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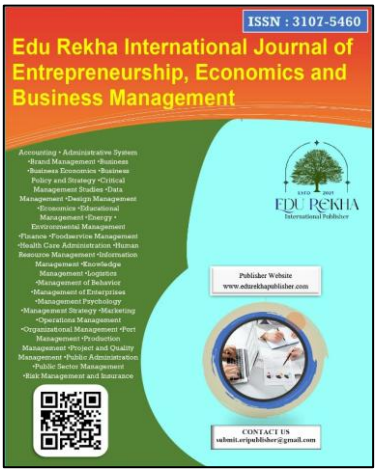
Keynes's logical, probability relation is not mysterious, Platonic, unusual, spooky, mystical, true, or mystic. It is Boolean



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Abstract

F P Ramsey never understood what a relational, propositional (or statement or sentential) logic was. Boole was the first to characterize such a logical system as being an argument form that was composed of propositions containing evidence that specified premises that were not demonstrative and conclusion(s) that were related to this evidence contained in the premises. On pp.7-8 of his The Laws of Thought (1854), Boole stated that the conclusion was internally related (logically connected) to the premises. It was F P Ramsey who constantly insisted that Keynes's argument form was, instead, related to Platonic, speculative, metaphysical relations, as used by Moore in his Platonic Intuitionism, where the proposition (not propositions) was a self-evident, metaphysical intuition that was true. This has led to a disastrous 105-year detour in the fields of economics, philosophy, psychology, social science, behavioral science and history, that has nothing to do with Keynes's A Treatise on Probability and the logical theory of probability presented in it.

Keywords: Boole's objective, logical, probability relation, Boole's critique of the Principle of Indifference, Boole's relational, propositional logic, Boole's indeterminate, upper, lower bounded probabilities, Boole's discussion of 'animal spirits', Boole's argument form

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Section 1. Introduction

The paper will be organized in the following manner. Section Two will cover M. Coates's claims about Keynes and Platonic Atomism. Section Three will cover Brekel's claims that Keynes's logical theory of probability was unusual. Section Four will cover Danne's characterization that Keynes's logical, probability relations were spooky. Section Five will cover Spiegelhalter's characterization that Keynes's relations were mystical and true, which follow Ramsey. Section Six will cover Organo's assertions about the mystic nature of Keynes's logical relations. Section Seven will conclude the paper.

F P Ramsey, in 1923 and again in 1926, was the first academician to use the word "mysterious" to characterize Keynes's application of Boole's logical, probability relation, as discussed by Boole on pp.7-8 of his 1854 The Laws of Thought, in his logical theory of probability as presented in his A Treatise on Probability:

"There seems to me to be some analogy between this question and that of objective or intrinsic good; in the latter we consider the justification of our actions, and are at once presented with the simple solution that this lies in their tendency to promote intrinsic value, a mysterious entity not easy to identify; if now we turn to the justification of our thoughts we have the equally simple solution that this lies in their following certain logical probability relations, equally mysterious and difficult to identify .... I think that both these simple solutions are wrong, and the true answers are in terms not of ethics or logic, but of psychology ....". (Ramsey, 1923, p. 300).

Ramsey follows up on his mischaracterization of Keynes's Boolean logical, objective, probability relation again in 1926 in a presentation to the Apostles:

"…it is easily seen that if partial beliefs are consistent they will obey these axioms, but it is utterly obscure why Mr. Keynes' [p.189] mysterious logical relations should obey them.1 We should be so curiously ignorant of the instances of these relations, and so curiously knowledgeable about their general laws. "(Ramsey, 1926.In Kyburg and Smokler, (eds.) ,1980,2nd ed., p.44).

Now Keynes, or Keynes and Russell, or Russell have an intellectually annihilating answer to Ramsey's mischaracterizations. This answer was never used because both Keynes and Russell realized that it would have ended Ramsey's career at Cambridge University, England

The answer is a hypothetical one:

My dear Frank,

Mr. Keynes's logical, objective, probability relation is identical to the logical, objective, probability relation discussed by Boole on pp.7-8 of his The Laws of Thought.

Regards,

JMK, BR

Another, far more serious, error of Ramsey's is the following claim that Keynes's (Boole's) logical probability relations do not exist:

"But let us now return to a more fundamental criticism of Mr. Keynes' views, which is the obvious one that there really do not seem to be any such things as the probability relations he describes. He supposes that, at any rate in certain cases, they can be perceived; but speaking for myself I feel confident that this is not true. I do not perceive them, and if I am to be persuaded that they exist it must be by argument; moreover, I shrewdly suspect that others do not perceive them either, because they are able to come to so very little agreement as to which of them relates any two given propositions." (Ramsey, 1926. In Kyburg and Smokler, (eds.), 1980,2nd ed., pp.26-27).

It is here that we can provide what would have been Boole's complete and total refutation of Ramsey's characterization of Keynes's logical, objective probability relations as being Moorean:

"Logic is conversant with two kinds of relations, –relations among things, and relations among facts. But as facts are expressed by propositions, the latter species of relation may, at least for the purposes of Logic, be resolved into a relation among propositions. The assertion that the fact or event A is an invariable consequent of the fact or event B may, to this extent at least, be regarded as equivalent to the assertion, that the truth of the proposition affirming the occurrence of the event B always implies the truth of the proposition affirming the occurrence of the event A. Instead, then, of saying that Logic is conversant with relation among things and relations among facts, we are permitted to say that it is concerned with relations among things and relations among propositions. Of the former kind of relations we have an example in the proposition– "All men are mortal;" of the latter kind in the proposition– "If the sun is totally eclipsed, the stars will become visible." The one expresses a relation between "men" and" mortal beings," the other between the elementary propositions– "The sun is totally eclipsed;" "The stars will become visible." Among such relations I suppose to be included those which affirm or deny existence with respect to things and those which affirm or deny truth with respect to propositions conclusion must express an implied relation among those elements. Now let those things or those propositions among which the relation is expressed be termed the elements of the propositions by which such relation is expressed. Proceeding from this definition, we may then say that the premises of any logical argument express given relations among certain elements, or among a part of them, i.e. a relation implied by or inferentially involved in the premises.

