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From Formal Logic to Human Logic: An Inquiry into Keynes's Philosophical Reasoning

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ABSTRACT

This paper argues that the development of John Maynard Keynes's thought, from *A Treatise on Probability* (TP, 1921) to *The General Theory* (GT, 1936), is best understood as a process of methodological evolution in which the formal logic of probability is progressively reformulated as a human logic of uncertainty. Drawing on the documented influences of G. E. Moore and Bertrand Russell on the young Keynes, and engaging with a pragmatist reading of Keynes, we argue that the notion of weight of argument functions as the methodological thread connecting the logical theory of probability of the TP to the state of confidence and to convention-based behaviour in Chapter 12 of the GT. The article situates this continuity in relation to Ramsey's critique and to Keynes's 1931 acknowledgement of the distinction between formal logic and human logic, interpreting it as a reconfiguration, rather than an abandonment, of the TP's epistemological framework. This paper positions itself between discontinuity-based and rigid-continuity readings and contributes to the contemporary debate in economic methodology by emphasizing the deep continuity between Keynes's philosophical realism and his treatment of decision-making under uncertainty.

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1. Introduction

A Treatise on Probability (hereafter TP), published in 1921 but largely written before the First World War, is Keynes's principal philosophical contribution. The work was conceived in the milieu of the Cambridge Conversazione Society — the 'Apostles' — in which Keynes engaged with G. E. Moore and Bertrand Russell, and it addresses the epistemological problem of grounding rational action under incomplete knowledge. Its relation to *The General Theory* (hereafter GT, 1936) has been the subject of debate since at least the 1980s, with discontinuity-based readings (Bateman 1996) emphasizing a decisive shift in Keynes's thought after Ramsey's critique, and continuity readings (Carabelli 1988; O'Donnell 1989; Runde 1994) treating the TP as the epistemological matrix of the GT.

The central argument of this paper is that the development of Keynes's thought, from the TP (1921) to the GT (1936), should be read as a process of conceptual evolution in which the formal logic of probability of the TP is progressively reformulated, under the

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dual influence of Frank Ramsey's pragmatist critique and Keynes's practical experience in financial markets, as a human logic of uncertainty. This reformulation does not constitute a break with the TP; it redirects the trajectory of its central insights. The category of weight of argument, originally conceived as a second, independent variable in logical-probabilistic reasoning, is carried over into the state of confidence that governs the crucial investment decisions of the GT.

The paper articulates this epistemological continuity, customarily discussed through the problem of induction (Carvalho 1988; Runde 1994), within the Keynesian-pragmatist framework proposed by Gerrard (2022), and positions itself as an alternative to discontinuity-based readings (Bateman 1996), recovering, against Bayesian reductionism, the epistemological specificity of Keynes's project. In addressing Ramsey's critique, moreover, the paper keeps analytically separate three elements that the literature frequently conflates: the probability calculus, on which subjective expected utility theory was later erected; Keynes's logical theory of probability; and the human logic of uncertainty.

The paper concentrates on G. E. Moore (1873–1958) and Bertrand Russell (1872–1970) as Keynes's direct philosophical interlocutors in the TP. Moore is named in the introduction of the TP as an influence on the conception of the indefinability of the concept of probability (Keynes 1921, p. 7), and Keynes's critique of *Principia Ethica*, articulated as early as 1904 in the paper *Ethics in Relation to Conduct* delivered before the Apostles, constitutes the initial impetus for the TP (Carvalho 1988, p. 69; O'Donnell 1989). Russell, also cited in the opening pages of the TP (Keynes 1921, p. 2), provided, with *Principia Mathematica*, the logical framework that Keynes sought to extend to the domain of non-conclusive arguments.

The thesis of continuity between the TP and the GT is not, in itself, novel. Carvalho (1988), Runde (1994), Lawson (1985), Davis (1995), Roncaglia (2009), and Vercelli (2011) have shown, in various ways, that the notion of weight of argument and Keynes's rejection any universal numericalization of probability reappear in the GT in the form of the state of confidence and convention. Vercelli (2011, pp. 151–152) presses the continuity claim furthest, arguing that the innovative method of the GT cannot be properly understood without reference to the role played in it by the weight of argument, a concept the GT resumes at crucial junctures of its reasoning (Keynes 1936, pp. 148, 240),[1] thereby supplying the practical significance about which Keynes had still professed puzzlement in the TP (Keynes 1921, pp. 83, 345, 348). Davis (1995) advances a complementary reading, emphasizing that Keynes's adoption of a social theory of judgment and belief by the 1930s provides the philosophical underpinning of the GT's account of conventions and interdependent expectations.

The reading proposed here builds upon these contributions by mobilizing the analytical framework of Gerrard (2022), for whom the development of Keynes's work should be understood as a transition from a 'formal logic of probability', inherited from the pre-war Cambridge analytical context, to a 'human logic of uncertainty' inspired by the logical pragmatism of Charles Sanders Peirce (1839–1914) and Frank Plumpton Ramsey (1903–1930). The pragmatist affiliation of Ramsey is itself contested in the literature:

[1]Vercelli's references to the GT (pp. 148 and 240) follow the pagination of the original 1936 edition, reproduced in volume VII of the Collected Writings (CW VII). These correspond to pages 130 and 235, respectively, of the 2018 Palgrave Macmillan edition adopted throughout this paper. Both citations refer to the same footnote in chapter 12, in which Keynes directs the reader to chapter 6 of the TP regarding the weight of arguments.

Gerrard (1992, 2022) and Misak (2020) defend it, while Sahlin (1990) reads Ramsey's subjectivism as closer to early 20th-century operationalism than to Peircean pragmatism.

