

FRANK RAMSEY:
“HIS ACTUAL ACHIEVEMENT IS AMAZING”¹

NICHOLAS GRIFFIN
Russell Research Centre / McMaster U.
Hamilton, ON Canada L8S 4L6
NGRIFFIN@MCMASTER.CA

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The death of Frank Ramsey in January 1930 just before his twenty-seventh birthday, was the last nail in the coffin of the Cambridge school of mathematical logic. The Polish logician, Janina Hosiasson, was in Cambridge working on probability with Keynes when Ramsey died. She returned to Poland to report that little remained of “the logical school of Bertrand Russell”. Cambridge was left so destitute of logical talent that Max Black, who was in the final year of his Mathematical Tripos when Ramsey died, was asked to recommend someone who could examine him on mathematical logic (Misak, p. 270). Without Ramsey, logic as a subject of serious concern to philosophers withered, not just in Cambridge, but throughout the uk, for the next thirty or forty years. (Arthur Prior’s arrival from New Zealand in 1960 began to put things right.) But mathematical logic was only one of Ramsey’s concerns: he made important contributions to economics, probability theory, foundations of mathematics, philosophy of science, decision theory, combinatorics and graph theory (in an area now known as Ramsey theory) as well as to areas of philosophy outside of logic. And he translated Wittgenstein’s *Tractatus*—as a second-year undergraduate at the age of eighteen. Since so many of his contributions were seminal it is astonishing that, 90 years after his death, we still do not have an authoritative edition of his writings and did not have, until now, a proper biography.²

¹ RUSSELL, review of RAMSEY, *The Foundations of Mathematics*, *Mind* 40 (1931); 18 in *Papers* 10, p. 107.

² The main collections of writings are: *The Foundations of Mathematics and Other Logical Essays* (1931), cited here as *FM*, much of which is reprinted (along with some

Misak is well known for her extensive writings on pragmatism and the pragmatists, but this, to my knowledge, is her first biography and it is a very good one. For a life so short, there is an extraordinary amount of material to cope with, most of it unpublished and scattered in archives around the world. Misak has been thorough in tracking it down and weaving it into a very readable biography.³ One of the problems of writing a biography of someone who contributed at such a high level to so many different fields, is that it is impossible for the biographer to have expertise in all of them. Misak circumvents this by having experts contribute “guest boxes” to explain Ramsey’s various contributions: Misak puts the work in context and gives a simple account for the general reader, then the expert has their box to give (often) a much more technical account. Here she follows the lead of Hugh Mellor who, in editing *Foundations*, brought in various experts to introduce the papers. In both cases it works well. So well in the present volume that I thought it a pity that their various boxes were not listed in the table of contents so that one could find them more easily. (The boxes—especially the philosophical ones—also show how many times Ramsey was groping towards, hinting at, or on the brink of something *really* important which emerged only decades later. There really seems no limit to what he might have achieved, though it is worth reminding ourselves that not all his roads could have been taken.) Misak herself, of course, deals with most of the philosophy (at least outside of mathematical logic). Not surprisingly, she claims Ramsey for the pragmatists. Indeed, she had already done so in her previous book, cleverly titled *Cambridge Pragmatism: from Peirce and James to Ramsey and Wittgenstein*. I shall come back to Ramsey’s place in the pragmatic pantheon.

Ramsey seems to have been born intelligent. He irritated his caregivers by calling out the letters on passing billboards from his pram (p. 21). But, at first sight, his family seems an unlikely source of such a prodigy. His father was a rather undistinguished mathematics don at Magdalen College, Cambridge,

unpublished works and the two major economics papers) in *Foundations: Essays in Philosophy, Logic, Mathematics and Economics* (1978), cited here as *F*; *On Truth: Original Manuscript Materials (1927–1929) from the Ramsey Collection at the University of Pittsburgh* (1991), cited here as *OT*, which includes writings intended for a book, *Truth and Probability*, on which Ramsey was working at the time of his death; *Philosophical Papers* (1990); and *Notes on Philosophy, Probability and Mathematics* (1991).