8. Now this being premised, the requirements of a general method in Logic seem to be the following:

1st. As the conclusion must express a relation among the whole or among a part of the elements involved in the premises, it is requisite that we should possess the means of eliminating those elements which we desire not to appear in the conclusion, and of determining the whole amount of relation implied by the premises among the elements which we wish to retain."(Boole,1854, pp.7-8)

Of course, either or both Keynes and Russell could have gotten up at any Apostles meeting and simply read Boole's discussion of the objective, logical probability relation used by Boole and Keynes. There is absolutely no role here for any Platonic atomism or Moorean Platonic intuitionism or real existing propositions (See Davis 1991, pp.70-72, where Davis repeatedly makes this type of assertion over and over again). Now Keynes cited this material from Boole in a footnote on page 5 of the *A Treatise on Probability.* Only one conclusion can follow. Keynes's *A Treatise on Probability* was either never read or never understood since its publication in 1921.

Section 2. Matthew Coates's claims about Keynes's Platonic Atomism

Matthew Coates (MC) makes many repeated claims concerning Keynes's alleged Platonic Atomism/Intuitionism (Coates,2025,

pp.2,3,8,9,10,11-20,23). The following quotation is an excellent example of his continual repetition of Keynes's supposed Platonic Atomism /Intuitionism:

"Therefore, second, I establish that Wittgenstein's remarks were targeting a theory of probability that had Keynesian features. This may have been Keynes's theory of probability itself, or it may have been the collection of ideas that became Keynes's theory. The significant idea is that the probability relation is an objective logical relation that exists separately from the propositions involved. In addition, this relation has many of the other features of Platonic atomism to which Keynes

adhered (O'Donnell 1992). Platonic atomism consists of the philosophical views held by Bertrand Russell and G. E. Moore, taken by Peter Hylton (1990) to be between 1898 and 1905, although this is not a strict timespan … I demonstrate that the language that Wittgenstein uses to criticize this theory of probability is similar to that used against Platonic atomism (e.g., criticism of logical objects). I then show that Wittgenstein's remarks on probability need to be read in the context of his remarks on inference, which are critical of a Platonic atomist (specifically, Russell's) view and appear immediately before the remarks on probability." (Coates,2025, p.100).

Coates's claims here are identical to those that have been made in some 40-50 articles over a 35-40 period by Davis. (For example, see 1991a and b):

"The knowledge of probability relationships, accordingly, was to be understood as a (direct) knowledge of (secondary) propositions about previously known (primary) propositions, made possible by our 'perceiving a logical relation' between these propositions. In this manner, Keynes made the perception of logical relations—a form of acquaintance not itself knowledge—the very basis of a knowledge of logical relations that accordingly took propositions rather than the content of intuition as its object… by distinguishing acquaintance and knowledge, however, Keynes was able to re-characterize intuition as an

acquaintance whose object was not knowledge proper, but rather simply one's mental contents, and then treat knowledge as a separate intellectual result, the objects of which were distinguished as truly existing propositions about what was rationally believed." (Davis,1991, p.70)

and

"It is ironic, then, that by the time Keynes was to complete the Treatise, Russell and Moore had abandoned the view that propositions actually existed, and had gone on to argue that the accompanying (dyadic) theory of judgement (as linking an act of judgement and the proposition judged) was fundamentally misconceived.[1] This was a matter of no small consequence for Keynes's arguments, since the idea of an objectively-existing proposition had enjoyed a very brief tenure in twentieth century philosophical circles, and its philosophical standing was hardly so well-established that it could easily survive abandonment by its chief defenders."(Davis,1991,p.71)

Nowhere in Keynes's TP or in anything written in his life on probability and statistics did Keynes ever believe in "…truly existing propositions "or in "…an objectively existing proposition". Keynes's views on propositions is directly based on G. Boole's handling of a relational logic. Coates, as well as all other academicians writing on Keynes's logical, objective probability relation, has erroneously substituted Ramsey's claims about Moorean intuitionism for Boolean relational, propositional logic. This error permeates 80 % of Coates's article.

Section 3. Berkel's Ramsey-based assessment of Keynes's logical probability relation

Consider the following assessment of Keynes's TP made by Brekel:

"Unfortunately, Keynes's logical approach to probability faces potentially insurmountable problems. Since the outset, Keynes faced criticisms for his unusual idea that probability arises from a rational assessment of the relation between the premises and conclusion of an argument.[2] Those criticisms, which began in earnest with Frank Ramsey's review of TP, only gained steam with the rise of the personalist or subjective approach to Bayesian probability.[3] "(Brekel,2022, p.1).

Pace Brekel, it was George Boole, not J M Keynes, who provided the idea

"...that probability arises from a rational assessment of the relation between the premises and conclusion of an argument…",

although a good argument can be made for Thomas Aquinas.

I have already demonstrated in the abstract that Ramsey's claims have no merit intellectually.

Section 4. Danne's" spooky" characterization of Keynes's logical probability relation

Consider the following mischaracterization of Keynes's objective, logical probability relation:

"Second, Marcus should do more to distinguish his proposed faculty of mathematical intuition from the Keynesian intuition (not mentioned by

Marcus) of probability relations (PRs). John Maynard Keynes posits a human faculty of acquaintance with a logical relation between proposi-

tions a and b, namely, the relation that proposition a makes probable proposition b (A Treatise on Probability, I, I, §3) … The point is that the Keynesian can invalidly conclude autonomy Platonism just as Marcus (perhaps validly) does, but that Keynesian and Marcusian intuitions remain indistinguishable to the agents who exercise them. The degree of rationality that a Keynesian infers for believing b from evidence a depends on her background knowledge of expressions resembling a, and theorems resembling b (Treatise, I, II, § 11; III, XIX, § 2). Thus, like Marcus, Keynesians can endorse autonomy Platonism by reflecting on a few experiences and positing mathematical objects as the referents to theorems rationalized from those reflections…n. So, who is the wiser about which intuitions—Keynesian or Marcusian—are in play? Granted, Keynesians perceive PRs via infallible intuition, a faculty that Marcus might call "spooky". But because acquaintance with a PR is not necessarily an intuition of numbers, only an intuition of a probable relation between propositions…" (Danne,2017, pp.593-594)

The severe problem here is that chapters I, II, and III of Keynes's TP have nothing whatsoever to do with Plato, Platonism, autonomy Platonism, infallible intuition, self-evident intuition, Moorean intuition, Platonic intuition, etc. Keynesian intuition is identical to Boole's description of the internal logical connections existing between

evidence and conclusions, as described by Keynes on p.5 of the TP with regard to Darwin's conclusions regarding his theory of natural selection as being based on the collected evidence presented by Darwin, which is not subjective.

