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F. P. Ramsey (1903–1930)

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Frank Plumpton Ramsey made lasting contributions to philosophy, logic, mathematics, and economics in an astonishingly short period. He flourished during the 1920s at Cambridge University, and he interacted with the many notable figures there, including Russell, Moore, Keynes, and Wittgenstein. He was by no means a minor figure among this group. His work makes it clear, in fact, that he was at least their intellectual equal, and perhaps more, a judgment quite consistent with opinions expressed by his contemporaries.

Ramsey held an appointment in mathematics, but his main mathematical interests were in its foundations. He published just one piece of real mathematical work, a nine-page first section of his investigation of a decision procedure for a special case of first-order predicate logic ("On a Problem of Formal Logic," in Ramsey 1931). What he presented there as a preliminary tool has since been recognized as an important result – Ramsey's Theorem – and is the origin of a now thriving branch of mathematics, Ramsey Theory. He also published two papers in economics, one on taxation, and another on saving, that have also come to be regarded as important pioneering contributions to their subjects (in Ramsey 1978).

Ramsey had wide philosophical interests. He criticized and revised the logical system of *Principia Mathematica*, simplified its theory of types, and distinguished between the logical and semantic paradoxes. He gave a proto-functionalist account of belief, together with a redundancy theory of truth. He developed now influential accounts of partial belief, reasonable belief, probability, and knowledge. He developed an account of causality closely related to Hume's that has strongly influenced important contemporary accounts of laws of nature, and he made a proposal for representing the content of scientific theories via what are now known as Ramsey sentences. This is a distinguished collection of original contributions to philosophy; it is astonishing in light of the tragic fact that Ramsey died shortly before his twenty-seventh birthday, in January 1930. The circumstances of Ramsey's short life, and the time it took for many of his various projects to influence others, put us in an unusual position in studying and assessing his work. Ramsey was extremely productive, and his work always contains remarkable insight and originality. But his time was short, and probably none of his efforts approach the refinement of the treatments that we can imagine he would have produced, had he lived longer.

Foundations of mathematics

Though he later became a convert to finitism, Ramsey's well-known work on the foundations of mathematics explores and defends logicism, the view that mathematics is part of logic. Ramsey adopted the logic of Wittgenstein's *Tractatus*[1] and used its accounts of propositions and tautology to criticize and improve on the system of *Principia Mathematica* (*PM*). Russell and Whitehead used the ramified theory of types to avoid a variety of potential contradictions, including the paradox found by Russell that undermined the previous logicist theory of Frege (see FREGE and RUSSELL). *PM*'s ramified type theory involved a double hierarchy of (1) types of classes and propositional functions, and (2) orders of propositional functions within each type. Both hierarchies were motivated by, and according to Ramsey sloppily deduced from, a vicious circle principle: its idea is that classes may not include themselves as members, nor can propositional functions meaningfully apply to, or quantify over, themselves. With its arrangement of classes into types according to their membership, the system of *PM* rejected the paradoxical set of all sets not members of themselves. With its insistence that meaningful propositional functions be defined to apply only to functions of lower order, the system avoided further contradictions, such as Richard's and Grelling's paradoxes.

Ramsey criticized *PM* for recognizing only an impoverished range of classes, namely those definable through its comprehension axiom, but he had no objection to the type hierarchy it imposed on classes. He thought the ramified hierarchy of orders among functions of a given type was flawed in two ways, however. It missed the real nature of the paradoxes it sought to defuse, and it forced into the system of *PM* a nonlogical axiom, thereby undermining the logicist project. The axiom in question was the axiom of reducibility, asserting that for any propositional function of higher order there is an extensionally equivalent function of *lowest* order. With ramified types the axiom is needed, for instance, to guarantee that upper bounds of sets of real numbers will themselves be real numbers, rather than distinct entities with defining characteristics having a higher order than do the defining characteristics of the reals. Without the axiom *PM* could not capture important parts of mathematics (calculus and analysis, for example), but with it, Ramsey argued, *PM* made use of an axiom lacking logical necessity, and so failed its attempt to ground mathematics in logic alone.