³ My main complaint is with the *extremely* cryptic way in which references are given in the endnotes: a catch-phrase is given (without being linked to a page) followed typically by an archival call-number, and that’s it. In the endnotes, except for published material, we are not told the author or the nature or date of the document quoted, and the text often does not provide the missing information. In the case of published writings by Ramsey and Wittgenstein, if you can’t guess, you have to look the acronym up in the list at the front of the book and then search for publication details in the bibliography at the end—where sometimes the work isn’t listed!

more interested in the college accounts and writing textbooks and than in serious mathematics. He was hardly a likeable person. The son of an evangelical preacher, he was irascible, rigid, puritanical and, in personal relations, cold, formal, and distant. His best (perhaps, his only) friend called him a “bully & tyrant” (p. 15). Yet, from a poor family and mediocre schools, after multiple attempts, he got into Cambridge on a scholarship and was fifth Wrangler in the Tripos of 1889—that’s two places better than Russell four years later. Even Cambridge examination results are not an infallible guide to intelligence, but they are evidence. And the evidence is that Arthur Ramsey, to have got where he did from where he started, must have had quite a good mind (and maybe much better than that), but chose to exercise it only in the routine duties of his station. The sad truth is that the story of his life looks a bit like what *Jude the Obscure* might have been, had Hardy given it a happy ending. Ramsey’s mother, Agnes, was from higher up the social order. She was schooled at home and then went up to St. Hugh’s, Oxford to study history, becoming a teacher afterwards. In character, she was altogether different from her husband: even her daughter-in-law (an unlikely source of favourable opinion about mothers) described her as “energetic, lively and warm” (p. 214). She was very active in left-wing Cambridge politics, including women’s suffrage and the Cambridge Labour Party. Ramsey inherited her socialism and her cheerful, outgoing nature. Both parents believed strongly in the importance of education for their children.⁴

The general impression left of Ramsey by those who knew him was that he was happy, sociable, unpretentious, easy-going and generally well adjusted. But Misak detects trouble behind this sunny exterior. On the basis of some diary entries from late 1922 when he was nineteen, she thinks that he had “what can best be described as a break-down” (p. 108). I think she over-draws the crisis. The two diary entries she quotes concern loneliness and sexual frustration—not uncommon conditions for straight, nineteen-year-old males who’ve spent most of their social life in mainly male communities. Ramsey had arrived in Cambridge two years before from the claustrophobia of an English public school. Many in his cohort at Cambridge were older than he, their education having been delayed by the Great War, and the war had given them vastly greater experience of life and sex than Ramsey had obtained at

⁴ Misak speculates that Ramsey’s parents may have been the model for Mr. and Mrs. Ramsay in VIRGINIA WOOLF’S *To the Lighthouse* (p. 147n.). It is usually thought that Woolf modelled the characters on her own parents, but Misak says that the fit with Ramsey’s parents is “near perfect”, which gives one an interesting impression of what Frank’s childhood might have been like, though I should have thought that Woolf’s Mr. Ramsay had rather more ambition than Arthur Ramsey. I hadn’t realized until I read Misak’s biography how very close Ramsey was to Bloomsbury, with connections, of course, through Keynes and the Apostles.

Winchester. It was not unnatural that he would think that sex was passing him by. At all events, in the summer of 1924 he went to Vienna to be psychoanalysed. He had hoped to be analysed by Freud, and then by Rank, but ended up with Theodor Reik. Misak maintains that Reik cured him, but I would give more credit to the prostitute he visited two or three times while in Vienna and whom he rather liked (p. 161). Surely, in matters of sex, if nowhere else, an ounce of practice is worth more than any amount of theory. This seems to be the one point on which Misak's pragmatism fails her. In any case, Ramsey quite sensibly said afterwards that in psychoanalysis you spend so much time talking about yourself you become bored with the subject (p. 167; *FM*, p. 290), and even Reik, to his eternal credit, told Alix Strachey that he thought "there'd never been anything much wrong with him" (p. 177).⁵

Ramsey's other purpose in going to Austria was to meet Wittgenstein, whose *Tractatus* he had recently translated for C. K. Ogden's International Library of Psychology, Philosophy and Scientific Method. The story of the first English translation of the *Tractatus* is now well known, after years of obfuscation by Wittgenstein and his disciples. Two puzzles remain: one important and the other not. Why was Ramsey not given credit for the translation when the *Tractatus* was first published in English? Though Ogden was regularly cited as the translator (and still is on the book's cover), he does not actually claim that role in the book. In his prefatory "Note" he thanks Ramsey for assistance with the translation and this no doubt gave rise to the impression Ogden was the translator (or, at least, the translator-in-chief). But the impression is definitely wrong: the translation was substantially Ramsey's, with some help from Wittgenstein and (perhaps) some input from Ogden.⁶ So Ramsey's role was egregiously under-credited. Other translations in the Library from this period were properly credited, so why not Ramsey's? It seems clear from Misak's extensive research that no clear answer is to be found in Ramsey's *Nachlass*. One wonders if, perhaps, it was felt that the book's credibility would have been