Section 5. Spiegelhalter's mischaracterization of Keynes's objective logical probability relations is based on the acceptance of Ramsey's mistaken characterization based on self-evident Moorean intuition

Consider the following discussion over Keynes's evidential weight of the argument relation that includes a characterization made by Spiegelhalter that Keynes's objective, logical probability relations were "mystical" and "true" in 2019. (See Brady, 2019e):

1. James Derbyshire @jrderbyshire1 Mar 31

More

Those aren't the only two interpretations. There is also Keynesian logical probability

2. David Spiegelhalter @d_spiegel Mar 31

More

But where's the logic in Brexit futures? [not meant to be a joke, but a genuine objection to this interpretation]

1. David Spiegelhalter @d_spiegel Apr 1

David Spiegelhalter Retweeted James Derbyshire

Ok, but where does the '40%' come from? Even if you believe in these mystical true logical probabilities, always left with subjective assessment of what they are.

James Derbyshire @jrderbyshire1

Replying to @d_spiegel

It is logical that there will be an election, with high probability. It incorporates the concept of 'weight of argument', which essentially means (in)completeness of relevant evidence. We'd have been better assessing on that basis from day one.

2. James Derbyshire @jrderbyshire1 Apr 1

Logical probability is a qualitative form of probability based on rank-ordering outcomes. It does not require numerical probabilities. If you think LP is 'mystical', ask yourself where the 40 percent in a subjective probability comes from? The clue is in the 'subjective'...

1. David Spiegelhalter @d_spiegel Apr 1

I'm afraid I'm with the great Frank Ramsey in this nearly-century-old argument

Replying to @jrderbyshire1 @d_spiegel

Logical Probability is an objective form of probability based on the (in) completeness of relevant evidence for particular outcomes. It is not based on subjectivity in the way Bayesian approaches are. I have just done a paper on this for Cambridge Journal of Economics.

(https://twitter.com/jrderbyshire1/status/1112659494624997376).

Anthony Cutler

@anthonyncutler

Replying to @d_spiegel

George Boole also wrote about the difficulties with "Logical Probability", back in 1862.

5:16 AM - 1 Apr 2019." (Exchange between J. Derbyshire and D. Spiegelhalter on Twitter).

There are a number of very severe errors in these exchanges.

- "Even if you believe in these mystical true logical probabilities…" has absolutely NOTHING to do with Keynes's logical theory of probability as presented in the TP. Keynes's logical probabilities are IDENTICAL to Boole's indeterminate upper-lower interval probabilities.
- "Logical probability is a qualitative form of probability based on rank-ordering outcomes" has absolutely NOTHING to do with Keynes's logical theory of probability, as presented in the TP. Keynes's logical probabilities are IDENTICAL to Boole's indeterminate, upper-lower, interval probabilities.
- "I'm afraid I'm with the great Frank Ramsey in this nearly-century-old argument ". There is NOTHING written by Frank Ramsey in any of his comments /reviews on Keynes's logical theory of probability, as presented in the A Treatise on Probability between 1921 and 1926, that is correct.
- "George Boole also wrote about the difficulties with "Logical Probability", back in 1862." George Boole presented the first mathematically, logically, technically advanced theory of logical probability in his 1854 The Laws of Thought, which he amended by integrating Henry Wilbraham's superior technical mathematical approach in his later writing (Thomas Aquinas and Adam Smith were the first to put forth logical probability, quasi-logical probability and/or imprecise probability concepts)

Again, the major problem here is the reliance on the totally ignorant comments of F P Ramsey, who, since he NEVER read any of Boole's works, had no idea about

- What a relational, propositional logic is
- What an objective, logical, probability relation is
- What an indeterminate, imprecise upper-lower interval probability is
- What Boole's severe criticisms of the Principle of Indifference (POI) entailed, which were passed on in Keynes's criticisms of the POI

Section 6. Organo's misunderstandings about Keynes's logical theory of probability

Organo's misunderstandings are on full display in the following abstract of her 2021 article:

"In this paper, I propose an assessment of the interpretation of the mathematical notion of probability that Wittgenstein presents in TLP (1963: 5.15 – 5.156). I start by presenting his definition of probability as a relation between propositions. I claim that this definition qualifies as a logical interpretation of probability, of the kind defended in the same years by J. M. Keynes. However, Wittgenstein's interpretation seems prima facie to be safe from two standard objections moved to logical probability, i. e. the mystic nature of the postulated relation and

the reliance on Laplace's principle of indifference…" (Organo,2021, p.131)

Contrary to Wittgenstein (and Ongaro), there is no mystic, intuitionist (Moorean) aspect to Keynes's logical, objective, probability relation. It is identical to the logical, objective probability relation of G Boole as specified on pp.7-8 of Boole's *The Laws of Thought* which Keynes cited on page 5 of the TP. Wittgenstein got his idea that Keynes was using some kind of Platonic, speculative, metaphysical, Moorean intuitionistic relation, from F P Ramsey's 1923 work, "Induction: Keynes and Wittgenstein".

The POI has absolutely nothing to do with Keynes's logical theory of probability. Ongaro has been misled by her having overlooked all of the many errors made by Ramsey in his confused discussions of the POI and Keynes's logical theory of probability, where Ramsey confuses Keynes's careful specification and application of a number of restrictions that were being placed on the POI in chapter IV of the TP. These restrictions served the purpose of eliminating the various paradoxes that can occur if Keynes's restrictions on applying the POI are not considered.

Keynes, just like Boole, was highly critical of the POI:

"It is evident that the cases in which exact numerical measurement is possible *are a very limited class, generally dependent on evidence which warrants a judgment of equiprobability by an application of the Principle of Indifference*. The fuller the evidence upon which we rely, the less likely is it to be perfectly symmetrical in its bearing on the various alternatives, and the more likely is it to contain some piece of relevant information favouring one of them. *In actual reasoning, therefore, perfectly equal probabilities, and hence*

exact numerical measures, will occur comparatively seldom." (Keynes,1921, p.160; italics and underline added).