Ramsey cites Peano for noticing that Richard's paradox is linguistic rather than mathematical, but he is the one remembered for drawing a general distinction between logical and semantic paradoxes. The contradiction threatened by Russell's set would occur within a mathematical system, but not so with many other paradoxes. The liar paradox, Richard's paradox and Grelling's paradox (which Ramsey attributes to Weyl) "occur not in mathematics, but in thinking about mathematics . . . [they] could not be constructed without introducing the relation of words to their meaning or some equivalent" (1990: 184, 200). *PM* made the mistake of treating the semantic paradoxes as logical ones, bringing in ramified type theory, and with it, the reducibility axiom. Ramsey reconceived propositions and logical necessity along the lines of the *Tractatus*, and he provided a revised, simpler theory of types, now applying to the various symbolic *expressions* of propositions, for which the axiom of reducibility

was not needed. "For me propositions in themselves have no orders; they are just different truth-functions of atomic propositions – a definite totality, depending only on what atomic propositions there are. Orders and illegitimate totalities only come in with the symbols we use to symbolize the facts in variously complicated ways" (1990: 211–12).

The logicist project was doomed by work done after Ramsey's death, but it seems Ramsey himself abandoned it before then. He had joked of preserving mathematics from the "Bolshevik menace of Brouwer and Weyl," but he later made extensive notes on intuitionist mathematics, and Braithwaite reports that he was converted to that view near the end of his life (1931: xii, 1990: 219, 1991a: 197–220).

Belief and truth

What is truth? For Ramsey, who takes truth to be first a property of beliefs and judgments, and only derivatively a property of sentences, this becomes the question, What is it for a belief to be true? His answer is that a belief is true when it is a belief that *p*, and *p*. He regarded this as entirely obvious; the difficult part in analyzing the truth of belief is not with the concept of truth, but with the analysis of what it is to believe that *p*. To say that it is true that the earth is round amounts to saying that if anyone were to believe that the earth is round, their belief would be true. Which is to say "no more than that the earth has the quality you think it has when you think it is round, i.e. that the earth is round" (1990: 38–9, 1991b: 7–13). To say, "Everything he believes is true" amounts to no more than "For all *p*, if he believes *p*, then *p*." The latter sounds odd in ordinary discourse; our grammatical habits demand a verb and push us toward tacking an "is true" on to the end of the latter sentence, which then would hardly be enlightening. But the verb and the clause are unnecessary; a verb is already present in any of the beliefs he may have.

Ramsey regarded his account of truth as a qualified correspondence theory, but it has come to be known as a redundancy theory. As he made clear, if in order to give an account of what it is to believe that *p*, he were forced to rely on the concept of truth, then not much progress would have been made. So what accounts for the contents of beliefs, judgments, and assertions? Ramsey sketched what he regarded as a pragmatist account, influenced by Russell and Peirce, that looks to the causal properties of our mental states. The primary target of his account is occurrent linguistically expressed belief, consciously asserted or denied; the contents of dispositional beliefs are derivative from the contents of occurrent thoughts.[2] The relevant mental states are silent or spoken linguistic utterances accompanied by feelings of assent or denial, and their contents are given by causal properties they bear to other mental states and to the world. Beyond describing the general picture, Ramsey devoted most of his attention to explaining how such causal properties exhibit patterns corresponding to the logical structures of the propositional contents born by the states. The key point is that his account of belief generates his account of meaning, rather than the other way around. "The essence of pragmatism I take to be this, that the meaning of a sentence is to be defined by reference to the actions to which asserting it would lead, or, more vaguely still, by its possible causes and effects" (1990: 51).

Reasonable belief, probability, and knowledge

"Truth and Probability" was written in 1926 and published posthumously (1931).[3] It is best known for its treatment of partial belief and subjective probability. Beyond this, however, Ramsey presented a view of logic construed as the science of rational thought, which he divided into two parts, the logic of consistency and the logic of truth.[4]

At the core of the views now known as probabilism, Bayesianism (in epistemology or decision theory), and subjectivism (about probability) is the idea of *partial belief*, and there is still no better introduction to it than the third section of "Truth and Probability." We hold some of our beliefs more strongly than we hold others. What is it that varies among the beliefs held with different strengths? Different beliefs will have different contents, of course, and sometimes the content of a belief may be about the strength of a belief, as when I believe that you strongly believe that *p*, or doubt that *q*. I might have a view about the strength of my own belief, but that view (a second-order belief, we might say) is distinct from its subject (my belief that *p*, with whatever strength it has). So if it is not in the content of a belief, where and what is the strength of a belief? And if we can answer that, can we go on to make systematic sense of the degrees of strength that beliefs can and do have? Perhaps we can do little better than to say that on different occasions we are certain, or confident, or think that maybe . . . , and so on. But Ramsey's answer to the first problem (What is strength of belief?) illuminates the *point* of distinguishing different degrees of strength, and it makes room for a range of strengths richer and more systematic than is the range indicated by our ordinary reports.