⁵ Ramsey remained interested in psychoanalysis for a little while afterwards and occasionally attended the meetings of the Psych An club at Cambridge, membership of which was limited to those who had been analysed. But he quickly became critical. Two months after his analysis, James Strachey encountered him in a bookstore and reported that he launched into "a long and violent tirade" against the "active technique which had the analyst directly intervening in the patient's production of associations" (p. 224). Though Misak makes nothing of this, it is worth saying that it is now one of the standard criticisms of psychoanalysis. It seems to me astonishing that Ramsey at twenty would have had the presence of mind to recognize it from the analyst's couch, as it were. B. A. FARRELL documented it in detail in several papers in the 1960s. See, e.g., his "The Criteria for a Psycho-Analytic Interpretation" (1962).

⁶ Cf. WITTGENSTEIN, *Letters to C. K. Ogden, with Comments on the English Translation of the Tractatus Logico-Philosophicus* (1973), which published most of the materials.

diminished had it become known that it had been translated by an undergraduate. The minor puzzle comes from Russell's letter to Wittgenstein of 24 December 1921 in which he says, "The translation is being done by two young men at Cambridge who know mathematical logic..."⁷ Who was the other translator? McGuinness and von Wright suggest (and Misak, p. 131, accepts their suggestion) that Russell may have *thought* that Braithwaite was involved, although that would have been impossible since Braithwaite did not know much German at that time. But I doubt that Russell would have thought that Braithwaite knew enough mathematical logic to impress Wittgenstein. My guess is that it was Max Newman, who was from a German family and was at that time writing his fellowship dissertation on the foundations of mathematics. But, whoever the second translator was, he seems to have been only slightly involved (if at all) in the project.

When it comes to Ramsey's life, Misak's book is excellent; when it comes to philosophy, I have (as, I suppose, is only to be expected) more concerns. Some are relatively minor. She misstates Moore's open-question argument (pp. 57, 391). Moore uses it to refute a definition of "good" in terms of any naturalistic property, *P*, by pointing out that even when it had been established that some thing or action had the property *P* it remained an open question (i.e., a question that could still be seriously raised) whether or not it had the property of being good.⁸ Misak says that the question which remains open is whether the property *P* is good, which, on the face of it, is absurd: properties are neither good nor bad. Misak's remarks about Ramsey's ethical emotivism tend to leave the impression that this was a view original to Ramsey (pp. 95, 217) or perhaps to Ogden and Richards in *The Meaning of Meaning* (pp. 95, 392), but of course it had been put forward by Russell in "The Ethics of War" (*Papers* 13: 63–73) in 1915. It's not clear whether Ramsey ever read that paper, but it is very probable that he heard Russell defend an error theory of ethics based on emotivism at an Apostles meeting on 4 March 1922.⁹ When speaking about propositions Misak gives the impression that Russell held that they were "objectively existing entities" (p. 235; also pp. 121 and 258, where she calls it "the standard Cambridge position"), as indeed he did in *The Principles of Mathematics*. But this view was long behind him by the time Ramsey came on the scene. It was replaced by the multiple relation theory, which Misak (p. 119) seems not to recognize was an attempt to eliminate propositions altogether as unnecessary entities, and then by the representational theory of "On Propositions" and *The Analysis of Mind*. Ramsey was admirably clear about

⁷ WITTGENSTEIN, *Cambridge Letters* (1995), p. 174 (quoted by Misak, p. 131).

⁸ *Principia Ethica* (1903), §13. Incidentally, RUSSELL used it to refute James's definition of "truth" ("William James's Conception of Truth" [1908]; 16 in *Papers* 5, pp. 477–8).

