962-N1-609   **David Dennis*** (`dennis@math.utep.edu`), Dept. of Mathematical Sciences, University of Texas at El Paso, El Paso, TX 79968-0514. *Integration By Parts as a Curve Drawing Machine: Leibniz's Transmutation of Curves as a Critical Experiment Testing the Ability of Formal Languages to Model Geometry.*

Geometrically, integration by parts attempts to resolve one curved area into the difference between a rectangle and another curved area; in hopes that the second area is something more tractable. As a technique in calculus this is derived as a simple reversal of the Leibniz product rule with no geometry in sight. Leibniz, however, first developed a geometrical locus construction which when attached to the original curve draws the new curve to be integrated in the "parts formula." He developed this geometrical construction which he called the "transmutation of curves," years before he developed the formal language of calculus. Applied to the circle and the hyperbola Leibniz found his strongest evidence in favor of the ability of formal language to accurately model geometry. Through the use of Dynamic Geometry Software it is possible for students to investigate and experiment with the Transmutation Device. When students ask "What's so earth-shaking about calculus?" a profound answer emerges: Geometry and Algebra are consistent with each other, and even more, they may actually be translatable each one into the other. Students can experience calculus as a stunning expansion of the possible connections between language and space. (Received September 15, 2000)