The essential idea is that the most fruitful way to think about the degrees of strength to which we hold beliefs (degrees of belief, for short), is to attend to the ways beliefs guide us in our choosing and acting. A degree of belief is a causal property of it, "which we can express vaguely as the extent to which we are prepared to act on it" (1990: 65). Ramsey proposed, first, that there is a univocal way in which a proposition *p* enters into a person's deliberations, so that it makes sense to speak of *the* degree to which she holds *p*.[5] If we are willing to accept that, then we can look to a person's deliberations and potential choices for indications of *p*'s influence on them, i.e. for indications of her degree of belief in *p*. In doing this, we are exploring a measurement problem, and Ramsey was well aware of both the theoretical difficulties and the practical complications that accompany a solution to it. On both scores, he drew an analogy to measurement in physical science. On the theoretical side, just as the length of a time interval between two events depends in relativistic physics on exactly how it is measured, so may the influence of a belief on choice. So just as when we use the idea of time intervals, when we use the idea of degrees of belief we should keep track of how we propose to measure them, but "for many purposes we can assume that the alternative ways of measuring it lead to [approximately] the same result" (1990: 63; see also p. 68). On the practical side, the intertwining of different physical influences and the disturbances introduced by measurement processes do not undermine all our attempts to understand and quantify physical phenomena. So it is at least not obvious that similar practical complications in studying belief and choice will defeat our attempts to do so.

Ramsey first gave a familiar, if piecemeal, account. As he put it, "The old-established way of measuring a person's belief is to propose a bet, and see what are the lowest odds

which he will accept. This method I regard as fundamentally sound; [though inexact and not general]" (1990: 68). The odds one will offer on a bet (ratios of its potential payoffs) indicate one's degree of belief. If I am willing to offer high odds as I defend *p*, my degree of belief in *p* is high; if I offer only low odds (demand high odds from my opponent) my degree of belief is low. A *conditional* degree of belief in *p*, given that *q*, is indicated by the odds I would place on a wager on *p* which only pays off in the circumstance that *q* is true. Of course we undertake wagers infrequently compared to the frequency with which we have beliefs, and the betting scenario is quite artificial as a model for the variety of choices we make. Beliefs and their strengths are dispositions, though, and the measurements proposed via wagering are *indicators* of them, not the degrees of belief themselves. And in a wider sense, Ramsey said, all our lives we are betting: "Whenever we go to the station we are betting that a train will really run, and if we had not a sufficient degree of belief in this we should decline the bet and stay at home" (1990: 79).

What degrees of belief ought we to have? The logic of consistency requires that degrees of belief obey the rules of probability. Apropos of the betting scenario, Ramsey stated – and seems to have understood better than most – what has become known as the Dutch book argument. Degrees of belief that violate probability would guide a person toward betting arrangements guaranteed to yield a loss (a certain loss, according to his own values) and Ramsey took this to be an indication of inconsistency in the partial beliefs.

The most remarkable part of Ramsey's treatment of partial belief is his generalization of the betting scenario used so far. Generalize the idea of a bet on *p* to a gamble having the form, α if *p*, β if not, where α and β represent states of the world bearing value and obtaining according to whether or not *p* does. Some gambles will be favored over others, depending upon the values of α and β, and on *p*. Ramsey showed that if a person's preferences among a rich set of these gambles is well arranged, according to stated principles (transitivity, for example, is one), then there are non-arbitrary measurements of all the values and of the probabilities of all the propositions *p*. These measurements are attributable to that person's values and beliefs, and can be taken to be the values and degrees of belief that guide his choices. This result is an early forerunner of similar demonstrations given by many later economists and philosophers, results that are usually taken as foundations for utility theory or decision theory. Ramsey emphasized the importance of the result for an account of partial *belief*, though this theory yields both. Important later theories that follow him in this are Savage's and Jeffrey's.[6]

