1125-A0-2209 **Tevian Dray*** (tevian@math.oregonstate.edu), Department of Mathematics, Oregon State University, Corvallis, OR 97331. *The geometry of calculus.*

Geometric reasoning lies at the heart of a coherent view of calculus. Differentiation involves ratios of small quantities. Integration involves chopping, adding—and multiplying. A geometric description of both processes is readily available using infinitesimal reasoning, an approach that transfers well to other disciplines, such as physics and engineering.

Examples of geometric reasoning in calculus include the use of the dot product to derive trigonometric identities, the use of differentials to determine the derivatives of trigonometric functions without the need for limits, and the use of vector differentials to provide a coherent view of vector calculus.

After giving several such examples, this talk describes our efforts to make geometric reasoning, in large part based on differentials, the central theme in calculus, through our very successful 20-year effort to bridge the gap between lower-division mathematics and upper-division physics, our much less successful attempts to apply what we had learned to first-term calculus, and our recent efforts to introduce a numerical representation of differentiation in terms of experimental data, leading to the concept of "thick derivatives". (Received September 19, 2016)