This framework permits a rereading of the memorial essay that Keynes wrote in 1931 (published in *Essays in Biography*, 1933) for Ramsey, in which he yields to his critic on the objectivity of probability's logical relations while preserving the distinction between 'rational degrees of belief' and 'belief in general' — not as a methodological capitulation, but as recognition that the logic of probability comprises two complementary domains: that of consistency (formal logic) and that of practical rationality under vague knowledge (human logic).[2] It is this human logic, Gerrard (2022) observes, that Keynes develops in Chapter 12 of the GT, in the 1937 *Quarterly Journal of Economics* article, and in the 1938 correspondence with Hugh Townshend (1890–1974) on the liquidity premium.

Methodologically, this paper follows Runde (1994, p. 98) in decoupling the formal structure of Keynes's probability theory from its original Platonic and empiricist ontology. We offer a rational reconstruction that is independent of Keynes's psychological or metaphysical evolution. Aligning with O'Donnell's (2021) non-Platonic reading, we argue that the analytical structure remains continuous. Specifically, it is the enduring epistemic function of the weight of argument — regardless of shifts in its metaphysical status — that renders the TP serviceable to contemporary heterodox economics. The paper engages, further, with the agenda of Keynesian philosophical scholarship and with recent efforts to recover the Cambridge intellectual context (Marouzi 2023, 2026), drawing directly on the primary corpus — the TP, the GT, the 1937 *QJE* article, and the correspondence collected in volume XXIX of the *Collected Writings* — in dialogue with the interpretive literature.

The paper is organized as follows. Section Two examines the intellectual context of Keynes's philosophy, with particular attention to Moore's and Russell's contributions and their relation to the theoretical development of the TP, situating them within the Cambridge anti-formalist turn. Section Three presents interpretations of Keynes's theory of probability, organized around methodological anti-reductionism and the notion of weight of argument. Section Four, devoted to Ramsey's critique and Keynes's response, examines the meaning and limits of Keynes's 1931 concession in light of O'Donnell's (2021) recent reading. Section Five shows how the TP is carried over into the GT through the transition from formal logic to a human logic of uncertainty, mobilizing the concepts of weight of argument, state of confidence, and convention. Concluding remarks summarize the results.

[2]The controversy over the meaning of Keynes's (1972 [1933], pp. 338–339) response to Ramsey's (1922, 1926) critique has oscillated between a discontinuity-based reading — sustained, with variations, by Bateman (1996), Mellor (in Ramsey 1990), and Sahlin (1990) — that interprets the 'I yield to Ramsey' of the memorial essay as a substantial capitulation to the subjective theory of probability, and a rigid-continuity reading that tends to minimize any concession. O'Donnell (2021) offers a third way, subscribed to here: the Keynesian 'so far' is conditional. Keynes accepts that, given Ramsey's axioms — in particular, the universal numericality of probabilities — the probability calculus is equivalent to a set of rules of internal consistency among degrees of belief, and admits that the primary source of initial degrees of belief may belong to the 'human outfit', possibly shaped by natural selection — a thesis, moreover, compatible with the framework of the TP, which treats probabilistic reasoning as a situated human faculty. What Keynes does not concede is the epistemological core of the TP: the distinction between rational belief and belief in general, the centrality of induction as a logical problem (and not as a merely useful habit), the coexistence of cardinal and ordinal probabilities, and the refusal of universal numericalization. The Platonist interpretation sometimes ascribed to the objectivity of logical relations was, according to O'Donnell (2021), always dispensable from the original formulation of the TP, since the central elements of the theory — the premise–conclusion structure, variation in powers of logical insight, the classificatory scheme of forms of reasoning — can be preserved within a non-Platonic interpretation of logical probability.

2. The Intellectual Context of Keynes's Philosophy: The Apostles

Before examining individually the contributions of Moore and Russell, it is useful to situate briefly the background debates in which these philosophers were embedded. In the late nineteenth and early 20th centuries, British philosophy witnessed a break with the Hegelian idealism that had dominated the universities, notably through F. H. Bradley (1846–1924) and J. M. E. McTaggart (1866–1925). The break was opened by the publication, in 1903, of G. E. Moore's *The Refutation of Idealism*, an attack directed specifically at the idealist proposition that *to be is to be perceived*. Russell joined Moore's insurgency (Crabtree 1980, p. 9). Moore and Russell were the principal protagonists of this turn, inaugurating the British analytic tradition, which placed at its centre logical clarity, conceptual analysis, and attention to ordinary language; it is in this milieu that Keynes was intellectually formed and conceived the TP. As Coates (1996) argues, the TP should be read precisely as an artefact of this pre-war Cambridge analytical philosophy, insofar as the search for logical formalism that, in Russell, applied to mathematics and, in Moore, to ethics, found in Keynes its extension to the domain of non-conclusive arguments. It is this characterization that will render intelligible, below, the distance between the TP and the approach Keynes would develop in the inter-war period under the impact of Ramsey's critique.

2.1. The Apostles and the Departure from Utilitarianism

Keynes's philosophical formation cannot be reconstructed without examination of the Cambridge Conversazione Society, founded in 1820 and known informally as the 'Apostles'. It was a closed group, with approximately twelve active members, governed by principles of intellectual candour, friendship, and the systematic discussion of philosophical, ethical, and aesthetic problems (Mini 1991, pp. 59–60). Keynes was elected to the society in 1903, the same year as the publication of Moore's *Principia Ethica*, a work that crystallized the *ethos* of the group.

The sociability of the Apostles is constitutive of the pragmatism that Gerrard (2022) identifies as a central methodological trait of Keynes's mature work. The Apostolic *ethos*, grounded in the conviction that truth emerges from honest discussion among committed interlocutors, anticipates epistemically what Gerrard (2022) calls the human logic of uncertainty. The transition from the formal logic of probability to a human logic does not, therefore, constitute a sudden rupture produced solely by Ramsey's critique. It is, rather, the unfolding of a philosophical sensibility already present in Cambridge sociability, in which prudential judgement over particular situations prevailed over the mechanical application of general principles. This pattern of reasoning reappears in the GT in the rejection of expected utility as the basis for far-reaching decisions, in favour of the state of confidence, convention, and contextual judgement. Keynes's pragmatism does not constitute a late importation of Ramseyan or Peircean doctrine but the economic articulation of a philosophical matrix that Keynes had internalized from his early years in the Apostolic milieu.