⁹ Cf. RUSSELL, "Is There an Absolute Good?" (1922); 58 in *Papers* 9.

this development from the very beginning,¹⁰ Misak a good deal less clear. There is a similar uncertainty in her distinction between primary and secondary systems¹¹ or languages (she is never quite clear which, p. 395), and which, more alarmingly, she runs together with Wittgenstein's distinction between what can and cannot be said (p. 363), even at one point speaking—surely inadvertently—of “Wittgenstein's own categories of primary and secondary language” (p. 365).

One obvious point on which Misak's book invites discussion is the extent to which she identifies Ramsey as a pragmatist. There is plainly something in this. Ramsey himself acknowledged it (*F*, pp. 57, 88, 96n., 99–100), and it has been widely recognized, from Braithwaite's introduction to his collection of Ramsey's papers (*FM*, p. ix) onwards. But here I think Misak overplays her hand. There once was a time when, in order to be accounted a pragmatist at all, one pretty much had to subscribe to a pragmatist theory of truth. Not surprisingly, there were then few pragmatists. Since then, however, the admission criteria have been considerably relaxed. But in Misak's hands pragmatism is an imperialist concept with a vengeance. All manner of philosophical positions get swept into it: those that adopt causal, dispositional, or behavioural accounts of belief (pp. 260, 386); those that hold that “truth does not go beyond potential human experience” (p. 378); those that hold that induction (or other forms of non-demonstrative or non-monotonic reasoning) is needed and reasonable though incapable of demonstrative justification¹² (pp. 116, 279–80); and pretty much any philosophy that holds itself accountable to actual human concerns and interests (under this head even modal logic gets included, pp. 405–6, on the ground that strict implication is closer to our actual inferential practices than material implication). Who knows where this process might end? Indeed, it is hard to think of any twentieth-century philosophy that might escape such spreading tentacles. Every philosopher wants their philosophy to “work” in some sense or another. If this is all that is required to be a pragmatist, we are all pragmatists. In this sense, *Principia Mathematica* is a work of pure pragmatism. For Russell selected his axioms by the regressive method;¹³ that is, according to whether they would support the

¹⁰ Cf. “The Nature of Propositions”, a brilliantly clever paper (read to the Cambridge Moral Sciences Club in 1921 and first published in *OT*, pp. 107–19), although the ingenious idea of multiple relational properties of beliefs, with which Ramsey proposed to replace propositions as independent entities, was not heard of again, presumably because he learnt of Wittgenstein's criticisms of the theory which the relational properties idea doesn't address.

¹¹ RAMSEY introduced the distinction in “Theories” (*FM*, pp. 212–36).

¹² AS RUSSELL did in *Human Knowledge: Its Scope and Limits* (1948).

¹³ “The Regressive Method of Discovering the Premises of Mathematics” (1907); **20** in *Papers* 5.

system of pure mathematics to be built on them, i.e., according to whether they *worked*. Add a pragmatist definition of truth—some version of “the truth is what works”—and we could make a decent pragmatist case that even the hated Axiom of Reducibility is *true*. This, I hasten to add, is not to be taken seriously. I mention it to show that we must be circumspect in applying philosophical labels, lest absurdities result.

Let us, therefore, turn our attention to doctrines and see what Ramsey’s pragmatism amounted to and where he got it from. Ramsey refers to pragmatism explicitly in three main texts: “Facts and Propositions” (published in 1926; reprinted in *FM*, pp. 138–55), “Truth and Probability” (first published in *FM*, pp. 156–98), and the fragments and drafts that make up *On Truth*. At the end of “Facts and Propositions” Ramsey says that he gets his logic from Wittgenstein and his “pragmatism ... from Mr Russell” (*FM*, p. 155). His pragmatism here is not a theory of truth, but a theory of meaning: “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. Of this I feel certain, but of nothing more definite” (*ibid.*). An account roughly along these lines is certainly put forward by Russell after 1918 and especially in *The Analysis of Mind*. It is usually described as Russell’s behaviourism or, somewhat more accurately, as his naturalism, and of course it has affinities with pragmatism.¹⁴ If this is the essence of pragmatism then Russell in *The Analysis of Mind* was a pragmatist, but I can’t entirely suppress the feeling that Ramsey was being, deliberately, a little bit cheeky in linking Russell with pragmatism before an audience (the Aristotelian Society) which would have been familiar with Russell’s many onslaughts against William James’s theory of truth.

