THE SEMIOTICS OF THE SCHEMA

Kant, Piaget, and the Calculator

Abstract. What is the relationship between our mental activity and the empirical objects of the world? Kant raised this question in the *Critique of Pure Reason* and attempted to answer it by arguing that between the realm of concepts and that of sensuous phenomena lies the *schema*. Piaget re-elaborated the Kantian concept of schema and since then it has been extensively used in constructivist and psychological accounts of the mind. In this article, I discuss Kant’s and Piaget’s concept of schema from a semiotic-cultural perspective. Attention is paid to the epistemological premises on which the Kantian and Piagetian theoretical elaborations of the concept of schema were based and the role that signs played therein. I contend that the schema and its genesis can be better conceptualized if we take into account linguistic and non-linguistic mediated actions embedded in the social processes of meaning production and knowledge objectification. My discussion interweaves epistemological concerns with the semiotic analysis of a group of Grade 11 students dealing with the mathematical understanding and description of a natural phenomenon – the movement of a body along a ramp in a technological environment.

Key words: activity, cultural semiotics, gestures, Kantian and Piagetian epistemology, mediated action, phenomenology, schema.

INTRODUCTION

Kant believed – contrary to Hume, Locke and the empiricist tradition – that knowledge cannot be reduced to what impressions and senses give us. Ideas should certainly be more than the result of impressions that we receive from the contingent world. The guiding principles of experience should be more than customs if we are to avoid confining them to subjectivity. But Kant also believed – contrary to the rationalist tradition of Descartes, Leibniz and Wolff – that knowledge cannot be reduced to an inner mental activity governed by the a priori rules of Reason. Leibniz, for instance, had said that “our ideas, even those of sensible things, come from within our own soul” (Leibniz 1949, 15). If such were the case, Kant asked, how is it possible that the formal rules of Reason – removed from all empirical content – can yield knowledge of the objects of the external world?

Kant constructed a sophisticated system that tried to accommodate both the empiricist and the rationalist traditions. In this system, the senses were no longer considered as superfluous or as with merely heuristic value, as in Leibniz. Kant provided the senses with an epistemological import. In an important passage of the *Critique of Pure Reason*, he says that knowledge is constituted of both sensual perceptions and concepts (A50/ B74, 92).

But knowledge is more than a cocktail of conceptual and sensual ingredients. The sensual perceptions, Kant claimed, have to be linked to their corresponding

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concepts. To distinguish between the pen on the table and the book beside it, we need to be able to differentiate among the perceptions. To accomplish this we need to judge. Otherwise, Kant said, we would be led to a “rhapsody of perceptions” (A 156/ B195, 193). Judgment is a “peculiar talent” that distinguishes whether something (a perception) goes under a certain concept or not (A133/ B172, 177). For Kant, the schema is precisely a function of the faculty of judgment. A schema is something mediating between the mind’s logical machinery and the phenomenal world. Its task is to ensure the link between concepts and senses, that is to say, between Form and Content.

THE ENCOUNTER OF FORM AND CONTENT

The schema is a kind of analogical procedure – a “monogram”, as Kant said – that unveils the link between the intellectual and the sensual in the course of its empirical execution.

Like the concepts, the schema for Kant is itself void of empirical content. Yet it must contain something which is represented in the object that is to be subsumed under the concept (A137/ B176, 180). While the schema, in one respect, must be intellectual, said Kant, in another, it must be sensible (A 138/ B 177, 181). But the schema does not have to be confounded with an image:

If five points be set alongside one another, thus,..., I have an image of the number five. But if, on the other hand, I think only a number in general, whether it be five or a hundred, this thought is rather the representation of a method whereby a multiplicity, for instance a thousand, may be represented in an image in conformity with a certain concept, than the image itself. For with such a number as a thousand the image can hardly be surveyed and compared with the concept. This representation of a universal procedure of imagination in providing an image for a concept, I entitle the schema of this concept. (Kant, A140/ B179, 182)

In saying that the schema is a method or universal procedure Kant meant that its execution can be repeated again and again. The schema entails, in fact, a principle of iteration linking thereby knowledge and action. Kant’s epistemology supersedes here the passive receptivity of impressions of the empiricist school and the reduction of knowledge to inner mental activity effectuated by the rationalist tradition. As a result, “there is knowledge only in the schematized experience.” (Chiurazzi 1990, 155). This is also what Piaget meant when he said that we know an object only when we act upon it (Piaget 1970a, 85).

Now, since the schema is not only intellectual but is also sensual, we can ask: What is the material of which the schema is made? In addition to the schema of number (quoted above), Kant mentioned other examples, among them the schema of a triangle and the schema of the concept of a dog. In the last two, the representation is made by drawing a figure that during its execution reveals the method; in the first one, the execution cannot reveal the method. There is no longer coincidence between execution and method. In the case of a number such as a thousand I can still draw point after point, except that, in this case, “the image can hardly be surveyed and compared with the concept.” Judgments (“perceptual judgments”, to use Peirce’s term) do not work the same in geometry as in arithmetic. In the schema of