The deepest consequence of this formation was Keynes's progressive departure from Benthamite utilitarianism, a process whose epistemological effects prepared the theoretical ground of the GT. Cambridge, in this period, opposed the utilitarian tradition (Mini 1991, pp. 51–52), rejecting the sensualistic epistemology of James Mill in favour of intuitionist positions. Moore radicalized this rejection by denouncing the naturalistic fallacy

and refusing the definability of the good in terms of pleasure, duty, or measurable consequence, as set out in the final chapter of *Principia Ethica* (Macciò 2015). For the Apostles, the Benthamite *homo economicus* was an abstraction incapable of capturing the psychological and cultural stratification of agents (Mini 1991, p. 52). Keynes internalized this diagnosis and transposed it to the theoretical plane of economics. The GT operates with psychologically differentiated agents whose decisions under irreducible uncertainty are guided by conventions, expectations, and states of confidence that are irreducible to expected-utility calculations.

The reconstruction of this intellectual milieu gains depth when one considers, as Dow (2017) suggests, its specifically history-of-economic-thought dimension. Keynes's receptivity to non-deductive approaches has a direct antecedent in the work of his father, John Neville Keynes, whose *The Scope and Method of Political Economy* (1890) makes explicit the terms of the *Methodenstreit* that, at the turn of the 20th century, opposed classical-marginalist economics, of deductive matrix, to the German Historical School (Wagner, Schmoller) and the English Historical School (Leslie, Toynbee, Ashley), of inductive and empirically situated matrix. Following Bagehot and James Steuart, Neville Keynes explicitly admitted that advanced economies tend to depart from any universal or deductive premise, and that the interdependence between cause and effect in complex social systems renders 'rash generalisations' insufficient (Dow 2017; Keynes 1890, p. 100). This methodological sensibility is kindred to the institutionalist critique that Veblen was articulating simultaneously in the American context, with which Maynard Keynes retained structural affinities — not direct filiation — in his emphasis on the organic and historically determined character of capitalist economies (Dow 2017). The Cambridge milieu was, therefore, not only a philosophical site of opposition to Hegelian idealism and Benthamite utilitarianism, but also a point of convergence for broader methodological controversies that traversed the political economy of the period. As Dow (2017) puts it, what connects Keynes to the Bloomsbury circle is not a shared doctrine but the joint recognition of the limits of knowledge — a question particularly acute for the economist, given the necessity of acting in the face of the impossibility of using the past as a reliable guide to the future.[3] This recognition, inherited from the *Methodenstreit* and from familiar contact with methodological discussion in political economy, antedates and prepares the thesis of the anti-reductionism of the TP examined in the next section.

2.2. Moore and the Rules of Conduct

According to Davis (2019b, p. 74), G. E. Moore (1873–1958) is 'a lens through which Keynes's intellectual development can be traced, especially with regard to his perspective on probability and uncertainty'. Keynes's relation to Moore evolved from initial adherence to a more critical stance consolidated in *My Early Beliefs* (1938).

[3]It is worth emphasizing that this Cambridge methodological concern with the limits of knowledge and with the necessity of producing knowledge useful for action finds a structural parallel in the American institutionalist–pragmatist tradition, particularly in Dewey. Foster (1991, pp. 561, 567) observes that Keynes and Dewey, in distinct intellectual territories, devoted a substantial part of their work to the problem of 'establishing meaningful propositions in the face of uncertainty', arriving — without documented mutual influence — at theories with notable parallels: both combine theorization and observation as moments of the same process of inquiry (Foster 1991, p. 563), refuse the rigid separation between fact and value, and treat rationality as the practical adequacy between means and consequences under conditions of incomplete knowledge.

Keynes was intellectually influenced by *Principia Ethica* (1903), published six months after his election as an 'Apostle'. In this work, Moore criticizes views that define the good in terms of natural properties (for example, the agreeable or the desirable). There would be a confusion, which Moore terms the 'naturalistic fallacy', that consists in conflating the use of a term in a sentence with its actual definition (Davis 2019b, p. 74). Keynes's relation to Moore was not, however, one of mere continuity. As Carvalho (1988, p. 68) argues, Keynes initially simplified the epistemological problem by assuming that the premises of probabilistic reasoning constituted 'true knowledge', but this assumption proved insufficient when confronted with the necessity of deciding under conditions of incomplete information.

For Moore, the 'good', like 'yellow', can only be apprehended by the subject upon being perceived. O'Donnell (1989, p. 88) argues that the same reasoning applies to Keynes's treatment of probability. It is worth, however, qualifying this analogy. Whereas Moore treated 'good' as a non-natural property apprehensible by intuition, Keynes, in the TP, treated probability as a logical relation between propositions, not as a property of events or states of affairs. Probability, for Keynes, is relative to a body of evidence and not to an intrinsic property of the object (Keynes 1921, p. 4). Roncaglia (2009, p. 493) emphasizes that this conception is distinct both from the classical and the frequentist approaches, since probability is not an objective characteristic of the phenomenon but a logical relation established by the observer between the available evidence and the proposition under consideration.

According to Davis (2019b, p. 75), Keynes argues that, in treating common sense as the rule of conduct, Moore presupposes the frequency of future events on the basis of past references — that is, he adopts a frequency notion of probability. Yet Keynes argues that the great majority of things that may come to pass have no past records. Keynes's critique was twofold: he rejected Moore's frequency-based probability and its practical corollary, namely the acceptance of conventional moral rules on the premise that future consequences are incalculable. Against this corollary, Keynes sought an alternative epistemological grounding for rational action under limited knowledge, a search that Carvalho (1988, p. 69) locates in the theory of the probability-relation as the connection between premisses and rational belief (see also Davis 2019b).