An example of the complete and total failure to absorb Keynes's analysis regarding the POI is in M. Heidelberger's paper in 2001:

"These three conditions are defined in the following way: the Spielraum of a hypothesis is indifferent if there is conclusive reason to believe that it can be subdivided into a set of exclusive and exhaustive equal alternatives such that none of them is more favourable to the outcome than any other. So, if we know for example that a die's centre of gravity is not eccentric, etc. we are justified in believing that whatever the initial conditions, none of the results is favoured over another. We arrive at six equal alternatives corresponding to the six outcomes of throwing the die. Von Kries thus abandoned the reliance on the Laplacian "Principle of Insufficient Reason" in favour of, as he calls it, the "Indifference Principle". (Unfortunately, Keynes, who was much influenced by von Kries, used this expression as a new terminology for the Laplacian principle and thus obscured and thwarted von Kries's own discussion and clarification. See Keynes, 1921, pp. 41, 88.)." (Heidelberger,2001, p.177).

Von Kries's ideas on the POI were developed from his reading of Boole's 1854 *The Laws of Thought*. The same holds for Keynes, who acknowledges von Kries's 1886 book, but, at the same time, realizes that von Kries had a limited understanding of what Boole had done. Hiedelberger follows Gillies erroneous views, based on pp.41,88 of the TP, which fails to grasp Keynes's analysis on pp.50-58, 160 of the TP, which neither Gillies nor Hiedelberger read.

Keynes, early in chapter IV of the TP, on p.4, does give the name POI to his starting point of presenting an analysis of the Bernoulli -Laplace concept, which was based on equally distributed ignorance. However, Keynes rejects this and replaces it with the requirement of equal amounts of positive evidence supporting each alternative.

Instead of reading and comprehending that Keynes's view was that it would be impossible to build a theory of probability on such a narrowly applicable concept as the POI, Ongaro has based her assessment on the work of philosophers, such as D. Gillies, whose assessment is based on Ramsey. Consider the following statement by D. Gillies:

"The subjective theory of probability emerged as a solution to certain problems which had arisen in the older logical view of probability. According to this logical account, a body of evidence e justifies just one rational degree of belief in a hypothesis or prediction h. This is the logical probability of h given e. Probability is a relation which we can 'cognise correctly' (to use Keynes's phrase ([1920], p. 5)).

The difficulty here is that (as Ramsey puts it ([1926], p. 161)) 'there really do not seem to be any such things as the probability relations he (Keynes) describes'. Admittedly, attempts had been made to evaluate the supposed logical probabilities by using the 'principle of indifference'; but apparently insuperable difficulties were found in this principle. Another weakness was that the axioms of probability were justified only by unsatisfactory appeals to 'logical intuition'.

In the face of these problems, the founders of the subjective theory (Ramsey and de Finetti) proposed independently, and at about the same time, that the apparently non-existent objective degrees of rational belief should be replaced by the degrees of actual belief held by particular persons. They proposed an operational method of measuring such degrees of belief and showed how the axioms of probability could be derived from their point of view. They thus established the subjective theory as a viable account of probability." (Gillies, 1972, p.138; italics added to erroneous material. See also the erroneous work of Howson and Childers).

D. Gillies' assessment demonstrates that he is completely ignorant of Boole's formal, mathematical, symbolic, relational, propositional logic, which requires there to be a logical, objective relation connecting RELATED premises and conclusions. This was discussed by Boole in great depth in chapter I of *The Laws of Thought*. Keynes's treatment in chapters I and II of the *A Treatise on Probability*, especially page 5, which Gillies can't grasp, follows directly from Boole. Keynes, in chapters I and II of the *A Treatise on Probability*, is covering precisely the same material covered by Boole in chapter I, XI and XII of The Laws of Thought.

D. Gillies overlooks that Keynes's analysis of the POI, as developed by Keynes in pp.52-58, suffers from NO problems at all, as Keynes eliminates the various possibilities leading to the various paradoxes. Keynes's version of the POI requires all outcomes to be discrete, finite, indivisible, requires representation by conditional, not marginal, probability if applicable, and equally balanced knowledge, which is exhaustive and symmetric with respect to all outcomes. Keynes's simply eliminates the possibility of paradox by restricting the range of application of the POI to a very narrow degree.

Organo (2021) is simply passing on the badly flawed claims originally made by F P Ramsey in 1923 and 1926, in 2021.

Section 7. Wittgenstein's theory is a logical theory of probability. However, it is vastly inferior to Keynes's, Boolean -based, theory and

needs to be augmented by an evidential weight of the argument relation in order to effectively deal with empirical considerations.

Wittgenstein, as also happened with Piero Sraffa, accepted Ramsey's mistaken assessment of Keynes's logical, objective, probability relation, which was first used by Boole in 1854 when applying his original relational, propositional logic, as put forth in Ramsey's 1923 paper, titled "Induction: Keynes and Wittgenstein":

"There seems to me to be some analogy between this question and that of objective or intrinsic good; in the latter we consider the justification of our actions, and are at once presented with the simple solution that this lies in their tendency to promote intrinsic value, *a mysterious entity not easy to identify;* if now we turn to the justification of our thoughts we have the equally simple solution that this lies *in their following certain logical probability relations, equally mysterious and difficult to identify* ... I think that both these simple solutions are wrong, and the true answers are in terms not of ethics or logic, but of psychology ..." (Ramsey, 1923, p. 300).

Wittgenstein had realized by 1929-30 that his purely a priori applications of Truth Functional, two valued logics were not operational when actual empirical data, information and evidence entered the picture, so that one had to deal with a posteriori probability. Wittgenstein had NO developed upper-lower, interval valued probabilities (Boole's indeterminate probabilities and Keynes's non numerical probabilities, both of which were modeled as lattice structures by Boole and Keynes) or conventional coefficients of weight and risk, c, or weighted means plus reliability criteria (not firm, getting firm, firm, firmer, firmest), a la Carnap in chapter Nine of his Logical Foundations of Probability. I should note that this chapter has nothing to do with Carnap's version of the POI.