Beyond the dictates of consistency, what degrees of belief are reasonable? With repeated acknowledgment of Peirce's influence, Ramsey conceived of the logic of truth along pragmatist lines. The best approach is to ask about the reasonability of the *habits* by which we arrive at and hold our beliefs. *Always fully believe the truth* is not bad advice, but it is not a very useful recommendation either. Nor is it useful as a standard for the sort of general habits open to humans, habits that so often yield partial beliefs rather than certainties. A more appropriate standard judges the habits according to how closely their partial beliefs correspond to the rate at which the beliefs are true. That is, the habit should yield a partial belief whose strength corresponds to the frequency with which relevantly similar beliefs are true. Ramsey used an illustration involving a belief

about the wholesomeness of yellow toadstools; we can use the beliefs of weather forecasters. A forecaster does well when it rains 70 percent of the time in which her degree of belief is 7/10. Ramsey's work on the *consistency* of partial belief is well known. It is worth emphasizing that he attached as much importance to this second standard calling for alignment of degrees of belief with frequencies of truth (and, further, that he was aware of the complexities of developing it, e.g., in identifying habits and specifying what classes of cases are relevant). To return to the action-guiding nature of partial belief:

> [B]elief of degree m/n is the sort of belief which leads to the action which would be best if repeated n times in m of which the proposition is true. . . . It is this connection between partial belief and frequency, which enables us to use the calculus of frequencies as a calculus of consistent partial belief. And in a sense we may say that the two interpretations are the objective and subjective aspects of the same inner meaning, just as formal logic can be interpreted objectively as a body of tautology and subjectively as the laws of consistent thought. (1990: 84)

Ramsey said less about knowledge than about reasonable belief. He regarded knowledge as true, certain belief produced by a reliable process, and so it appears he considered it the extreme case of fully held true belief, backed up by a process that tends to produce such beliefs. This is a natural extension of his suggestion for evaluating our habits of belief, especially if the required reliability matches the strength of the belief (certainty). Though his most straightforward and explicit statements demand certainty, they are accompanied by discussions of fallibilism and by further remarks that soften the demand to near-certainty, practical certainty, or conviction "just a minute fraction short" of certainty (1990: 110–11, 1991b: 62–4). He agrees with Russell's view that "all our knowledge is infected with some degree of doubt," and in a paragraph on Moore's paradox and the paradox of the preface, he shifts from talk of certainty to talk of being *nearly* certain. It is likely a mistake to overanalyze his brief unpublished remarks, and it is difficult to determine how closely Ramsey's account of knowledge is tied to his account of reasonable belief. It is clear, though, that he endorsed a reliable-process account of knowledge, and he is remembered by contemporary epistemologists for doing so.

Laws, causality, and theories

In the last two years of his life Ramsey worked seriously on causality, laws of nature, and the formal structure of scientific theories. The several papers on these topics are not so finished as his earlier work, and in places indicate rapidly evolving views. This is also the period in which he was at work on his book on truth and moving away from logicism to an intuitionist view of mathematics.

Ramsey's view of causality was not very distant from Hume's. In his brief 1928 paper on law and causality (1990: 142–3), he suggests that the difference between universals of law and universals of fact (between lawlike and accidental generalizations, we might say) lies in their distinct roles in our system of knowledge. If we knew everything and organized our knowledge in a deductive system that strove for simplicity, the

general axioms of the system would be the fundamental laws of nature. They and the generalizations derivable from them without reference to facts of existence are the "statements of causal implication." And though really we do not know everything, we do tend to organize our knowledge in a deductive system, regard its axioms as laws, and regard as undiscovered laws the future axioms we expect to arise as we learn more. Ramsey soon revised this view, but its influence persists in the work of more recent philosophers, notably in David Lewis's best-system account of laws[7] (see LEWIS).

Ramsey's revised treatment is in the 1929 paper, "General Propositions and Causality." The view there is that causal laws do not get their force by being simple fundamental generalizations in an axiomatic summary of our knowledge. Their causal force lies in our trusting them as guides in our inferences about particular events. Causal generalizations "are not judgments but rules for judging 'If I meet a ϕ, I shall regard it as a ψ.' This cannot be *negated* but it can be *disagreed* with by one who does not adopt it." An assertion of a causal law is an assertion not of a proposition, but of a formula from which we derive propositions about particular events. Its causal character lies in the temporal ordering of the events about which it licenses our judgments (ψ does not precede ϕ). The special importance we attach to judgments with that ordering is traceable to the importance of forward-looking judgments in our thinking about the influence our actions may have on the world.[8] In the course of discussing conditionals in this paper, Ramsey suggests that the acceptability of a conditional goes by the acceptability of its consequent after the antecedent is hypothetically added to one's beliefs:

> If two people are arguing "If *p* will *q*?" and are both in doubt as to *p*, they are adding *p* hypothetically to their stock of knowledge and arguing on that basis about *q*; . . . We can say that they are fixing their degrees of belief in *q* given *p* . . . (1990: 155)

In contemporary work on conditionals this idea has become widely known as the *Ramsey test* for the acceptability of a conditional.

