



## The Enigma of the Aerofoil: Rival Theories in Aerodynamics, 1909-1930

By David Bloor

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Why do aircraft fly? How do their wings support them? In the early years of aviation, there was an intense dispute between British and German experts over the question of why and how an aircraft wing provides lift. The British, under the leadership of the great Cambridge mathematical physicist Lord Rayleigh, produced highly elaborate investigations of the nature of discontinuous flow, while the Germans, following Ludwig Prandtl in Göttingen, relied on the tradition called “technical mechanics” to explain the flow of air around a wing. Much of the basis of modern aerodynamics emerged from this remarkable episode, yet it has never been subject to a detailed historical and sociological analysis.

In *The Enigma of the Aerofoil*, David Bloor probes a neglected aspect of this important period in the history of aviation. Bloor draws upon papers by the participants—their restricted technical reports, meeting minutes, and personal correspondence, much of which has never before been published—and reveals the impact that the divergent mathematical traditions of Cambridge and Göttingen had on this great debate. Bloor also addresses why the British, even after discovering the failings of their own theory, remained resistant to the German circulation theory for more than a decade. The result is essential reading for anyone studying the history, philosophy, or sociology of science or technology—and for all those intrigued by flight.

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- Sales Rank: #1460877 in Books
- Published on: 2011-11-15
- Released on: 2011-11-15
- Original language: English
- Number of items: 1
- Dimensions: 9.00" h x 1.40" w x 6.00" l, 1.85 pounds
- Binding: Paperback
- 608 pages

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**Editorial Review**

Review

“Valuable for everyone interested in the history of aeronautics, fluid dynamics, early aircraft, applied mathematics, and the sociology of science and engineering. Highly recommended.”

(A. M. Strauss, Vanderbilt University *Choice*)

“A detailed technical history of the development of airfoil theory, a central achievement of modern aerodynamics . . . [as well as] a careful comparative analysis of the two main schools of aerodynamic theory in the early twentieth century, one British and the other German . . . [Bloor] provides penetrating insights into different modes of reasoning involved in the application of mathematical theory to technological practice.”

(Eric Schatzberg *Metascience*)

“Superb. . . Joins excellent recent work on the intriguing but technically demanding subject of the history of fluid dynamics by Olivier Darrigol and Michael Eckert, and opens the field to historical-sociological analysis. Bloor’s extensive case study compares the development of aerodynamical theories of lift in Britain and Germany from 1909 to 1930. . . . One of the most convincing cases since *Leviathan and the Air Pump* for the simultaneously cognitive and social character of knowledge production.”

(Daniela Helbig, University of Sydney, Australia *Endeavour*)

“The reader is expertly led on a narrative journey that is filled with technical detail on the accomplishments of a bygone era.”

(Thomas J. Pence, Michigan State University *Meccanica*)

“Historians and philosophers rethinking the underpinnings of myriad scientific projects through the lens of technoscience would do well to grapple with Bloor’s magnum opus. It rewards the patient reader with a partial and situated toolkit to face the evolving designs of a nature we help make.”

(Matthew Wisnioski, Virginia Tech *Studies in History and Philosophy of Science*)

“David Bloor’s *The Enigma of the Aerofoil* sets out to explain the development of aerodynamics in Britain and Germany early in the twentieth century. Why, he asks, was it in Germany, and not in Britain, that practitioners produced a fusion of theory with aerofoil design when the basic concept upon which the Germans relied, that of circulation about an aerofoil with the flow treated otherwise as an ideal fluid, had long before been used by Rayleigh in Britain for the flight of a tennis ball? Bloor probes this ‘enigma,’ combining deft analysis of the technical arguments involved with a sure examination of the social frameworks within which his several protagonists worked. Along the way, he grapples with the character of reasoning and practice when scientific theory confronts engineering reality. Written by a founder of the strong program in the sociology of science, Bloor’s *Enigma* is among the very finest histories that raise these difficult and important questions—one that succeeds by refusing to break the intellectual from the social, and both from the exigencies of engineering practice.”

(Jed Z. Buchwald, California Institute of Technology)

“In *The Enigma of the Aerofoil*, David Bloor paints a seamless picture of how and why British and German theorists struggled, typically in different ways, to make an aerodynamic theory that corresponded even

approximately with aeronautical practice. In doing so, Bloor gives us a stark reminder of the extraordinary power—and the limits—of mathematics and mathematicians in their many guises. As a result this book will help redefine what we take the central sciences and technologies of the twentieth century to be, and how we study them.”

(David Edgerton, Imperial College London)

“A masterpiece of writing and research. David Bloor brings his varied background to the table, writing the only book that describes a wonderful mixture of the scientific, historical, philosophical, and sociological forces that help to explain the ‘enigma’ of the aerofoil.”

(John D. Anderson Jr., National Air and Space Museum, Smithsonian Institution)

About the Author

**David Bloor** is professor emeritus in the Science Studies Unit at the University of Edinburgh. He is the author of *Knowledge and Social Imagery* and coauthor of *Scientific Knowledge: A Sociological Analysis*, both published by the University of Chicago Press.

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