This critique of Keynes against Moore, articulated as early as 1904 in *Ethics in Relation to Conduct*, constitutes a decisive moment, for the rejection of frequency probability as a foundation for the rules of conduct opens the way to his own theory of probability as a logical relation. As Carvalho (1988, p. 69) observes, Keynes's search for rational decision criteria that would not depend on the frequency of past events was the central impetus for the writing of the TP. The probability theory of the TP is therefore inseparable from the Moorean ethics that precedes it, particularly through the epistemological problem that it raises: namely, the impossibility of grounding rational action in general rules without an adequate theory of reasoning under uncertainty.

2.3. Russell and the Extension of Logic

According to Davis (2019a, p. 78), for Keynes, probability was a matter of judgement and logic and not of statistical frequencies, as Moore (1903) had supposed. It is in this alternative view of probability that Keynes engages with *Principia Mathematica* (Whitehead and Russell 1910, 1912, 1913), Russell's three-volume work co-authored with Alfred North Whitehead (1861–1947) Keynes regarded his TP as an extension of the *Principia*:

whereas in Russell and Whitehead's work the aim was to establish the logical foundations of mathematics, Keynes sought to do the same for the logical foundations of probability.

Keynes cites Russell and Moore as early as the introduction of the TP. At the opening of the book, Keynes (1921, p. 3) states that 'for a philosophical treatment of these branches of knowledge, the study of probability is required', placing his work in the tradition of Russell's logicist project. Further on, in defining probability as 'the degree of belief which it is rational to entertain in given conditions' (Keynes 1921, p. 4), Keynes mobilizes Russell's (1912) epistemological distinction between knowledge by acquaintance and knowledge by description. These references, together with the explicit critique of Moore's *Principia Ethica*, provide the textual support for the scope adopted here, according to which Moore and Russell are, in the TP, Keynes's direct and nominally identified philosophical interlocutors.

The reading of the TP as a direct extension of the logicist project of *Principia Mathematica* requires, however, qualification anchored textually in Keynes himself. In a methodological note in chapter 2, Keynes (1921, pp. 19–20) registers that 'there are occasions for very exact methods of statement, such as are employed in Mr Russell's *Principia Mathematica*' and that 'Mr Moore has developed in *Principia Ethica* an intermediate style'. The passage proceeds to warn that 'those writers, who strain after exaggerated precision without going the whole hog with Mr Russell, are sometimes merely pedantic' and that 'it is possible, under cover of a careful formalism, to make statements, which, if expressed in plain language, the mind would immediately repudiate' (Keynes 1921, p. 20).[4]

The deliberate choice of an intermediate style, inherited from Moore, signals that the TP does not operate as a simple transposition of Russellian logicism to the domain of non-conclusive arguments. From its initial exposition, it incorporates a methodological position that refuses the reduction of probabilistic reasoning to axiomatic formalism. This refusal is articulated to the observation, registered by Keynes (1921, p. 6) in chapter 1, that 'as soon as mathematical probability ceases to be the merest algebra or pretends to guide our decisions, it immediately meets with problems against which its own weapons are quite powerless'. The Cambridge intellectual milieu and the philosophical dialogue with Moore and Russell allowed Keynes to move beyond a strictly mathematical theory of probability and to develop an anti-reductionist philosophical foundation that would be mobilized, in the inter-war period, for the methodological grounding of the GT.

3. A Treatise on Probability: Logical Probability and the Weight of Argument

3.1. Probability as a Logical Relation

The TP, Keynes's principal philosophical work (O'Donnell 2019, p. 123), originated in undergraduate works begun in 1904 and underwent successive revisions before its

[4]Several short fragments are quoted from this passage of Keynes (1921, pp. 19–20). The original passage in the TP includes the formulations 'there are occasions for very exact methods of statement, such as are employed in Mr Russell's *Principia Mathematica*' and 'Mr Moore has developed in *Principia Ethica* an intermediate style', as well as the warning that 'those writers, who strain after exaggerated precision without going the whole hog with Mr Russell, are sometimes merely pedantic'. Wording verified against the Macmillan 1921/1957 edition of the TP (chapter 1, footnote 1, spanning pp. 19–20).

publication in 1921. Roncaglia (2009, p. 489) situates the TP at the intersection of the logic of probability — as a field concerning rational human behaviour in an uncertain world — and the pure theory of probability as a branch of mathematics. For Roncaglia, Keynes's views on probability lie at the basis not only of his theory of employment, interest, and money, but also of his attitude towards econometrics. On this view, the TP is an autonomous contribution to the logic of probability, and not a mere antecedent of the GT.

Keynes (1921) opens the TP with the intention of comprehending and clarifying the class of arguments arising from the most varied forms of knowledge — arguments deemed rational yet inconclusive and not constructible by deduction. He develops this idea by exposing the intrinsic relation between inconclusiveness and probability. Rationality, for Keynes, implies a connection with logic, and what is inconclusive bears, in turn, a connection with probability (O'Donnell 2019, p. 123).

Although induction holds a central place in the TP, the literature diverges on the unicity of Keynes's method. Chick and Dow (2001) defend a methodological pluralism appropriate to open systems; Carabelli (1985) sustains the unicity of the method, centred on the relation between the agent and the perceived world; O'Donnell (1989) identifies a deliberate epistemological neutrality regarding ontological commitments. These readings are not mutually exclusive: pluralism describes analytical procedures, unicity describes the epistemological matrix, and neutrality describes O'Donnell's interpretive stance regarding which specific ontology Keynes commits to — not a denial that Keynes commits to any.