Ramsey's misunderstandings about the evolution of Russell's attempts to deal with issues concerning the application and use of first order(predicate) logics and second order (predicate) logics can be seen in his November 18th Apostles paper, which failed to incorporate for the reader the fact that Russell had abandoned his Moorean views on "real existing propositions" by 1912, when his revised views appeared in his The Problems of Philosophy. There can be no doubt that, as far as applications of the relational, propositional (or statement or sentential) logic were concerned, regarding the application of logic to the problems of induction and probability, Russell had accepted Keynes's Boolean analysis as presented in his 1908 Second Fellowship Dissertation.

Section 8. Conclusions

There is absolutely nothing wrong with Keynes's specification of an objective, logical, probability relation holding between related sets of propositions. How could there be any problem with an analysis that comes directly from the Master himself, George Boole?

The problem here is one that Hishiyama uncovered in 1969. That problem was that the TP had not been read by academicians, in general, with chapters III, IV VI, VII and XXVI being what academicians meant when they said they had read the TP. Another problem is that no one read chapters XVI-XXII of Boole's The Laws of Thought.

Given that an understanding of what Keynes is doing in the TP depends on an understanding of what Boole did in 1854, one arrives at the final conclusion, which is that no economist, philosopher or historian in the 20th or 21st centuries or any other academician writing on the connections between those books, understands what it is that Keynes is doing, not only in the TP, but also in Vol. I of the *A Treatise on Money* (TM,1930) or the later *General Theory*(1936), which is an updated version of both volumes of the TM.

References

1. Andrews, D. R. (1999). Continuity and change in Keynes's thought: the importance of Hume, Journal of the History of Economic Thought, vol. 6, no. 1, pp.1–21.
2. Arthmar, Rogério & Brady, Michael Emmett. (2016). The Keynes-Knight and the deFinetti-Savage's Approaches to Probability: An Economic Interpretation. History of Economic Ideas, Vol. XXIV, no.1, pp.105-124.
3. Arthmar, Rogério & Brady, Michael Emmett. (2017). Reply to Feduzi, Runde, and Zappia. History of Economic Ideas, Vol. XXV, no.1, pp.224-233.
4. Basili, M. and Zappia, C. 2009. Keynes's 'non-numerical' probabilities and non-additive measures. Journal of Economic Psychology, 30, pp. 419–30. DOI: https://doi.org/10.1016/j.joep.2008.11.003.
5. Basili, M. and Zappia, C. 2021. Financial markets and Keynes's long-term expectations. Cambridge Journal of Economics, 45 (5), (September), pp. 1047-1067.
6. Bateman, B. (1987). Keynes's changing conception of probability. Economics and Philosophy,3, (March), pp.97-119.
7. Bateman, B. W. (1988). G.E. Moore and J.M. Keynes: a missing chapter in the history of the expected utility model, The American Economic Review, vol. 78, no. 5, 1098–106
8. Bateman, B. (1989)." Human Logic" and Keynes's Economics: A Comment. Eastern Economic Journal,15, no.1(Jan.-Mar.), pp.63-67.
9. Bateman, B. (1990). Keynes, Induction, and econometrics. History of Political economy,22, no.2, pp.359-380.
10. Bateman, B. (1992). Response from Bradley Bateman. Journal of Economic
11. Perspectives, Volume 6, Number 4, (Fall), pp. 206–209.
12. Bateman, B. (2016). Review of Frank Ramsey (1903-1930): A Sister's Memoir. History of Political Economy.pp.181-183.
13. Bateman, B. (2021). Pragmatism and Probability: Re-examining Keynes's thinking on probability. Journal of the History of Economic Thought, Volume 43, Issue 4, (December), pp. 619 – 632.
14. Blackburn, Simon. (2021). Review of Misak's 2020 biography of Ramsey. Mind, Vol.130, no.520, (October), pp.1367-1375
15. Brady, Michael Emmett. (2021a). The diagram on p.39 (Keynes, TP; p.42 of the CWJMK ed., Vol.8) has little to do with ordinal probability. Available at ResearchGate.
16. Brady, Michael Emmett. (2021b). On the mathematical innumeracy of Heterodox economists working on Keynes's illustration on p.39 of his 1921 book. Available at ResearchGate.
17. Brady, Michael Emmett (2020a). (J M Keynes's 1931 Comment, "…I Yield to Ramsey, I Think He Is Right" Refers to Ramsey's Work on Precise Probability and Degrees of Belief, Not to Imprecise Probability and Degrees of Rational Belief: 20th and 21st Century Philosophers and

Economists Simply Are Ignorant About Keynes's Imprecise Theory of Probability Contained in Part II of the A Treatise on Probability. (January). SSRN Electronic Journal. DOI: 10.2139/ssrn.371914

