PATTERNS OF DISCOVERY

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AN INQUIRY INTO THE CONCEPTUAL FOUNDATIONS OF SCIENCE

BY

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TO

FAY

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PREFACE

This book owes so much to so many; yet space permits the mention of so few. But the friendly guidance of H. H. Price, G. Ryle, P. F. Strawson, S. E. Toulmin, A. J. T. D. Wisdom and W. C. Kneale amongst philosophers, and Sir H. Jeffreys, P. A. M. Dirac and N. F. Mott amongst physicists, must be gratefully acknowledged. So must my indebtedness to R. A. Becher of the Cambridge University Press, and to the Master and Fellows of St John's College, Cambridge. Without their encouragement, this work would have expired long since, which, I concede, might have been a more deserving fate for it. To my wife, Fay, the most endearing of critics, I give my grateful thanks—for everything.

N. R. H.

BLOOMINGTON, INDIANA
May 1958

PREFACE TO THE 2010 PAPERBACK REISSUE

By Professor Matthew Lund

Patterns of Discovery enjoys a prominent place in the canon of History and Philosophy of Science. Its impressive treatment of both historical and contemporary physics set a new standard of expertise for would-be writers in the philosophy of science. The freshness and fertility of Hanson's approach made an immediate impact, characteristically noted by Hilary Putnam: "at last we have a philosopher of science who is in fact writing about science and not about the papier-mâché constructions that frequently replace science in the writings of philosophers and logicians of science."

Before we can put the book in its proper perspective, a few words should be said about its author. Norwood Russell Hanson was not an easy man to forget. Hanson's confidence was only exceeded by his abilities, which were just as remarkable in their breadth as in their intensity. In addition to his academic talents, Hanson was gifted in athletics, music, drawing, and the theory and practice of flight. Before all things, Hanson was an artist. His talents as an illustrator are on display in *Patterns of Discovery*: all the book's unacknowledged figures were produced by his own hand. The young Hanson was celebrated as a musical prodigy—were it not for the seismic disturbance of WWII, Hanson-the-musician might be discussed instead of Hanson-the-philosopher. However, WWII spawned yet another Hanson persona: his experience as a Marine Corsair pilot instilled in him a life-long love of flying that reached its crest when Hanson appeared as "The Flying Professor" in the mid-sixties. Unfortunately, Hanson's unquenchable zest for flying ultimately ended his life at the age of 42. In April 1967, Hanson was killed when his self-piloted Bearcat crashed near Cortland, New York.

One of Hanson's largest influences on the character of American higher education was his creation of Indiana University's History and Philosophy of Science Department, the first of its kind in the United States. Hanson capitalized on the post-Sputnik insecurity over American scientific education in obtaining a large federal grant, and thereby laid the institutional foundation for a new discipline. However, Hanson was never one to settle in his conquered territory, and left Indiana for Yale soon after the Department was in full operation.

It is now over 50 years since the original publication of *Patterns of Discovery*. While the book is still frequently cited, especially as having ushered out the formalist approach of the logical positivists, the true originality and boldness of the book often go unnoticed. The central approach of the book was to examine the fundamental concepts of both science and scientific epistemology through the lens of the history of science. However, Hanson's lens was focused in a peculiar way, for he used the development of twentieth century microphysics as a means to magnify features of older theoretical triumphs that might otherwise be passed over. One of the central motifs of *Patterns of Discovery* is the continuity of scientific inquiry and knowledge from the 16th century onward. Hanson did not see the development of 20th century

microphysics as some unprecedented break with older, more quaint, theories of matter. Instead, close attention to the conceptual hurdles cleared by 20th century physics discloses that their novelty lies only in their newness, not in some wholesale transcending of previous approaches to investigating nature.

