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Limits of constructivism: Kant, Piaget and Peirce.

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The paradox of mathematical knowledge that mathematics cannot be conceived of as completely separated from empirical experience and yet cannot be explained by empiricist epistemology, can only be resolved if one accepts that the causal interactions between knower and environment have themselves a generalizing tendency, a sort of continuity, rather than consisting just of singular events. Kant resolves the schism between the continuous and the distinct in a constructivist manner. He assumes that all our knowledge-extending cognitions are synthetic. This synthesis does not lie in the matter of experience but springs from the function of cognizant consciousness. Piaget adhered to a Kantianism where 'the categories are not there at the outset'. He conceives of the subject as constructing itself as well as of the emerging subject's structure as the source of the apprehension of the world and believes in a Kantianism which emphasizes man's active being and potential for unlimited self-development. But he has no use for the Kantian idea of space and time as forms of mathematical intuition. Kantian thought is also central to Peirce's philosophy and conception of mathematics. But Peirce emphasizes the role of perception and analysis as its prerequisites. Peirce's and Piaget's origins in Kantianism are exhibited when both try to replace the Aristotelian notion of abstraction and generalization by something more suitable for mathematical epistemology. Peirce proposes that 'hypostatic abstraction' is the chief explanation for the power of mathematical reasoning and explains: 'This operation is performed when something, that one has thought about any subject, is itself made a subject of thought'. Piaget speaks of 'reflective abstraction' in this context, making it the basis of mathematical knowledge; but separating it completely from empirical abstraction. (orig.)

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