3.2. Measurement, Intuition, and Anti-Reductionism

Following Russell's legacy in *Principia Mathematica*, Keynes seeks to ground his notion of probability in logical structure. He thus admits probability as an irreducible concept, representing the logical relation between a set of premisses (p) and a conclusion (q), assessing the degree to which the former supports the latter through induction. Roncaglia (2009, p. 493) emphasizes three central elements in Keynes's approach: the definition of probability as 'rational degree of belief', the notion of 'weight of argument', and the 'theory of groups'. The first element defines probability not as an objective property of the phenomenon, but as a logical relation between the available evidence and the proposition under consideration. The second element, the weight of argument, introduces an additional dimension that distinguishes Keynes's theory from other approaches: the completeness of the evidence on which probability rests.

In treating logical relations of probability, O'Donnell (2019, p. 124) observes that, in Keynes, they may be expressed in three aspects: degree of partial inference, rational degree of belief, and degree of certainty. Keynes (1921, p. 3) holds that the vast majority of arguments produced in the sciences pertain to the logical interval of partial inference, in which probability lies between 0 and 1 — that is, they are inconclusive to a greater or lesser degree.

The measurement of probability occupies a decisive position in Keynes's theory. As Roncaglia (2009, p. 496) notes, Keynes repeatedly insists that it is not always possible to express probabilities as quantitative magnitudes. He presents four alternatives: either there is no probability in some cases; or probabilities do not belong to a single set of measurable magnitudes; or such measures exist but are unknown; or probabilities

are indeed measurable. Carvalho (1988, p. 71) underscores that, for Keynes, each probability-relation is particular, whereas in frequency theory probability can only be attributed to an event as part of a wider family of observations. Carabelli (2023, pp. 467–470) systematizes this set of alternatives into three cases. Case 1 covers precise (cardinal) and imprecise (interval) probabilities; Case 2 covers merely orderable or comparable probabilities, in terms of equal, more, or less, under the condition of homogeneity in the motives or evidence; and Case 3 deals with indeterminate probabilities, intrinsically incommensurable. This last situation, arising from the heterogeneity of motives, grounds what Carabelli calls the *philosophy of measurement* and gives rise to rational dilemmas, exemplified by Keynes (1921, pp. 31–32) in the choice between inductions of distinct kinds and in the so-called umbrella dilemma.

The illustration of the walk under threat of storm reinforces this position. Keynes (1921, p. 30) asks whether the probability of arriving home after a walk always has a numerical measure, and replies that, when a storm breaks, 'the probability is less than it was before; but is it changed by some definite numerical amount?'. The passage condenses the TP's refusal to postulate the universal numericalization of probability as a precondition of practical rationality. Keynes (1921, p. 75) adds that 'the rules for the determination of equality and inequality between probabilities all depend upon it [direct judgment] at some point', a dependence that does not constitute a weakness of the theory, since 'the fact that we ultimately depend upon an intuition need not lead us to suppose that our conclusions have, therefore, no basis in reason, or that they are as subjective in validity as they are in origin' (Keynes 1921, p. 76). The recognition of an intuitive moment in probabilistic logic, articulated to a non-subjectivist position, grounds the reading sustained here that the TP is, from its initial formulation, anti-reductionist.

This anti-reductionist reading finds an earlier resonance in Lawson (1988), who reads Keynes's contribution as a form of *interactionist realism* — a position that rejects both direct realism and representational dualism — and groups Keynes with Knight in a quadrant distinct from the subjectivism of Ramsey–Savage–Friedman and from the rational expectations hypothesis. Lawson's reading reinforces the thesis defended here on two grounds: it offers a realist substratum for the TP's anti-reductionism, in dialogue with the non-Platonic interpretation of O'Donnell (2021); and, by situating uncertainty as a condition deriving from the structural incompleteness of knowledge concerning real social processes, it anticipates the TP→GT continuity mobilized in Section Five. The nuance with respect to O'Donnell (2021) is one of focus: while the latter reconstructs Keynes's realism from the TP and the memorial essays, Lawson reconstructs it from a social ontology that renders intelligible the category of uncertainty in economic behaviour — readings that are complementary, not competing.

3.3. The Weight of Argument

Agents' decision-making does not come to a halt before these limitations, and some further variable is required for rational belief in a context of uncertainty. O'Donnell (2019, p. 125) argues that Keynes proposed a 'second independent variable', called by Keynes (1921, ch. 6, pp. 77–85) the 'weight of argument', which provides a measure of evidential grounding for the non-conclusive argument — that is, the confidence that

may be placed in the argument. The weight of argument, as Runde (1994, p. 113) observes, should not be confused with probability, since 'the weight, to speak metaphorically, measures the sum of the favourable and unfavourable evidence, the probability measures the difference' (Keynes 1921, p. 84). New evidence always increases weight but may diminish probability.

The notion of weight of argument implies that two probability judgements may have the same numerical value (when measurable) yet differ in the reliability of the evidential base that sustains them. As Runde (1994, p. 113) observes, the concept of weight captures the difference between betting on a fair coin on a first toss and betting after a thousand tosses with balanced results. In both cases, the numerical probability may be 1/2, but the weight of argument is substantially different.

4. Ramsey's Critique and Keynes's Response

The articulated concepts of logical relation, intuition, and indefinability that sustain the TP became, as early as the 1920s, the object of critique of Ramsey, also a member of the Apostles. Ramsey (1922, 1926) objected that there are no such objective logical relations between propositions as the TP postulates and proposed in their place a subjective theory in which the degree of belief is measured by the agent's betting behaviour — a formulation that would later underpin Savage's (1954) subjective expected utility model. In parallel, Ramsey divided the domain of reasoning into two 'logics': formal logic, concerning the internal consistency among beliefs (and of which the probability calculus would be a department), and human logic, concerning the mental habits useful in the search for truth — among which is induction.

