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James T Smith* (smith@math.sfsu.edu), 1363 27th Avenue, San Francisco, CA 94122.

Definitions and Nondefinability in Geometry: Legacies of Mario Pieri and Alfred Tarski.

This talk traces development of the modern axiomatic method by Pasch, Peano, Pieri, and Tarski, and their efforts to minimize the number and complexity of primitive concepts sufficient for a foundation of geometry. By 1900, Peano and Pieri had reduced that number to two: point and direct motion. But the latter is an involved set-theoretic concept. Veblen tried point and betweenness of point triples in 1904, but his system seemed inadequate. Pieri succeeded in 1908 with point and equidistance of a point from two others. His axioms were frightfully complicated but laid bare the logic required for their manipulation and used sets only sparingly. He avoided projective methods. Pieri's work attracted little attention except in Poland. In the late 1920s, applying modern logical techniques to geometry, Tarski followed Pieri's approach to develop a much simpler system that has since become a standard in foundations of geometry. It permitted formulation of a theory of definition, which Tarski used to show clearly that Veblen's 1904 attempt had to fail. Further, he showed that Pieri's single ternary primitive relation among points was in a sense optimal: no family of binary relations could suffice. Tarski's work has led to deeper recent studies, particularly by Pambuccian. (Received August 24, 2009)