark Johnson's argument, the paper suggests that image schema plays a crucial role in promoting the development of embodied cognition by combining body and mind. To overcome dualism in embodied cognition, we should first "appreciate the way image schemas arise from, and give structure and meaning to, our bodily engagement with our world; and know they provide the form and content of our most basic forms of abstract conceptualization and reasoning, especially through metaphors" (Johnson 2017, 141).

In our daily life, many examples can prove the significance of image schema in bridging body and mind, for instance, the process of dance learning. Now consider how we learn dance. In our view, the basic procedure is: (1) observing dancing movement structures with eyes; (2) forming the image schemas of dancing

movements in the brain; (3) imitating the actions with the body according to the image schemas in mind. When the dancing movements are grasped, we can dance independently without imitating others through recalling the image schemas of the movements. Actually, before we make a movement, the image schema of the movement would emerge in the brain first, and the body would conduct the corresponding movement under the guidance of image schema. However, as mentioned above, since image schema possesses recessive feature, we usually neglect the existence of image schema, especially in the case of skillful and proficient movements. Though image schema is unnoticed by us at ordinary times, it exists in our life everywhere at any time, helping us understand and reason.

4. Conclusion

Both “image schema” and “embodied cognition” take “body” as their origins and bases with the former being the product of body-environment interactions as patterns of experience in mind and the later focusing on cognition’s dependency on body. In addition, image schema is the integration of bodily property and mental property. As the recurring patterns of sensory-motor-affective experience, image schema generates from body-environment interactions, but forms and develops in mind. Though image schema is usually discussed in linguistics, psychology, and pathology, it should also be recruited and discussed in cognitive philosophy, particularly in embodied cognition, to explain the problem of body and mind because image schema is closely interrelated with embodied cognition. Through analyzing the definition and features of image schema, we can see that image schema, as the bridge of body and mind, is an important concept of embodied cognition and can be used to solve the problem of how body connects mind in embodied cognition, thus making the theory of embodied cognition more persuasive and reliable.

At present, the study of image schema is immature with many objections and obstacles. For example, despite the same importance as structural aspects, it is difficult to explore and confirm the qualitative aspects of image schema such as feelings and emotions, except for some phenomenological descriptions. It is likely in the future we can solve this problem with the aid of interdisciplinary research, for instance, by recruiting the achievements of neuroscience in the role feelings and emotions play in conception and inference to understand the qualitative aspects of image schema (Johnson 2017, 136-9).

Although there are limitations in the present study of “image schema” theory and it’s hard to thoroughly explain the contents of image schema’s qualitative dimension, we cannot deny that image schema plays an essential role in embodied cognition. Except for bridging body and mind, image schema could also contribute to the study of other issues of embodied cognition, such as other minds and intersubjectivity, and even shed light on the development of strong artificial intelligence. The research on the significance of image schema is far from all-round stage, so we should make more efforts in the future to explore the roles image schema plays in different cross-disciplinary fields.

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