

Abstract Submitted
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Revisiting Einstein's Happiest Thought: On Ernst Mach and the Early History of Relativity RICHARD STALEY, University of Cambridge — This paper argues we should distinguish three phases in the formation of relativity. The first involved relational approaches to perception, and physiological and geometrical space and time in the 1860s and 70s. The second concerned electrodynamics and mechanics (special relativity). The third concerned mechanics, gravitation, and physical and geometrical space and time. Machs early work on the Doppler effect, together with studies of visual and motor perception linked physiology, physics and psychology, and offered new approaches to physiological space and time. These informed the critical conceptual attacks on Newtonian absolutes that Mach famously outlined in *The Science of Mechanics*. Subsequently Mach identified a growing group of relativists, and his critiques helped form a foundation for later work in electrodynamics (in which he did not participate). Revisiting Machs early work will suggest he was still more important to the development of new approaches to inertia and gravitation than has been commonly appreciated. In addition to what Einstein later called Machs principle, I will argue that a thought experiment on falling bodies in Machs *Science of Mechanics* also provided a point of inspiration for the happy thought that led Einstein to the equivalence principle.

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