



ETHICAL NORMATIVITY AND THE LIMIT OF MATHEMATICAL MONISM

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Abstract

This paper uses the everyday reality of our moral lives to question the idea that everything in the universe is ultimately mathematical. Advocates of mathematical monism most notably Roger Penrose argue that the world is built out of mathematics and that all genuine truths can, in principle, be expressed in mathematical form. However, our ethical experiences tell a different story. Moral decisions are not simply calculations; they involve emotions, values, context and an inner sense of “what ought to be done” that no equation can fully capture. Even the most sophisticated mathematical tools utilitarian calculus, game theory, or decision models can describe how people behave, but they cannot explain why a person should act one way rather than another. This paper adopts analytic method to argue that the gap between describing behaviour and justifying moral obligation reveals a deeper limit in mathematical monism. Ethics operates in a space of meaning, responsibility and human concern that resists reduction to numbers or formulas. By taking ethical normativity seriously, we see that mathematics, while extraordinarily powerful, it is only one of the perspectives through which we understand the world. It cannot serve as a complete map of reality. The paper concludes by asserting that ethical experience provides compelling evidence that human understanding is richer and more plural than mathematical monism allows.

Keywords: Mathematical monism, Ethical normativity, Moral reasoning, Philosophy of mathematics, Human understanding, Pluralism, Non-mathematizability of ethics

Preamble:

The claim that reality is fundamentally mathematical has enjoyed renewed prominence in contemporary philosophy, particularly through the work of Roger Penrose, Max Tegmark, and defenders of various forms of mathematical Platonism. Penrose, for instance, argues that mathematics forms a timeless, abstract realm whose structures underlie both the physical universe and human consciousness; for him, mathematical truth is “out there,” discovered rather



than invented and its uncanny success in physics reflects its deep ontological role.¹⁸ Such a view i.e. mathematical monism, asserts not merely that mathematics is useful, but that it constitutes the ultimate fabric of reality. Everything meaningful, it holds, is in principle expressible in mathematical terms. Yet the very idea that the world is reducible to mathematics encounters significant challenges when confronted with the lived complexity of human moral life.

Ethical normativity presents one of the strongest challenges to this monistic claim. Moral experience is grounded not in quantities, equations, or structural relations, but in evaluative judgments, commitments and the prescriptive force of the “ought.” Hume famously argued that no amount of factual description however precise can logically generate a moral obligation, a distinction now known as the *is-ought* gap.¹⁹ Mathematical monism, by attempting to subsume all truths under the category of mathematically describable structures, implicitly denies or downplays this gap. Yet ethical experience continually demonstrates that normativity arises from forms of reasoning qualitatively different from those found in mathematics or empirical sciences.

This paper argues that ethical normativity exposes an intrinsic limitation in the thesis of mathematical monism. While mathematics offers a powerful framework for explaining physical phenomena, it does not and cannot account for the prescriptive, meaning-laden structure of moral life. Instead, the moral domain reveals the plural character of human understanding: we employ multiple conceptual lenses, each suited to different aspects of reality. This paper shows that mathematics, though indispensable in science, cannot serve as an all-encompassing metaphysical foundation by examining the irreducibility of ethical reasoning. Ethics thus serves not only as a counterexample to mathematical monism but as evidence for the broader claim that reality exceeds any single mode of human comprehension.

The Claims and Commitments of Mathematical Monism

Mathematical monism is the thesis that the fundamental nature of reality is mathematical; that everything that exists, everything that is true and everything that can be known is ultimately reducible to, grounded in, or constituted by mathematical structures. In its strongest form, mathematical monism asserts that mathematics is not merely a tool for describing the world but the very substance of the world itself. Although versions of this idea can be traced back to Pythagorean thought, the contemporary articulation of mathematical monism draws heavily on developments in theoretical physics, cosmology and the philosophy of mathematics.

Among its most influential proponents is Roger Penrose, whose work has done much to popularize the notion of a deep “three-world” structure to reality. Penrose argues that there exist three fundamental domains: the physical world, the mental world and the Platonic mathematical world; each interacts with the others in a non-reducible way.²⁰ Crucially, for Penrose, the mathematical world is not an abstraction invented by humans but a timeless and objective realm

¹⁸Penrose, R. (2004). *The Road to Reality: A Complete Guide to the Laws of the Universe*. London: Jonathan Cape., pp. 19-21.

¹⁹Hume, D. (1740). *A Treatise of Human Nature*. London: John Noon., p. 469.

²⁰Penrose, R. (2004)., pp. 8-10.



of truths waiting to be discovered. The force of his claim is metaphysical: mathematics is not a language but a reality. This position stands in contrast to the more modest view that mathematics is a convenient set of symbolic tools, arising from cognitive structures used to model certain facets of the world.

