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Proof-analysis and the development of geometrical thought. (Análise de prova e o desenvolvimento do pensamento geométrico.)

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Author's abstract: Piaget characterizes the historical development of geometry as a succession of three periods of thought: intrafigural, interfigural, and finally, transfigural or structural. We discuss an example to illustrate Piaget's conception of geometrical development and to provide a particular interpretation of it. The example concerns Euler's theorem, according to which the concurrent points of the perpendicular bisectors, the medians and the altitudes of any triangle are collinear. What we want to show is that by conceiving mathematical activity as essentially constructing proofs one might better understand Piaget's conception. In this context, Rotman's criticism of Piaget is presented and discussed. Rotman argued that Piaget's characterization of mathematics and its creation is limited by his misunderstanding of 'the nature and status of proof' (Rotman). Rotman, who concentrates on the semiotic and social aspects of mathematics, continued, 'The central error of Piaget's structuralism is the belief that it is possible to explain the origin and nature of mathematics independently of the non-structural justificatory questions of how mathematical assertions are validated' (Rotman). Rotman completely misses the point that proof and justification always depend on structural contexts as represented by signs and language, and that the objective meanings of mathematical signs are nothing but structural determinations. No isolated sign can be intrinsically a sign. Thus, our aim is to show that it may be worthwhile trying to combine the approaches of Piaget and Rotman.

Classification: E20 E50

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