18. Brady, Michael Emmett. (2020b). How SIPTA Overlooked Keynes's Major Contributions to Imprecise Probability and Decision Making, 1999–2019 (August 20). Available at SSRN: https://ssrn.com/abstract=3678032 or http://dx.doi.org/10.2139/ssrn.3678032
19. Brady, Michael Emmett. (2020c). On the Very Severe Contradictions, Inconsistencies, and Confusions in the Assessment of Keynes's Logical Theory of Probability in the A Treatise on Probability by Heterodox Economists: J.M. Keynes Showed That Incommensurability Is Dealt with by Interval Valued Probability (August 29). Available at SSRN: https://ssrn.com/abstract=3683053 or http://dx.doi.org/10.2139/ssrn.3683053.
20. Brady, Michael Emmett. (2020d). A Historical Summary of How a Severe Misinterpretation of the only Diagram in Keynes's A Treatise on Probability in Chapter III on Page 39 Spread to Philosophers: From G. Meeks (1976) to S. Dow and V. Chick (2012) to S. Bradley (2019) (February 5). Available at SSRN: https://ssrn.com/abstract=3532241 or http://dx.doi.org/10.2139/ssrn.3532241.
21. Brady, Michael Emmett. (2020e). The Claim That the Diagram on Page 39 of Keynes's a Treatise on Probability (1921) Represents 'Keynes's View of Probability' (S. Bradley, 2019), Has No Support: It Represents a Very Brief Introduction to Part II of Keynes's a Treatise on Probability On Non-Additive Probability (January 13). Available at SSRN: https://ssrn.com/abstract=3518231 or http://dx.doi.org/10.2139/ssrn.3518231.
22. Brady, Michael Emmett. (2019a). Keynes's Theory of Measurement is contained in Chapter III of Part I and in Chapter XV of Part II of the A Treatise on Probability (1921;1973 CWJMK Edition): Keynes Stated That the Exposition in Chapter III of the a Treatise on Probability Was 'Brief', While the Exposition in Chapter XV, Part II, Of the a Treatise on Probability, Was 'Detailed' (March). Available at SSRN: https://ssrn.com/abstract=3350852 or http://dx.doi.org/10.2139/ssrn.3350852.
23. Brady, Michael Emmett. (2019b). An Examination of Some Possible Explanations for the Existence of the 'Mystery' Concerning the Only Diagram in the A Treatise on Probability on Page 39 (Page 42 of the 1973 CWJMK Edition) (March). Available at SSRN: https://ssrn.com/abstract=3349928 or http://dx.doi.org/10.2139/ssrn.3349928.
24. Brady, Michael Emmett. (2019c). How Keynes Solved the 'Mystery' of the Diagram on Page 39 (Page 42 of the 1973 CWJMK Edition) of the A Treatise on Probability in Part II in Chapter 15 on pp.161–163 Just as he had foretold on pp. 37–38 of Chapter III (March 9). Available at SSRN: https://ssrn.com/abstract=3349602 or http://dx.doi.org/10.2139/ssrn.3349602
25. Brady, Michael Emmett. (2019d). Professor Sakai's Conjecture About the Diagram on Page 39 (Page 42 of the 1973 CWJMK Edition) of the 1921 Edition Illustrating Keynes's Interval Probability: His Heuristically Correct Analysis of Keynes's Probability Intervals Is Supported by Keynes's Worked Out Problem on pp.162–163 of the A Treatise on Probability and Footnote on p.161 (March 7). Available at SSRN: https://ssrn.com/abstract=3348201 or http://dx.doi.org/10.2139/ssrn.3348201.
26. Brady, Michael Emmett. (2019e). Keynes's Logical Theory of Probability Is Concerned with Rational Degrees of Belief Based on Cognition, Which Are Not Mysterious or Mystical, Rank Ordered or Qualitative: F P Ramsey Failed to Grasp Keynes's Use of Non–Additivity in His Reviews of the a Treatise on Probability (July 14). Available at SSRN: https://ssrn.com/abstract=3419642 or http://dx.doi.org/10.2139/ssrn.3419642
27. Brady, Michael Emmett. (2012). John Maynard Keynes's Upper and Lower Valued Probabilities: A Study of How Statisticians, Philosophers, Logicians, Historians, and Economists Failed to Comprehend Keynes's Breakthrough Application of Boole's Interval Approach to Probability in the 20th Century. (January 30th). Available at SSRN: https://ssrn.com/abstract=1996129 or http://dx.doi.org/10.2139/ssrn.19961292. See also International Journal of Applied Economics and Econometrics, 2013, Vol. 21, no.2, pp. 254-272.
28. Brady, Michael Emmett. (2012). John Maynard Keynes's Upper and Lower Valued Probabilities: A Study of How Statisticians, Philosophers, Logicians, Historians, and Economists Failed to Comprehend Keynes's Breakthrough Application of G. Boole's Interval Approach to Probability in the 20th Century (January 30). International Journal of Applied Economics and Econometrics, Vol. 21, 2013, no. 2, pp. 254-272, Available at SSRN: https://ssrn.com/abstract=1996129 or http://dx.doi.org/10.2139/ssrn.1996129
29. Brady, Michael Emmett. (2004a). J. M. Keynes' Theory of Decision Making, Induction, and Analogy. The Role of Interval Valued Probability in His Approach. Xlibris Corporation: Pennsylvania; Philadelphia.
30. _____. (2004b). Essays on John Maynard Keynes and …. Xlibris Corporation. Pennsylvania; Philadelphia.
31. Boole, George. (1854). An Investigation of the Laws of Thought on Which are Founded the Mathematical Theories of Logic and Probability. New York: Dover Publications, [1958].
32. Borel, Emile. 1924.A propos d'un traité de probabilités.Revue Philosophique de laFrance et de l'Étranger, T. 98 (JUILLET A DÉCEMBRE,1924), pp. 321-336
33. Braithwaite, R B. (1931). Book review of Harold Jeffrey's Probability. Mind. Volume XL, no.160(October), pp.492-501.
34. Braithwaite, R.B. (1973). Editorial Foreword to A Treatise on Probability, Vol. 8, CWJMK edition. London, Macmillan, pp. xiv-xxii.
35. Brekel, Josh. (2022). A VERY CONFUSING PROBLEM: INTERPRETING KEYNESIAN WEIGHT. M.A. THESIS.
36. Brekel, Josh. (2025). A New Look at Keynesian Weight of Evidence. Erkenntnis , pp.1-23.
37. Broad, C. D.1922.Review of A Treatise on Probability. Mind, 31:72–85.