Max Tegmark extends the theory more radically. In his “Mathematical Universe Hypothesis,” Tegmark claims that the universe *is* a mathematical structure and that all entities, including human consciousness, physical objects and even space-time, are manifestations of purely mathematical relations.²¹ For Tegmark, there is no gap between physics and mathematics; physics simply identifies which mathematical structure our universe instantiates. This view eliminates the need for non-mathematical ontology entirely and affirms that all existence is reducible to formal structure.

Both Penrose and Tegmark share the essential claim of mathematical monism that mathematics is both ontologically primary and explanatorily universal. However, their motivations differ. Penrose arrives at mathematical monism through reflections on mathematical truth and the mysterious effectiveness of mathematics in physics; Tegmark arrives at it through the belief that physics must be purified of metaphysical vagueness and allowed to converge fully with mathematical formalism. Nonetheless, both views depend on the idea that mathematical truths are independent of human minds and that they accurately map the fabric of reality.

The first major commitment of mathematical monism is ontological realism about mathematical entities. Mathematical objects i.e. numbers, sets, functions, manifolds and so on are not human inventions but are taken to exist independently in an abstract realm, much like Plato’s Forms. When Penrose claims that mathematical truths “exist quite independently of whether human beings ever happened to discover them.”²² He is defending precisely this kind of ontological commitment. Tegmark’s claim that the universe *is* a mathematical structure also depends on accepting mathematical objects as robust features of reality. However, traditional Platonism merely claims that mathematical objects exist; mathematical monism adds the stronger claim that only mathematical objects exist fundamentally. Everything else, physical processes, mental phenomena, moral relations is either reducible to or emergent from pure mathematical structure. This is what distinguishes mathematical monism from mathematical realism; it is a unifying metaphysical thesis rather than a claim about one particular domain of objects.

Mathematical monism also entails epistemological commitments. If reality is mathematical, then genuine knowledge must be mathematical in nature. Penrose argues that human understanding of mathematics reveals aspects of reality that are not accessible through empirical observation; mathematics allows us to grasp timeless truths that the physical world only partially reveals.²³ Tegmark equally argues that mathematics is the only language capable of describing the

²¹Tegmark, M. (2014). *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. New York: Knopf, pp. 11-13

²²Penrose, R. (2004), p. 19

²³Penrose, R. (1994). *Shadows of the Mind: A Search for the Missing Science of Consciousness*. Oxford: Oxford University Press. pp. 34-36.



universe with complete precision. Thus, poetic, moral, narrative, or phenomenological forms of understanding are seen as less fundamental because they cannot be reduced to rigorous formal structure. According to mathematical monism, the more mathematical a theory is, the more fundamental it becomes.

A third major commitment concerns explanation. For mathematical monists, a complete explanation of any aspect of the world must ultimately be a mathematical explanation. Penrose suggests that the success of mathematical physics in explaining planetary motion, *quantum* mechanics and relativity reveals a deep structural truth that mathematics unveils the hidden architecture of the universe.²⁴ Tegmark goes further, arguing that the universe is literally the same as the mathematical structure describing it; thus, explanation is simply the act of identifying the appropriate structure. This leads to a strong explanatory monism: if mathematics cannot in principle explain something, then that “something” is either illusory, reducible, or not fundamental.²⁵ This is where ethical normativity begins to conflict with mathematical monism because ethical obligations do not appear to be the sorts of things that can be mathematically derived or expressed.

The motivations behind mathematical monism are rooted partly in the history of physics. Since the success of Newtonian mechanics and the later revolutions of relativity and quantum theory, physics has relied on increasingly sophisticated mathematical concepts. Wigner famously called this the “unreasonable effectiveness of mathematics” in the natural sciences.²⁶ Mathematical monists interpret such effectiveness as evidence that mathematics is not just a tool but the very essence of the physical world. Furthermore, Gödel’s incompleteness theorems although often misunderstood have been used by Penrose to argue that human consciousness has access to truths that no algorithm could derive, suggesting that mathematical reality is discovered rather than computed.²⁷ Tegmark, conversely, uses mathematical symmetry principles and the unity of physical laws across the cosmos as evidence for his monistic hypothesis.

Even with its elegant simplicity, mathematical monism faces internal tensions. First, it relies heavily on the assumption that all aspects of reality can be captured mathematically. Yet not all domains of human experience exhibit mathematical structure. Phenomenology, aesthetics and especially ethics challenge the universality of mathematical explanation. As Putnam argues, the success of mathematics in physics does not imply that the universe is mathematical; it simply shows that mathematics is an effective modelling system.²⁸ Second, mathematical monism struggles to explain consciousness. Penrose contends that consciousness is connected to non-computable physics,²⁹ but this seems at odds with the claim that reality is purely mathematical. Tegmark insists that consciousness is simply another mathematical pattern, but this explanation

²⁴Penrose, R. (2004), pp. 25–27

²⁵Tegmark, M. (2014), p. 11

²⁶Wigner, E. P. (1960). *The Unreasonable Effectiveness of Mathematics in the Natural Sciences. Communications in Pure and Applied Mathematics*, 13(1), p. 2

²⁷Penrose, R. (1994), pp. 76–79

²⁸Putnam, H. (1979). *Meaning and the Moral Sciences*. London: Routledge & Kegan Paul., pp. 2–4

²⁹Penrose, R. (1994), pp. 129–131



is widely criticized for collapsing into reductionism and for failing to capture subjective experience.³⁰Third, mathematical monism tends to blur the distinction between representation and reality. Just because mathematics describes something does not mean that the thing *is* mathematical. The map–territory distinction becomes central here because mathematics may be the map, but it does not follow that the world is the map.

