Types and Ideas: Ontology of Geometrical Objects

Takashi Iida

At *Republic* 510D-511A, Socrates tells us how geometers use geometrical figures in their proof. Though his description of their procedures is apt, it relies upon a metaphor of an original and its copy. This paper argues that instead of this metaphor we can construe the relation between an abstract geometrical object and its concrete instances as one between a type and its tokens.

This paper consists of two parts. In the first part, several questions and objections that can be raised to the thesis that a geometrical object is a type-like entity are taken up and answered. Firstly, it is argued that the relation between a type and its tokens is different from that between a universal and its instances. Secondly, to an objection that geometry would become contingent because the existence of a type depends on that of its tokens which are contingent, it is answered that a mathematical science deals with possible existence, not actual existence, and hence, that geometry considers not only the types that happen to exist in the actual world but also those that exist in some possible world. Thirdly, it is argued that notions of fundamental geometrical types constitute an essential part of our mental capacity. Finally, to an objection that we can conceive a perfect square although there is nothing like a perfect letter “A”, it is answered that it is not that a “perfect square” is reached by going from some concrete figures to an ideal square, but that we need a notion of a type “square” in order to recognize a square in concrete objects.

In the second part, the place of philosophy of geometry in the overall philosophy of mathematics is considered. It is explained why examining the status of our knowledge of elementary geometry is important in the current situation of philosophy of mathematics, which has a tendency of homogenizing different branches of mathematics and, as a result, making mathematics much more unified than it is. Given the importance of understanding the nature of our knowledge of elementary geometry, discussing the passage of *Republic*, from which our discussion took off, may give us still new insights.