38. Bures, C. (1938). The Concept of Probability. A Critical Survey of Recent Contributions. Philosophy of Science. Vol. 5, No. 1 (January), pp. 1-20.
39. Carabelli, A. (1988). On Keynes's Method. Palgrave Macmillan; London.
40. Childers, T. (1996). ON THE RELATION BETWEEN THE NORMATIVE AND THE EMPIRICAL. Thesis submitted for the PhD degree of the University of London.
41. Childers, T.(2013). Philosophy and Probability. Oxford; Oxford University Press.
42. Carabelli, A. (2003). Keynes: economics as a branch of probable logic. In Runde and Mizuhara(eds.),2003, The philosophy of Keynes's economics, London, Routledge, pp.216-226.
43. Clarke, P. (2023). Keynes at work. United Kingdom; Cambridge University Press.
44. Coates, John. (1996). The Claims of Common Sense: Moore, Wittgenstein, Keynes and Social Science. Cambridge: Cambridge University Press.
45. Coates, Matthew. (2024). Keynes, Wittgenstein, and Probability in the Tractatus. Forthcoming in HOPOS: The Journal of the International Society for the History of Philosophy of Science.
46. Danne, Nicholas. (2017). Review: Autonomy Platonism and the Indispensability Argument by Russell Marcus, Metaphilosophy, Vol. 48, No. 4 (July), pp. 591-594
47. Davis, J. B. (1991). Keynes's critiques of Moore: philosophical foundations of Keynes's economics. Cambridge Journal of Economics, (March), Vol. 15, No. 1, pp. 61-77.
48. Davis, John B. (1992). Keynes on the Socialization of Investment. International Journal of Social Economics. Vol. 19, no.10/11/12. (December), pp.150-163.DOI: 10.1108/EUM0000000000509.
49. Davis, J. B. 1991. Keynes's critiques of Moore: philosophical foundations of Keynes's economics, Cambridge Journal of Economics, vol. 15, no. 1, 61–77
50. Davis, J. B. (1994a). Keynes's Philosophical Development, New York, Cambridge University Press
51. Davis, John B. (1994b). Review of Maynard Keynes, D. Moggridge. Economics & Philosophy, Vol.10 (no.2), pp.359-364.
52. Davis, J. B. (1996). Convergences in Keynes's and Wittgenstein's later views. The European Journal of the History of Economic Thought,3(3), (Autumn), pp.433-448.
53. Davis, John B. (1997). Keynes on History and Convention. In A Second Edition of The General Theory. Eds. Geoffrey Harcourt and Peter Riach. New York: Routledge, 1997. pp. 203-221.
54. Davis, John B (1999). Review: Common sense: a middle way between formalism and post-structuralism? Reviewed Work: The Claims of Common Sense: Moore, Wittgenstein, Keynes and the Social Sciences by John Coates. Cambridge Journal of Economics, Vol. 23, No. 4 (July), pp. 503-513.
55. Davis, John B. (2010). Uncertainty and Identity: A Post Keynesian Approach. Erasmus Journal for Philosophy and Economics, Vol. 3, No. 1 (Spring): pp. 33-49. Publisher Link. © 2010 Erasmus Institute for Philosophy and Economics. Used with permission
56. Davis, John B. (2021). Keynes's Treatise on Probability 100 Years Later: Small vs. large worlds and closed vs. open systems. Working Paper series 2022-02. College of Business Administration, Marquette University, pp.1-19. See also History of Economic Ideas,2021, Vol.29, no.3, (November).
57. Davis, John B. (2025-26). Ramsey and Keynes … and Sraffa and Wittgenstein: Change in Interwar Cambridge economics and philosophy (Forthcoming in Cambridge Companion to Frank Ramsey, editors, Pedro Duarte and Cheryl Misak, Cambridge University Press)
58. Dequech, D. (1997). A Brief Note on Keynes, Unknown Probabilities, and Uncertainty in a Strong Sense. History of Economic Ideas, Vol.5, no.2, pp.101-110.
59. Edgeworth, F. Y. (1922). The philosophy of chance, Mind, 31(23), 157-185.
60. Edgeworth, F. Y. (1922). Review of A Treatise on Probability. By John Maynard Keynes.JRSS,85,107-113.
61. Gerrard, B. (2023). Ramsey and Keynes Revisited. Cambridge Journal of Economics, 47, no.1, (January), pp.195-213.
62. Gillies, Donald. (1972). Review: The Subjective Theory of Probability. The British Journal for the Philosophy of Science.Vol.23, no.2, (May), pp.138-157.
63. Gillies, Donald. (2000). Philosophical Theories of Probability. London; Routledge.
64. Gillies, Donald. (2021). Difficulties in the Logical Interpretation of Probability. History of Economic Ideas, Vol. XXIX, no.3(November), pp.143-147.
65. Good, I.J. (1950). Probability and the Weighing of Evidence. London; C. Griffin.
66. Good, I.J. (1962). Subjective probability as the measure of a non-measurable set,in: E. Nagel, P. Suppes, A. Tarski (Eds.), Logic, Methodology and Philosophy of Science, Stanford University Press, Stanford, 1962, pp. 319–329.
67. Good, I.J. (1983a). Good Thinking. Minnesota; University of Minnesota Press.
68. Good, I.J. (1988). Causal Tendency. In Skyrms, B. and Harper, W. L. (1988). Causation, Chance and Credence, pp.22-46.
69. Hacking, I. (1980). The Theory of Probable Inference: Neyman, Pierce and Braithwaite. In Science, belief and behavior: Essays in honor of R B Braithwaite. (ed.) by D.H. Mellor. London; Cambridge University Press, pp.141-160. (Chapter 8).
70. Hailperin, T. (1965). Best possible inequalities for the probability of a logical function of events. American Mathematical Monthly, 72, 343-359.
71. _____. (1986). Boole's Logic and Probability. Amsterdam: North-Holland. 2nd edition.
72. Heidelberger, Michael. (2001). Origins of the logical theory of probability: von Kries, Wittgenstein, Waismann. International Studies in the Philosophy of Science, Vol. 15, no.2, pp.177-192.
73. Hirai, Toshiaki. (2021). Keynes's "New Liberalism" Re-examined: From Versailles towards The General Theory. Review of Keynesian Studies,3 (November), pp.157-206.
74. Hirai, Toshiaki. (2024). Keynes as an Economist, World System Planner and Social Philosopher: A Treatise on Probability and "My Early Beliefs". Palgrave Studies in the History of Economic Thought. (February), pp.237-258.

