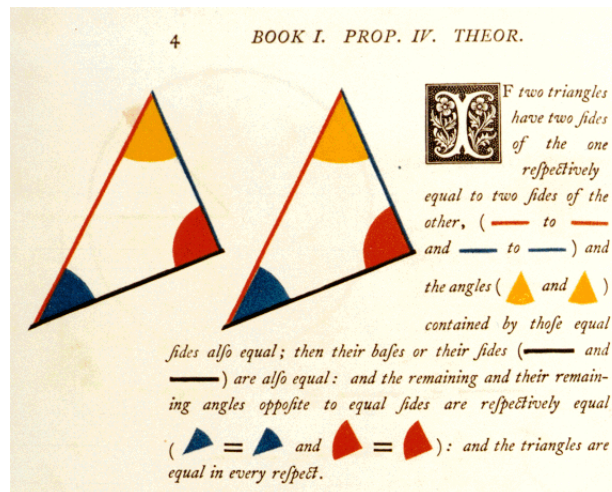


The Parallel Postulate and Geometries without Rigidity

Edwin O'Shea

James Madison University



Abstract:

The discovery of non-Euclidean geometry in the 19th century elicited two distinct reactions from mathematicians wishing to preserve the ethos of classical geometry: address the crises of foundations (led by David Hilbert and others) and recast geometry vis-a-vis transformation groups (led by Felix Klein and others). This talk aims to build a bridge between these paradigms by exploring axiomatic models of geometry without Hilbertian SAS congruence / Kleinian rigidity. Using these models, we show that the classical equivalence of Euclid's parallel postulate and Playfair's axiom collapses in the absence of SAS and that a perfectly standard sum of angles property is equivalent to SAS.

The first half or so of this talk will serve as an introduction to Euclid's Elements and its progeny so an in-depth knowledge of the axiomatic development

of geometry is not assumed; I won't even assume you have studied geometry since high school. This is joint work with my colleague, Elizabeth T. Brown and our four REU students, Emily Castner, Stephen Davis, Edouard Seryozhenkov, and AJ Vargas (J. Geom. (2019) 110: 42), and ongoing work with Brown.

Speaker Bio:

Dr. Edwin O'Shea is an Associate Professor in the Department of Mathematics and Statistics at James Madison University. His research interests are in combinatorics, commutative algebra and combinatorial optimization with growing interests in the areas of (classical) number theory, (classical) geometry, and history of mathematics, especially as these pertain to Euclid's Elements.

Monday, October 7 at 3:50 pm in Roop 103

Refreshments at 3:30 pm