The Eponymous F. P. Ramsey

D. H. Mellor
UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND

Frank P. Ramsey will be known to readers of this Journal as the eponymous discoverer of ramsey numbers and founder of ramsey theory, but perhaps for little else. Yet his other achievements—several also eponymous—were no less remarkable, and their range was even more so: logic, foundations of mathematics, economics, probability, decision theory, cognitive psychology, semantics, scientific method and metaphysics. Most remarkable of all was his doing so much seminal work in so short a life, for he died of jaundice in 1930 at the age of 26. This note is written in the belief that even a bare outline of the life and work of this extraordinary man may be of interest to those still cultivating the fruits of his genius.

Frank Ramsey came of a distinguished Cambridge family. His father, A. S. Ramsey, was also a mathematician, and the President of Magdalene College; and his younger brother Michael went on to become Archbishop of Canterbury. Frank was an atheist, but they remained close friends. Through his family and Magdalene young Frank met, while and even before he read mathematics at Trinity College, the brilliant group of Cambridge thinkers who stimulated his later interests: notably Bertrand Russell and his philosophical colleagues G. E. Moore and Ludwig Wittgenstein, and the economist and philosopher of probability John Maynard Keynes.

Russell and Wittgenstein gave the original impetus to Ramsey's early metaphysics, logic, and philosophy of mathematics. In 1925, two years after graduating as Cambridge's top mathematics student, Ramsey produced "The foundations of mathematics" [9, Chap. 7], defending Russell's *Principia Mathematica* [10] reduction of mathematics to logic by removing its major flaws: simplifying Russell's implausibly complex theory of types, for instance, and strengthening his weak definition of mathematical propositions as purely general by requiring them also to be tautologies in the sense of Wittgenstein's *Tractatus* [11]. Although this logicist reduction of mathematics has since lost favor with mathematicians, it has recently been vigorously defended [7, Chap. 2], and Ramsey's record of prescience in many subjects makes the orthodox burial of his logicism now look decidedly premature.

Keynes's influence on Ramsey took him into two subjects: probability and economics. Keynes's 1921 *Treatise on Probability* [4], still influential, treats

Journal of Graph Theory, Vol. 7 (1983) 9–13
 CCC 0364-9024/83/010009-05$01.50

it as an extension of deductive logic, the logic of conclusive inference, to inductive logic, the logic of reasonable inconclusive inference. It appeals to a primitive logical relation of "partial entailment" which, when measurable, uses probability to say how strong an inference is from the one related proposition to the other. Ramsey criticised this theory so effectively, however, that Keynes himself abandoned it, although it was later revived in the work of Carnap [1] and others. Ramsey's own theory, in his 1926 "Truth and probability" [9, Chap. 3], by showing how to use gambling behavior to measure people's expectations (subjective probabilities) and wants (utilities), laid foundations for modern theories of subjective probability and Bayesian decision making [3].

Despite Ramsey's demolition of his *Treatise,* Keynes got Ramsey a Fellowship at King's College Cambridge in 1924 at the ripe age of 21, and encouraged him to work on problems in economics. There resulted "A contribution to the theory of taxation" and "A mathematical theory of saving" [9, Chaps. 10 and 11], appearing in *The Economic Journal* in 1927 and 1928, respectively. In his obituary of Ramsey [8, p. x], Keynes called the latter "one of the most remarkable contributions to mathematical economics ever made," and—since 1960—each paper has generated a flourishing branch of economic theory: optimal taxation and optimal accumulation [9, p. 14].

It will be noted that these economics papers, like nearly all Ramsey's work, took decades to be caught up with and developed by others. This was partly because Ramsey's work was generally highly original and thus hard to appreciate. But the very simplicity and clarity of Ramsey's prose tends to conceal the depth and precision of his thought. His writing is so free of jargon, so unacademically light and easy, that one can readily underrate it—until one tries to think through the matter oneself. Moreover Ramsey was not a controversialist. As his friend and early mentor at Magdalene, the critic and poet I. A. Richards put it in a radio program about Ramsey, "he never was a showman at all, not the faintest trace of trying to make a figure of himself. Very modest, gentle, and on the whole he refrained almost entirely from argumentative controversy . . . He felt too clear in his own mind, I think, to want to refute other people" [6]; a fact confirmed by his wife and other surviving friends. So it is perhaps not surprising that more flamboyant and forceful figures should have overshadowed Ramsey's reputation in the decades following his death, and diverted attention from his work.

That certainly happened in philosophy, which in the thirties and forties in Cambridge was dominated by Wittgenstein. Much of Ramsey's philosophy was therefore not picked up straight away, and was only belatedly rediscovered via the influence, largely in America, of the first edition of Ramsey's major works [8], put out in 1931 by his friend R. B. Braithwaite, now Knightbridge Professor Emeritus of Philosophy at Cambridge. Philosophy, as Braithwaite said in his introduction to that work, was Ramsey's "vocation" if not his profession, and it would be quite impossible here to

summarize his philosophical output, let alone its present influence and ramifications. For the work, see [8] or [9]; for an idea of the present condition of Ramsey's kind of pragmatist philosophy, see the essays in [7], written to commemorate the fiftieth anniversary of his death. Here two examples will have to serve to illustrate the striking originality and profound simplicity of Ramsey's philosophical thought.

