A picture falls under many categories: How ancient mathematical marks became extinct

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Abstract: The development of mathematical marking conventions from prehistory to the present is characterized by a trend from conventions with more iconic relationships to concrete structures of the physical world (such as more pictorial ancient land surveying marks) to marking systems with less-iconic relationships to physical structures (that represent numbers, operations, infinity, and other more abstract concepts). We propose how certain constraints of perception-cognition induced conventions that made more-iconic (pictorial) marks controversial. These became too conceptually ambiguous to convey more abstract conceptual categories during the formalization of mathematics: Iconic properties of ancient proto-mathematical conventions recruited lower level perceptual capabilities developed to perceive-act in a concrete world of occluded surfaces-edges and were suitable for conveying concrete structures (such as landforms during surveying). However, these were too conceptually ambiguous to convey more abstract conceptual categories that emerged when mathematics was formalized because a (pictured) concrete structure can fall under many possible conceptual categories