Keynes's (1972 [1933], pp. 338–339) response to Ramsey's paper, formulated in a memorial essay published in 1931 and reprinted in *Essays in Biography* (1933), has been read in part of the literature as a substantial capitulation to subjectivism (Bateman 1996). The present reading subscribes to the reconstruction proposed by O'Donnell (2021), who recovers the conditional character of the Keynesian 'so far': Keynes accepts that, *given* Ramsey's axioms — in particular, the universal numericality of probabilities — the probability calculus is equivalent to a set of rules of internal consistency among degrees of belief; he also accepts that the primary source of initial degrees of belief may belong to the 'human outfit', possibly shaped by natural selection. What Keynes does not concede, and which O'Donnell (2021) underscores, is the epistemological core of the TP: the distinction between rational belief and belief in general, the centrality of induction as a logical problem (and not as a merely useful mental habit), and the coexistence of cardinal and ordinal probabilities.

In assessing this response, three elements must remain distinct: the probability calculus, which supplies the formal skeleton of expected utility theory; Keynes's logical theory of probability; and the human logic of uncertainty. Keynes's 1931 concession to Ramsey's formal logic applied specifically to the calculus of probabilities, a domain the TP had always treated as merely one region within a wider logic of non-conclusive argument. The logical theory itself survived the concession, and the human logic developed in the GT reconfigures it for decision contexts where the calculus loses applicability. As Coates (2025) shows, early Cambridge debates on probability, including Wittgenstein's engagement in the *Tractatus*, targeted the objective Platonic status of Keynes's probability

relations. Accordingly, Keynes's evolution can be read as an adaptation to metaphysical critiques that ultimately preserved the epistemological structure of his theory.

The writings posterior to 1931 confirms this reading. Chapter 12 of the GT, the 1937 *QJE* article, the Galton lecture on population of the same year, and the 1938 correspondence with Townshend mobilize categories — irreducible uncertainty, weight of argument, state of confidence, and convention — that would be impossible under the Ramseyan hypothesis that every agent has internally consistent subjective probabilities. Vercelli (2011, p. 152) documents the disciplinary counterpart of this incompatibility. As he shows, the decision theories under uncertainty erected upon the probability calculus, from Ramsey and de Finetti to von Neumann and Morgenstern and Savage, which shaped the foundations of mainstream Keynesian macroeconomics after Keynes's death, were formulated to exclude any possible role for the weight of argument.

What Keynes appears to have qualified, or in part abandoned, is not the epistemological core of the TP, but a Platonist interpretation that some readers had ascribed to logical relations of probability — an interpretation that, as O'Donnell (2021) argues, was always dispensable from the original formulation of the TP, since the central elements of the theory (the premise–conclusion structure, variation in powers of logical insight, the classificatory scheme of forms of reasoning) can be preserved within a non-Platonic interpretation of logical probability. Davis (1995, pp. 243–245) reads Keynes's 1931 response to Ramsey as the moment in which Keynes abandons Moore's epistemology of rational intuition without abandoning the distinction between rational belief and mere belief — reading kindred to the position sustained here, in which the Keynesian 'so far' is conditional rather than capitulatory.

This reading finds support in Runde (1994), for whom the formal structure of Keynes's theory — centred on comparative probability — remains intact after the concession to Ramsey, and in Carabelli (2023, p. 484; 1988, pp. 97, 134–148, who qualifies the 1931 memorial essay as 'lip service' and sustains that Keynes did not abandon his substantive argumentative logic. The position defended here lies between the two: it acknowledges the qualification of the Platonist interpretation sometimes ascribed to logical relations of probability as objective and independent entities, but maintains that the epistemological structure of the TP — rational degrees of belief, weight of argument, uncertainty not reducible to calculation, practical rationality under vague knowledge — remained operative and was reconfigured in the GT as a human logic of uncertainty.[5]

5. From Formal Logic to Human Logic: Weight, Confidence, and Convention in the GT

5.1. Economics as Method and the Object of Economic Theory

The transition from the TP to the GT involves the transposition of the logical conception of probability to the plane of economic behaviour in an uncertain environment. Davis

[5]Assessments of the scope of the TP vary by register. From a strictly statistical standpoint, Robert (2011) considers the contribution limited and oriented toward the past, observing that Kolmogorov's axioms would not be published until 1933. From a philosophical standpoint, Runde (1994) maintains that the Keynesian thesis on the non-measurability of probability and on the weight of argument anticipates issues that remain on the agenda of contemporary decision theory. The two assessments are not incompatible: the continuity reading sustained here is affiliated with the philosophical register.

(2022) compares Keynes's view of 'grand worlds' with the 'small worlds' established by Bayesian Decision Theory and adopted by Leonard Savage (1954). Roncaglia (2009, p. 498) observes that the notion of 'groups' proposed by Keynes (1921, ch. 11) already pointed to a methodology of investigation that isolates subsets of problems for separate analysis, with formal affinities to Savage's idea of 'small worlds', though with distinct epistemological foundations. For Keynes, the theory of probability cannot be reduced to a single axiomatic model — that is, a unified deductive structure deriving all probability judgments from a fixed set of axioms, in the manner that Kolmogorov (1933) would later propose for measure-theoretic probability and Savage (1954) for subjective expected utility — covering all decision situations. This refusal of the unified axiomatic model is what allows Keynes, in the GT, to treat short-term expectations, long-term expectations, and liquidity preference separately, without seeking a formal unification across the three domains — a methodological choice that, as Davis (2022) emphasizes, distinguishes Keynes's 'grand worlds' approach from the Bayesian 'small worlds' of Savage.

As Carabelli (2021, p. 128) notes, in the introduction to the 'Cambridge Economic Handbook Series' of 1922, there is a passage by Keynes that sheds light on the continuity between the TP and his economic work: 'the theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions'.