In “Truth and Probability”, Ramsey turns to Peirce for his pragmatism. On page 194n. he says, “What follows ... is almost entirely based on the writings of C. S. Peirce”, citing in particular “The Fixation of Belief” and “How to Make Our Ideas Clear”.¹⁵ He then formulates his question as “What habits in a general sense would it be best for the human mind to have?” and then restricts consideration to habits of mind which have to do with the holding of beliefs. He says (*FM*, p. 196) that “given a single opinion we can only praise or blame it on the ground of truth or falsity.” But this is obviously not true: we can praise or blame it on the ground of whether it was reasonable in the

¹⁴ MISAK explores these affinities further in her contribution to *The Bloomsbury Companion to Bertrand Russell* (2019), especially p. 65 for her account of Peirce’s views on meaning, and in her *Cambridge Pragmatism*.

¹⁵ His source for these was *Chance, Love and Logic* (1923), a collection of Peirce’s writings published in the UK in Ogden’s International Library of Psychology, Philosophy and Scientific Method. (It is cited here from a Routledge reprint of 2001.) Ramsey made notes on the book which have survived (*cf.* Misak, p. 144).

circumstances to hold it, of whether it had been duly considered, whether it was politically correct, whether it was charitable, or hopeful, or edifying, etc., etc., none of which depends on whether it is true or false. Ramsey, however, was exclusively concerned with truth and falsity, and, given his views on degrees of belief, he is concerned with the degree of conviction with which it would be best to hold a belief. His example is someone who concludes that a particular toadstool is unwholesome from the fact that it is yellow and inquires: with what degree of conviction it would be best for them to hold that belief?¹⁶ And his entirely reasonable conclusion is that their degree of belief should be identical to the proportion of yellow toadstools which are in fact unwholesome (*FM*, p. 195). The pragmatism in all this is not immediately apparent, except for the “Russellian pragmatism” of “Facts and Propositions”, that beliefs consist in dispositions to act. But Ramsey pushes this conclusion: “This is a kind of pragmatism: we judge mental habits by whether they work, i.e., whether the opinions they lead to are for the most part true, or more often true than those which alternative habits would lead to” (*FM*, pp. 197–8).

So now we have the pragmatist theory of truth squarely on the table, but in a rather self-effacing role. The best opinions to have are those that work, but those that work are those that are true. On the face of it, many opinions that work are not true at all. A thief on trial will likely have a view of which belief on the part of the judge works best that has as little as possible to do with the truth. So Ramsey needs a carefully constrained notion of working, such that an opinion works just in case it is true. He comes back to this in slightly different terms in *On Truth*, this time citing Peirce. It is worth noting that he mentions Peirce only three times in *On Truth*. In a note on page 24 he says: “A definition of truth in terms of reference must not bring in any extraneous idea, like Peirce, Meinong, Höfler”, the purport of which is not immediately obvious. Certainly Peirce finds himself here in unusual company. The second is the passage I deal with below, and the third is a footnote to it which says, “Wanted: Note on Peirce”. So Peirce is hardly a major figure in the book.¹⁷ In the one substantive reference to Peirce (which occurs in what the editors describe as an “older draft version”), Ramsey identifies the pragmatist account of truth as the view that a true belief “is one which is useful” and holds that Peirce put it forward as an account of what Ramsey calls “the propositional reference” of a belief, i.e., an account of the belief’s content: “a belief that *A is B*, being roughly a belief leading to such actions as will be useful if *A*

¹⁶ His example has a curious history: it begins with a chicken and a caterpillar in “Facts and Propositions” (*FM*, p. 144) and ends with humans and strawberries in “General Propositions and Causality” (*F*, p. 149).

¹⁷ There are more than twice as many references to James—all of them critical. And there are many more than that to Harold Joachim, whose coherence theory of truth gets refuted twice.

is *B*, but not otherwise". Ramsey then goes on to show how this is consistent with his own redundancy account of truth, that a belief that *p* is a true belief if and only if *p*: "a belief that *A* is *B*, means on this view, a belief which is useful if and only if *A* is *B*; such a belief will therefore be useful if and only if *A* is *B*, *i.e.*, if (and only if) it is true; and so conversely it will be true if and only if it is useful" (*OT*, p. 91; the words in angle brackets are supplied by the editors).