In another 1929 paper, Ramsey addresses the formal structure of scientific theories ("Theories," in Ramsey 1990). He is particularly interested in the question of the content of theoretical assertions, and how such content is related to the observational assertions on which the theory is built. One idea for demonstrating the dispensability of theoretical terms is to show that they are explicitly definable in terms of the observational assertions, and further, that the definitions can be inverted so that anything we express in theoretical language can also be expressed without recourse to the theoretical terms. Ramsey works all this out for a very simple example; even for that example, the results are complex and extremely cumbersome. Worse, as he points out, the method of explicit definitions creates the problem that additional data not seriously inconsistent with the theory will nevertheless falsify the theory unless adjustments are made to the meanings of its terms. Is there another alternative? Ramsey offers one. Conjoin all the sentences of the (first-order) theory, replace the occurrences of each distinct theoretical term with a second-order variable, and introduce for each distinct variable a second-order existential quantifier that binds its occurrences. The result is now known as the *Ramsey sentence* of the theory. It contains only observational terms, is entailed by the first-order theory, and it entails the

same particular observation sentences as the first-order theory. This device has since been used by Hempel, Carnap, and many others in treatments of the content and meaning of theories, whether the concern is, as above, with the observational content of scientific theories or with, for example, the relation between mental and neurophysical theories.

Notes

1 L. Wittgenstein, *Tractatus Logico-Philosophicus*, London: Routledge, 1922. Ramsey contributed to the 1922 English translation and made criticisms that led to changes in the 1933 second edition. Wittgenstein mentions Ramsey's influence in the preface to his *Philosophical Investigations*.
2 Dispositional linguistic belief, that is; Ramsey also entertained the idea that a chicken has beliefs, to be understood as relations between its potential behavior and circumstances in which the behavior is appropriate. This resembles the analysis he gives of dispositional strengths of belief (see below); Ramsey 1990: 40.
3 Several later notes expressing afterthoughts and further ideas are in Ramsey 1931, 1991a.
4 The organization of "Truth and Probability" was the starting point for a planned book. Much of the unfinished manuscript for the book has been published as Ramsey 1991b.
5 Notice that the idea of a single degree of belief is for a person, at a time, among a collection of other beliefs. A degree of belief may very well change for a variety of reasons, including observations, the passage of time, or changes in other beliefs.
6 L. J. Savage, *The Foundations of Statistics* [1954], 2nd edn., New York: Dover, 1972; R. C. Jeffrey, *The Logic of Decision* [1965], 2nd edn., Chicago: University of Chicago Press, 1983.
7 D. Lewis, *Philosophical Papers*, vol. II, Oxford: Oxford University Press, 1986. Lewis acknowledges "following the lead of (a short temporal segment of) Ramsey," p. xi.
8 Ramsey calls these rules for judging *variable hypotheticals*, of which causal laws are an important kind. Ramsey 1990: 149, 157–9.

Bibliography

Ramsey's best-known and most influential work is found in the collections of 1931, 1978, and 1990; their philosophical contents are very similar. His surviving papers are in the Ramsey Collection housed at the University of Pittsburgh's Hillman Library. A fascinating group of these papers, almost all otherwise unpublished, appear in the collection dated 1991a. A substantial manuscript on truth, also from the Ramsey Collection, was published in 1991b. The contents of Mellor (1980) are more inspired by Ramsey than centered on his work. Bibliographies of Ramsey's work appear in Ramsey 1931, 1978, 1990, and in Sahlin 1990; all of the books listed below contain interesting introductions or prefaces.

Works by Ramsey

1931: *The Foundations of Mathematics and Other Logical Essays*, ed. R. B. Braithwaite, London: Routledge and Kegan Paul.
1978: *Foundations*, ed. D. H. Mellor, Atlantic Highlands, NJ: Humanities Press.
1990: *Philosophical Papers*, ed. D. H. Mellor, Cambridge: Cambridge University Press.
1991a: *Notes on Philosophy, Probability, and Mathematics*, ed. M. C. Galavotti, Naples: Bibliopolis.
1991b: *On Truth*, ed. N. Rescher and U. Majer, Dordrecht: Kluwer.

Works by other authors

Mellor, D. H. (ed.) (1980) *Prospects for Pragmatism: Essays in Memory of F. P. Ramsey*, Cambridge: Cambridge University Press.
Sahlin, N. (1990) *The Philosophy of F. P. Ramsey*, Cambridge: Cambridge University Press.