This conception of economics as method, and not as doctrine, connects directly with the TP's approach. As Roncaglia (2009, p. 505) argues, Keynes regarded statistical analysis not as an 'objective' method of scientific investigation but as a tool to be deployed with care and caution, guided by intuitive capacity nourished by experience and knowledge of the phenomenon under consideration. In the 1938 letter to Harrod, Keynes declares that economics is 'a branch of logic, a way of thinking', and warns against 'the pseudo-analogy with the physical sciences' which works against the most important habit of mind for an economist to acquire (CW XIV, p. 300). This methodological emancipation is documented in his 1936 correspondence with Hugh Townshend. Recognizing the artificiality of formal mathematical reductions, Keynes confessed to being 'bogged in an attempt to bring my own terms into rather closer conformity with the algebra of others than the case really permits', suggesting he might leave 'out all this sort of stuff altogether' in future revisions (Keynes 1979 [CW XXIX], p. 246). Acknowledging that the GT's remaining formalism stemmed from 'old associations of my mind', Keynes noted that Townshend's critique helped him 'get more fully emancipated from what one has emerged out of' (CW XXIX, pp. 246–247). This exchange confirms his deliberate departure from earlier axiomatic constraints toward a human logic.

The connection between weight of argument and course of action finds textual support in chapter 6 of the TP itself, and provides the methodological articulation that sustains this conception of economics as method. Keynes (1921, p. 83) observes that, 'in deciding on a course of action, it seems plausible to suppose that we ought to take account of the weight as well as the probability of different expectations'. He adds, on the same page, that 'when our knowledge is slight but capable of increase, the course of action, which will, relative to such knowledge, probably produce the greatest amount of good, will often consist in the acquisition of more knowledge' (Keynes 1921, p. 83). The 1921 formulation anticipates, in the language of logical probability,

the problematic that reappears in chapter 12 of the GT in the form of the state of confidence and the relation between available information and the disposition to invest. The continuity here operates on the methodological plane: the TP frames, in the language of the formal logic of probability, the practical problem that the GT will take up in the language of a human logic of uncertainty.

The future is 'incalculable', yet one must act in an environment of 'doubt', 'precariousness', 'hope', and 'fear'. Carvalho (1988, pp. 74–76) develops this point by showing that uncertainty in Keynes arises when the focus shifts from the premisses, assumed as 'true knowledge' in the TP, to expectations and the fragility of the information on which they are anchored. The inevitable incompleteness of this information, which characterizes at least some economic processes, underlies the emphasis on uncertainty in Keynes's mature works. A distinction must nonetheless be preserved at this point. Where partial reasons still yield a logical probability, even if merely ordinal, the agent acts under incomplete knowledge but retains a usable probability relation to guide conduct. Uncertainty in Keynes's strict sense designates the stronger condition in which no usable probability can be formed. The agent must 'create' additional premisses — 'figments of the imagination', in Shackle's terminology — to fill the gaps in knowledge and to construct a sequence of decisions.

5.2. Expectations, Uncertainty, and the State of Confidence

To clarify the scope of the analysis and the nuances of Keynes's epistemology, three senses of uncertainty must be distinguished within his framework. In the first sense, (i) uncertainty amounts to a low weight of argument: a logical probability relation subsists, but the supporting evidential base remains scanty, a reading whose economic consequences Vercelli (2011, pp. 151–152) pursues most systematically. In the second sense, (ii) uncertainty consists in the intrinsic incommensurability of probabilities arising from the heterogeneity of reasons, meaning no determinate probability relation can be established, in line with Carabelli (2023, pp. 472–475). In the third sense, (iii) uncertainty is irreducible. This is the limit-case prominent in the 1937 writings, where no calculable probability can be formed owing to the ontological openness of social processes emphasized by Lawson (1988). When this paper mobilizes the concept of 'irreducible uncertainty', it refers primarily to senses (ii) and (iii). Furthermore, it is crucial to distinguish acting under incomplete knowledge from acting under strict uncertainty. Where partial reasons still yield a logical probability, even if merely ordinal, the agent operates under incomplete knowledge; strict uncertainty designates the stronger condition in which no usable probability is formed.

In chapter 5 of the GT, Keynes (1936, p. 41) states that there is no other way to be guided than by expectations, since production involves processes that require time. Keynes distinguishes two types of expectations: short-term expectations, related to existing facts that we may suppose to be more or less known; and long-term expectations, concerning future facts that can only be predicted with a greater or lesser degree of confidence.

Carvalho (1988, pp. 79–80) observes that this distinction between short- and long-term expectations is one of the innovations of the GT. Short-term expectations permit the use of induction, since 'a large part of the circumstances usually continue

substantially unchanged from one day to the next' (Keynes 1936, p. 45). Investment decisions, however, are 'crucial' and non-repetitive, and their consequences are too complex to be apprehended in advance. In this case, the 'human logic' of belief prevails over the formal logic of probability.

Keynes refers to the 'knowledge' that one has today about some moment in the future. This knowledge is 'uncertain', not because of any contingent ignorance of the agent, but because no 'calculable probability whatever' can be formed about what will happen in the future, since, regarding it, 'we simply do not know' (Keynes 1937, pp. 113–114). Roncaglia (2009, p. 506) connects this passage directly to the TP by observing that Keynes's rejection of a general equilibrium model derives from his view on probability. Although all economic events may be considered related to one another, each theoretical proposition concerning each individual link carries an element of uncertainty, and uncertainty accumulates when we consider successive links, so that the theorist must content himself with considering one or a few links at a time (the method of 'short causal chains').

It bears adding that, in Keynes, uncertainty does not derive solely from a deficiency of reasoning but is rooted in objective characteristics of social processes. As Carvalho (1988, p. 77) argues, the insufficiency of premisses for decision-making, in a monetary economy, cannot be overcome through observation or better means of information, since consumers may not spend all their income and may indefinitely postpone spending decisions. Uncertainty is therefore constitutive of the social world in which the agent operates, and not merely epistemic.[6]

At the close of chapter 5 of the GT, Keynes (1936, p. 45) anticipates that long-term expectations are liable to 'sudden revision', a theme he develops in chapter 12. According to him, it is the product of human folly to 'attach great weight, in forming our expectations, to matters which are very uncertain' (Keynes 1936, p. 130). He refers this point back to chapter 6 of the TP, noting that 'very uncertain' is not the same as 'improbable'. This passage provides the most direct textual support for the continuity between the TP and the GT, insofar as Keynes, in explaining the behaviour of investors, explicitly returns to the distinction between probability and weight of argument developed in the TP. As Runde (1994, p. 113) argues, the concept of weight reappears in the GT as 'degree of confidence'.