In order to put Hanson's book in proper context, a few words must be said about the historical conditions of its composition. While Hanson had been steeped in ordinary language philosophy at Oxford, it was his position as Cambridge's first Lecturer in the Philosophy of Science that most definitively shaped *Patterns of Discovery*. At Cambridge, Hanson was exposed to some of the brightest lights in both history of science and in science itself, such as Herbert Butterfield, Sir Lawrence Bragg, Paul Dirac, and Fred Hoyle. Through his work with historian A. Rupert Hall on the Natural Sciences Tripos, Hanson became a sort of personification of the fusion of science, philosophy, and history. Thus, Hanson's boldness, if not audacity, in marshalling primary sources in 17th century mechanics and in taking on the philosophical worries of physicists opposed to the Copenhagen Interpretation (one must remember that the term "Copenhagen Interpretation" was only 3 years old in 1958) is explainable, in part, because of the fortunate circumstances in which he found himself at Cambridge.

As early as his Oxford B. Phil. Essay, Hanson had demonstrated a predilection for viewing science as a process of growth and discovery rather than a cold, formal algorithm. With his immersion into historical and contemporary science at Cambridge, Hanson was able to add flesh to, and vivify, the abstract philosophical structures he had been articulating. *Patterns of Discovery* is best read when one bears in mind that Hanson's primary interest was to show the indispensability of concepts to scientific discovery. Hanson's unswerving goal of trying to lay bare the embryonic conditions of discovery made him put the phenomena – in this case, empirical psychology, the history of science, and science itself – before its analysis. Hanson's procedure, unorthodox in its day, has become a standard.

One of the most alluring features of *Patterns of Discovery* is the suggestive and intimate way in which the central concepts of scientific epistemology are intertwined. Hanson begins the book with his classic discussion of observation. Utilizing the insights of everyday language philosophy and Gestalt psychology, Hanson impressively showed that the vaunted distinction between observation and interpretation is not only specious, but acts as a barrier to an adequate understanding of the conceptual terrain of science. The scientist's eye is the intelligent eye, which always sees things in the context of an assumed conceptual pattern. The will to cleanse seeing and observing of all conjectural and interpretive elements is the will to a useless and impossible objectivity. Moreover, putting airy epistemological ideals before the facts can render much of our most salient and valuable intellectual accomplishments unintelligible. From a masterful demonstration of the centrality of conceptual patterns to observation, Hanson explored throughout the remainder of the book the significance conceptual patterns have for our notions of fact, causation, explanation, discovery, theory, and the interpretation of quantum theory. Hanson's analyses tend to result in an expansion of the subject matter of philosophy of science, rather than the constriction, if not extinction, of philosophical problems so often aimed at by

philosophers of the analytic cast.

What we do not find in Hanson is a theory of science. He accepts science as we find it and provides a *philosophical analysis* of it, but stops well short of giving a full theory of science after the fashion of Popper and Kuhn. Because of Hanson's 'agnostic' perspective, it is easy to read the system of others into his analysis. However, true to his Wittgensteinian roots, Hanson held that the meaning of science's epistemologically loaded terms was to be determined according to how such terms are used, or have been used, within science. While clearly influenced by ordinary language philosophy, Hanson's book is free of the narrow tediousness often associated with that persuasion. Hanson had very real concerns about the status of science, and he provides many answers. However, like nearly everything Hanson gave rise to, *Patterns of Discovery* is a work of art, whose many gestures and dramatic turns never come close to degenerating into sententious didactics. The book pulsates with tantalizing questions and seemingly forthcoming resolutions.

We can finally ask what *Patterns of Discovery* has to offer the 21st century reader. Most saliently, the book provides an exemplary case of philosophy, history, and science working together. In the decades since Hanson's death, academics have fecklessly attempted to codify the proper relationship these disciplines ought to have to one another. To be sure, Hanson offered his own solutions, but it was his less explicit sense of the interrelation—most famously presented in *Patterns of Discovery*—that provided one of the most memorable examples of a successful navigation of the unsurveyable borderlands between the disciplines. Even if contemporary readers are not fully conversant with the philosophical adversaries Hanson assails, his discussions are gripping and address themselves to issues that are still of vital significance. After half a century, *Patterns of Discovery* never settles for being philosophy-as-usual, and therefore still reads as a fresh and exciting book.

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