First, Ramsey's (subsequently so-called) "redundancy theory" of truth. Pilate's notorious question "What is truth?"—what does it mean to call a belief or assertion true?—is as old and elusive as anything in philosophy. Ramsey disposed of it in a two page aside to a paper, "Facts and propositions" [9, Chap. 2], on pragmatist semantics: "It is evident," he says, "that 'It is true that Caesar was murdered' means no more than that Caesar was murdered." To think that another person's belief is true is just to be aware of sharing it; so there is, as Ramsey said, no separate problem of truth. The problem instead is to say what belief is: how it differs generically from other attitudes like hope and fear, and how one specific belief differs from another. But only recently have most philosophers been weaned away from Pilate's problem and come to follow up Ramsey's own admittedly sketchy ideas on how to solve the real one.

Secondly, in his posthumously published "Theories" [9, Chap. 4], Ramsey strikingly anticipated much later ideas of how scientific theorizing works. He saw much sooner than most that defining theoretical entities (such as fundamental particles) in observable or operational terms made no sense of how in practice theories are developed to apply to and explain new phenomena. Theoretical predicates, he said, are actually treated like existentially quantified variables—and such a presentation of a theory is in consequence now called its "Ramsey sentence." It follows that parts of theories cannot be understood, or assessed for truth or falsity, on their own, since they contain bound variables: as Ramsey put it, "we have to consider what else we might be going to add to our [theory], or hoping to add, and consider whether [it] would be certain to suit any further additions" [9, p. 121]. Hence also, rival theories may give quite different meanings to theoretical concepts which they appear to share, such as Newtonian and relativistic mass, so that they are rather "incommensurable" than simply incompatible. Again in Ramsey's words "the adherents of two such theories could quite well dispute, although neither affirmed anything the other denied" [9, p. 122]. Much methodological and historical literature on science from about 1960 (see [5]) has concerned itself with just these problems of comparing and assessing theories in the development of science; but there is still no better account than Ramsey's of why the problems arise.

Given the relatively large amount of work Ramsey did in logic, philosophy, and economics, readers may be surprized to learn that he was in fact a mathematician by trade as well as by training. In 1926, he became a University Lecturer in mathematics, the post he held until his death four years later. But oddly enough, that is not how he came to do the work on

which his mathematical reputation now rests. His lectures in the Cambridge Mathematics Faculty were mostly on the foundations of mathematics, not on mathematics itself; and he produced his famous theorem in a quite different and now rather ironic context.

Ramsey proves his theorem in the first eight pages of a 20 page paper "On a problem of formal logic" [8, Chap. 3], which solves a special case of the decision problem for first-order predicate calculus with equality. The irony is that, although Ramsey produced his theorem to help solve this problem it can be solved without it. Moreover, Ramsey only solved this special case as a contribution towards solving the general decision problem, an objective which Gödel [2] in effect showed to be unattainable the year after Ramsey died. So Ramsey's enduring fame in mathematics, which was his job, rests on a theorem he didn't need, proved in the course of trying to do something we now know can't be done!

We cannot be sure how Ramsey would have reacted to Gödel's result, but it is not the least tragic aspect of Ramsey's early death that he did not live to see and exploit it. As Braithwaite remarked in the radio programme already alluded to, "Gödel's paper really made mathematical logic into a professional subject and a specific and exciting branch of mathematics. I believe," Braithwaite added, "this would have excited Ramsey so much that he might have galloped down this for ten years or so." Given what has come from the eight pages of mathematics Ramsey did produce, we can only conjecture the enormity of our loss.

References

[1] R. Carnap, *Logical Foundations of Probability,* 2nd ed. University of Chicago Press, Chicago (1962).

[2] K. Gödel, Über formal unentscheidbare Sätze der Principa Mathematica und verwandter Systeme I. *Monatshefte für Mathematic und Physik* 38 (1931) 173–198.

[3] R. C. Jeffrey, *The Logic of Decision.* McGraw-Hill, New York (1965).

[4] J. M. Keynes, *A Treatise on Probability.* Macmillan, London (1921).

[5] T. S. Kuhn, *The Structure of Scientific Revolutions,* 2nd ed. University of Chicago Press, Chicago (1970).

[6] D. H. Mellor, Better than the stars. *BBC Radio 3 Documentary* transmitted 27 February 1978.

[7] D. H. Mellor, ed. *Prospects for Pragmatism.* Cambridge Univ. Press, Cambridge (1980).

[8] F. P. Ramsey, *The Foundations of Mathematics,* R. B. Braithwaite, Ed. Routledge & Kegan Paul, London (1931).

[9] F. P. Ramsey, *Foundations*, D. H. Mellor, Ed. Routledge & Kegan Paul, London (1978).
[10] A. N. Whitehead and B. Russell, *Principia Mathematica.* Cambridge Univ. Press (1913).
[11] L. Wittgenstein, *Tractatus Logico-Philosophicus.* Routledge & Kegan Paul, London (1922).