This distinction deserves emphasis. The weight of argument is an epistemic property of the argument itself, registering the degree of completeness of the available evidence, and it belongs to a category strictly distinct from convention. While a low weight of argument may characterize a situation of uncertainty that triggers conventional behaviour, the weight itself remains a measure of evidential grounding in the sense of chapter 6 of the TP. Vercelli (2011, p. 152) corroborates this epistemic reading by defining weight as a property of the argument x/h alongside its probability. Furthermore, he identifies the specific passages where the GT explicitly revisits the concept (Keynes 1936, pp. 148, 240).

[6]This ontological distinction between calculable risk and irreducible uncertainty is crystallized in the 1937 exchange between Keynes and Townshend. Townshend acutely observed that classical theories fail because they attempt 'to describe a world in which risk exists without uncertainty' (CW XXIX, p. 257). Keynes emphatically agreed, confirming this as the fundamental flaw of classical assumptions (CW XXIX, p. 258).

5.3. Convention and Imitative Behaviour

The notion of convention in the GT, whose essence is to presume that 'the existing state of affairs will continue indefinitely, except in so far as we have specific reasons to expect a change' (Keynes 1936, p. 133), operates as the explanatory element through which Keynes addresses the precariousness of the knowledge base. In Keynes, conventions operate as rationalizations or practical rules adopted by agents to face an unknown future. Carabelli (2021, pp. 15–16) characterizes conventional expectations precisely as artificial and practical means through which agents rationalize ignorance and uncertainty. This rationalization takes the distinct forms catalogued in the 1937 *QJE* article: the projection of the present situation into the future and a reliance on the judgment of the rest of the world, expressed in average opinion (Keynes 1937, p. 114).

This concept connects directly to the TP, since from the outset Keynes does not propose that the economic agent grounds his decisions on an *ex ante* probability calculation; rather, the necessity of action leads him to seek qualitative evidence reinforcing the coherence of his disposition to act. Convention provides such evidence, although it is itself fragile, since it is formed on the basis of the behaviour of other agents whose knowledge base is equally precarious.

Convention, in Keynes, is illustrated by the metaphor of the 'beauty contest' (Keynes 1936, pp. 136–137). Roncaglia (2009, p. 507) observes that this metaphor illustrates the application of the TP's 'groups' theory to financial markets: the daily events on the markets constitute a group in which, however much evidence accumulates, the weight of argument never reaches a maximum, and the personal nature of probability judgements is clearly apparent. The access of investors to the beliefs of other agents proceeds through anticipation, imitation, and conformity to average opinion. The Keynes's formula is strictly non-calculative in its social dimension: it consists in anticipating what average opinion expects the average opinion to be (Keynes 1936, p. 138). As Davis (1995, p. 249) emphasizes, the structure of interdependent belief expectations articulated in chapter 12 of the GT is not merely a metaphysical feature of the unknowability of the future, but constitutes uncertainty as a social relation — a reformulation of the TP's epistemological framework into what Gerrard (2022) terms a human logic of uncertainty.

6. Concluding Remarks

Keynes's trajectory from the TP to the GT sustains a thesis of *reformulated* continuity, rather than rigid permanence or rupture. Philosophy and economic methodology in Keynes are not separate domains running parallel to economic theory, but conceptual tools mobilized to sustain a theory capable of dealing with the complexity of human decision under uncertainty, in opposition to quantitativist, frequentist, and subjectivist reductionisms. The Cambridge milieu and the dialogue with Moore and Russell allowed Keynes to develop, in the TP, anti-reductionist foundation that would be reconfigured, in the inter-war period, as the matrix of the GT. Engagement with these issues allows three propositions.

The first proposition concerns the anti-reductionism of the TP, already documented by Keynes's choice of an 'intermediate style' (Keynes 1921, p. 20), by his recognition of intuition as an irreducible moment of probabilistic reasoning (Keynes 1921, p. 75), by his

refusal of universal measurability (Keynes 1921, p. 30), and by the thesis of incommensurability between probabilities of heterogeneous series. The TP, therefore, cannot be reduced to a formal antecedent of any later axiomatization. This anti-reductionism, moreover, is not merely epistemological: as Lawson's (1988) realist reading suggests, Keynes's refusal of universal numericalization and the maintenance of uncertainty as an irreducible category derive from the recognition that social processes are themselves open, historical, and structurally incomplete with respect to the information available to the agent.

The second proposition concerns the mobilization of this substratum in the GT. The notion of weight of argument (Keynes 1921, ch. 6, pp. 77–85; p. 83) is carried over into the state of confidence that governs crucial investment decisions (Keynes 1936, ch. 12), and into the distinction between risk premium and liquidity premium articulated in the 1938 correspondence with Townshend. The weight of argument operates as the methodological thread that links the formal logic of probability of the TP to the human logic of uncertainty of the GT.

The third proposition concerns Keynes's response to Ramsey. The reading sustained here, supported by O'Donnell (2021), lies between the thesis of capitulation and the thesis of rigid continuity: Keynes qualified the Platonist interpretation sometimes ascribed to the objectivity of logical relations, but preserved the epistemological structure of the TP — rational degrees of belief, weight of argument, uncertainty not reducible to calculation, practical rationality under vague knowledge. This structure is reconfigured, in the GT and in the texts of 1937–1938, as a human logic of uncertainty, and retrospectively frames the contributions of Carvalho (1988), Runde (1994), Roncaglia (2009), Davis (1995), and Carabelli (2023) as successive elaborations of this same anti-reductionist matrix.

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