75. Hishiyama, I. (1969). The Logic of Uncertainty according to J. M. Keynes. Kyoto University Economic Review, 39, no.1, pp. 22-44.
76. Hishiyama, I. (2010). A Critical Reorientation of Keynes's Economic and Philosophical Thoughts. In Silva Brandolini and R. Scazzieri, (eds.), Fundamental Uncertainty: Rationality and Plausible Reasoning. Palgrave Macmillan; London, pp.232-271.
77. Howson, C. (1976). The Development of Logical Probability. In R. S. Cohen et al. (eds.), Essays in Memory of Imre Lakatos, pp. 277-298. D. Reidel Publishing Company. Dordrecht-Holland
78. Howson, C. (1997). Logic and Probability. The British Journal for the Philosophy of Science, (Dec.), Vol. 48, No. 4, pp. 517-531.
79. Howson, C. (2003). Probability and logic. Journal of Applied Logic, 1, pp. 151–165.
80. Keynes, J.M. (1921). A Treatise on Probability. Macmillan, London, 1921.
81. Keynes, J. M. (1973). A Treatise on Probability. Macmillan, London. Volume 8. CWJMK edition of the A Treatise on Probability (with the editorial foreword of R. B. Braithwaite, pp. xiv-xxii).
82. ____. F. P. Ramsey. In Essays in Biography, CWJMK (pp. 335-346), vol. X, London: Macmillan for the Royal Economic Society (reprinted from The New Statesman and Nation, 3 October 1931).
83. Kyburg, H. E. Jr., & Smokler, H. E. (1964[1980,2nd ed.]). Introduction. In Kyburg and Smokler, Studies in Subjective Probability. New York: Wiley.
84. Kyburg, H. E. Jr. 1995. Keynes as a philosopher. In Cottrell, A. F. & Lawlor, M. S.(Eds.), New Perspectives on Keynes. Durham: Duke University Press.
85. Kyburg, Henry E. (1999). Interval valued probability. Society for Imprecise Theory and Application (SIPTA): http//www/sipta.org.
86. Kyburg, Henry E., Jr. (2003). Are there degrees of belief? Journal of Applied Logic, Vol. 1, pp.139–149.
87. Kyburg, H.E., Jr. (2010). Logic, Empiricism and Probability Structures. In Fundamental Uncertainty: Rationality and Plausible Reasoning, Edited by S. Brandolini and R. Scazzieri. Palgrave Macmillan, England, pp.39-58.
88. Lang, Berel. (1964). Intuition in Bloomsbury. Journal of the History of Ideas. Vol. 25, No. 2 (Apr. - Jun.), pp. 295-302.
89. Levi, Isaac. (1996). Aspects of Conditional Logic, chapter 4). In For the Sake of an Argument: Ramsey, Test Conditionals, Inductive Inference, Nonmonotonic reasoning. Cambridge, England; Cambridge University Press.
90. Marsay, D. J. (2014). Ramsey on Keynes's Treatise. (December). (https://djmarsay.wordpress.com/mathematics/maths-subjects/uncertainty-maths/broader-uncertainty/keynes-treatise-on-probability/comments-on-keynes-treatise/ramsey-on-keynes-treatise/).
91. Mellor, D. H. (1983). The Eponymous F. P. Ramsey. Journal of Graph Theory, Vol. 7, pp.9-13.
92. Mellor, D.H. (1995). "F.P. Ramsey". Philosophy, 70, pp. 243-257.
93. Methven, S.J. (2015). Frank Ramsey and the realistic Spirit. Palgrave Macmillan, London.
94. Misak, C. (2016). The Subterranean influence of Pragmatism on the Vienna Circle: Pierce, Ramsey, Wittgenstein. Journal for the History of Analytical Philosophy ,4, no.5., pp.1-16.
95. Misak, C. (2020). Frank Ramsey: A Sheer Excess of Powers. Oxford: Oxford University Press.
96. Monk, R. (1991). Russell and Ramsey. London Reviews of Books, 29 August, pp. 11-13. Reprinted in Russell Society News, No. 72, (Nov. ,1991), pp. 25-26.
97. O'Donnell, R. (1989). Keynes: Philosophy, Economics and Politics. Palgrave Macmillan; London
98. O'Donnell, R.(2021a). Keynes and Knight: risk-uncertainty, distinctions, priority, coherence and change. Cambridge Journal of Economics,45(September), pp.1127-1144.
99. O'Donnell, R. (2021b) Keynes's Treatise on Probability: The First Century. Review of Political Economy, (October), 33:4, pp.585-610.
100. Ongaro, Malvina. (2021). The Interpretation of Probability in the Tractatus Logico-Philosophicus. Wittgenstein-Studien ,12 (1): pp.131-144.
101. Ramsey, F. P. (1922). Mr. Keynes on Probability, Cambridge Magazine, Vol. XI, no. 1, (January), pp.3-5. Reprinted in British Journal of the Philosophy of Science, 40, [1989], pp.219-222.
102. Ramsey, F.P (1923). Induction: Keynes and Wittgenstein. Papers for the Cambridge Discussion Society. Ramsey, F.P. (1991). Notes on philosophy, probability and mathematics (In M. C. Galavotti, ed., pp. 296–301). Naples: Bibliopolis-Edizioni di filosofia e scienze.
103. _____. (1926). Truth and Probability. In Mellor, D. H (Ed.) Foundations: Essays in Philosophy, Logic, Mathematics, and Economics, London: Routledge & Kegan Paul, [1978] and in Kyburg and Smokler (eds.), Studies in Subjective Probability,1980, (2nd ed.); New York; Krieger.pp.26-52.
104. Rowbottom, Darrell. (2008). On the Proximity of the Logical and "Objective Bayesian 'Interpretations of Probability. Erkenntnis, Vol.69, no.3(November), pp.335-349.
105. Rowbottom, Darrell. (2018). Probability Theory. In Hansson, S.O. and Hendricks, V.F. (eds.), Introduction to Formal Philosophy, pp.417-430.
106. Runde, J. (1994a). The Keynesian Probability-Relation: In Search of a Substitute. In: Davis, J.B. (eds) The State of Interpretation of Keynes. Recent Economic Thought Series, vol 44. Springer, Dordrecht. (https://doi.org/10.1007/978-94-011-1392-2_13).
107. Runde, Jochen (1994b). Keynes after Ramsey: In Defense of A Treatise on Probability. Studies in History and Philosophy of Science, Vol.25, no.1, pp.97-121.
108. Russell, B. (1922). Review of A treatise on Probability by John Maynard Keynes. Mathematical Gazette, Vol.11(July), pp.119-125.
109. Russell, B. (1948). Human Knowledge: Its Scope and Limits. Routledge; London,2009.
110. Russell, B. (1959). My Philosophical Development. George Allen and Unwin; London, England.
111. Skidelsky, R. (1992). John Maynard Keynes: The Economist as Savior,1920-1937, Volume II. England; Penguin Publishers.

112. Wheeler, G. (2012). Commemorating the work of Henry E. Kyburg, Jr. Synthese, Vol.186, no.2, (May), pp.443-446.
113. Wilson, E.B. (1923). Keynes on Probability. Bulletin of the American Mathematical Society,29,7,319-322.
114. Winslow, E. (1989). Organic Interdependence, Uncertainty and Economic Analysis. The Economic Journal, Vol. 99, No. 398 (December), pp. 1173-118.
115. Zabell, S.L. (1991). Ramsey, Truth, and Probability. Theoria, vol.57, no.3(December), pp.211-238.
116. Zabell, S. L. (2005). Symmetry and its Discontents. Cambridge; Cambridge University Press.