Two points about this. First: not much of it is to be found in *Chance, Love and Logic*, where Peirce hardly talks about utility, beyond a discussion about the great usefulness of rationality which concludes that a habit of drawing inferences is good (he does not say "useful") if it produces true conclusions from true premisses (pp. 11–13). As regards belief he maintains the familiar view, found elsewhere in his writings, that a true belief is one which will bring inquiry to a (permanent) end.¹⁸ Its chief usefulness, at least on Peirce's account, is that it will bring doubt to an end. Second, and more important: the notion of utility that Ramsey appeals to, the utility a belief has if and only if it is true, is a very specialized one. It is not the same as doxastic utility *tout court*, for beliefs are useful in all sorts of ways, not all of which have to do with their truth and falsity. Nor, again, is it simply the epistemic utility of beliefs, for (as noted above) beliefs can have kinds of epistemic value which do not depend upon their being true. It is specifically *alethic* utility, the usefulness that a belief will have if and only if it is true. In this account, truth does *all* the work. The concept of alethic utility depends upon truth, and all other forms of utility are irrelevant. And yet truth is the concept that Ramsey is trying to eliminate. To do that he needs, not only a robust concept of alethic utility, but one that is independent of truth. In the account as he has it, the concept of alethic utility is an idle wheel: a true belief has whatever sort of usefulness comes from its being true. This is hard to dispute, but it seems a long way, not just from Peirce, but from pragmatism in general. It is no accident, I think, that this passage appears in an early draft and no trace of it is to be found in later material for the book.

It is not fair to suppose that the fragments which make up *On Truth* as published present any fully settled position, let alone one that might be called Peircean. Peirce seems to get dragged into an early draft in the hope of augmenting the "Russellian pragmatism" of "Facts and Propositions" and "Truth and Probability" with a real sort of pragmatism which links true belief with usefulness. But then any sort of account along these lines had to be consistent with the "perfectly obvious" truth that a belief that *p* is a true belief if and only if *p* (*OT*, p. 9). The only way this could be properly secured against counter-

¹⁸ At least for the most part: on p. 70 he says, "Truth consists in the existence of a real fact corresponding to the true proposition", which, with facts, propositions and correspondence, contains all three elements that Ramsey was working hard to get rid of.

examples was by invoking a special kind of usefulness that only true beliefs had, alethic usefulness. But this added nothing by way of explanation because, ultimately, it was trivial, like saying that a drug puts people to sleep because of its dormative power.¹⁹ At any rate, all this gets eliminated in the last treatment of propositional reference in favour of a straight dispositional account of belief, which derived more directly from Russell without a digression through the pragmatists. It was in any case a position which faced huge problems because of the inability of the material conditional to handle counterfactuals.²⁰ Ramsey was working on this problem in a highly original way in the last two years of his life.²¹ I doubt that it would have given him an adequate dispositional theory of belief, but it might have given him an adequate theory of dispositions. There was also, of course, the redundancy theory of truth, of which he is rightly regarded as a pioneer; though in this journal I should be remiss if I didn't point out that the twenty-six-year-old Ramsey was anticipated by more than a quarter of a century in this by the twenty-seven-year-old Russell, who wrote in "Fundamental Ideas and Axioms of Mathematics" (1899):

"*P* is true" contains as many terms as *P* contains, not one more. I doubt whether "*P* is true" differs from *P*. It seems to contain the additional concept *truth*, but I doubt whether there is such a concept. (Papers 2: 285)

In Ramsey there is, also, even a hint of a prosentential theory of truth. So far as I know, it was he who coined the word "prosentence" (*OT*, p. 10). It is impossible to know how he would have put all these elements together in what was a very large project of which we have rather small pieces. I doubt that it would have been very much like any of the available pragmatist theories of truth, but I suspect it would have retained the "pragmatic" account of meaning that he got from Russell. That, after all, was the bit of which he said he felt certain.

¹⁹ I would suggest that Ramsey's note to this account that he needed a note on Peirce, indicates that he was, at that time at least, less sure of what Peirce's position was than Misak supposes. Certainly, the view he links with Peirce's name is not one that I have been able to find in Peirce's writings.

²⁰ CARNAP laboured with endless ingenuity in "Testability and Meaning" (1936–37) to make material implication work—to no avail.

²¹ See RAMSEY, "Universals of Law and of Fact" (1928) and "General Propositions and Causality" (1929), both in *F*, pp. 128–51.

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