Mathematical monism is an ambitious metaphysical theory that seeks to unify reality under the banner of mathematical structure. Its boldness lies in its claim that mathematics is not only effective in physics but fundamentally constitutive of existence. Yet this very boldness opens it to significant philosophical challenges. By insisting that mathematics is the most fundamental mode of understanding, mathematical monism risks oversimplifying or ignoring domains of human experience particularly ethical normativity that resist formalization. The tension between the mathematical and the moral is therefore not peripheral but central to evaluating the viability of mathematical monism.

The Limits of Mathematical Reductionism in Moral Explanation

One of the most persistent temptations in modern philosophy is the reduction of complex human phenomena to simplified mathematical structures. This temptation emerges not merely from the success of mathematics in the natural sciences but also from the allure of elegance, precision and universality that mathematical reasoning promises. Ethical life in contrast, is cluttered, messy, ambiguous and often resistant to strict quantification. The attempt to treat moral reality as fully reducible to mathematical terms therefore exposes fundamental limitations in mathematical monism. To understand the problem, one must first appreciate what mathematical reductionism claims. At its boldest, it asserts that ethical properties can be described as mathematical relations or configurations of abstract objects. In this view, moral norms would ultimately be statements about optimality functions, utility vectors, or equilibrium states. Some contemporary theorists such as Harasanyi implicitly adopt this stance when they describe ethics as rational choice optimization or portray moral agents as utility-maximizing entities operating within a decision matrix.³¹ While such models may offer predictive power in specific contexts, their success is often mistaken for a complete metaphysical explanation.

The first limitation emerges from the qualitative nature of moral experience, which cannot be captured through quantitative abstraction. Moral judgment is phenomenologically rich. It involves empathy, guilt, indignation, compassion, loyalty and a deep sense of responsibility. These modes of experience are not merely emotional stuffs on top of “core” rational or mathematical structures; they are intrinsic to what it means to judge ethically. As Charles Taylor observes, moral understanding is rooted in “strong evaluations” i.e. the capacity to see some desires as higher, nobler, or worthier than others.³² Such evaluations are inherently qualitative and

³⁰ Chalmers, D. J. (1996). *The Conscious Mind: In Search of a Fundamental Theory*. Oxford: Oxford University Press, pp. 13-15

³¹ Harasanyi, J. C. (1977). *Morality and the Theory of Rational Behavior*. *Social Research*, 44(1), p. 35

³² Taylor, C. (1989). *Sources of the Self: The Making of the Modern Identity*. Cambridge, MA: Harvard University Press., p. 19



value-laden. A mathematical description may capture preferences or choices, but it cannot articulate “higher” versus “lower” in the moral sense without already presupposing moral content.

A second limitation lies in contextuality, the fact that moral norms operate within human narratives, histories and relational frameworks. Mathematics, by design, abstracts away from particularities. It seeks generality, timelessness and repeatability. Ethics, however, requires attending to the discrepancies of a given situation, the particular actors involved and the historical relationships that shape their obligations. Bernard Williams notably criticized ethical theories that attempt to achieve impartiality at all costs, noting that morality cannot be detached from the “thick relations” and loyalties that constitute human life.³³ Mathematical reductionism fails specifically because its abstractions disregard the very particularities that make moral judgment intelligible.

A third drawback concerns semantic irreducibility. The central terms of ethics such as “ought,” “duty,” “wrong,” “injustice” and “responsibility” carry normative force that cannot be translated into numerical values without distortion. When a mathematical reductionist claims that an “ought” is simply a function maximization problem, they overlook that moral normativity involves bindingness, accountability and a sense of obligation that compels action even against personal interest. Kant’s formulation of duty as a law that holds “regardless of inclination”³⁴ demonstrates that moral demands cannot be fully captured by any system that treats agents as mere optimizers.

A fourth limitation arises from the problem of moral disagreement. Mathematical structures are, in principle, determinate: the same equation yields the same solution for all rational agents. Yet the history of ethics reveals deep and persistent disagreement not merely about applications, but about foundational principles. This disagreement is not merely epistemic; it reflects diverse moral sensibilities, cultural traditions, social contexts and metaphysical commitments. If moral properties were fundamentally mathematical, one would expect convergence akin to that found in physics or geometry. But ethical disagreement is not eliminated by increasing rationality or information. As John McDowell notes, moral perception is “shaped by upbringing, culture and habituation”³⁵ suggesting that ethics is grounded in forms of life rather than abstract logical space.

Another limitation is found in the inadequacy of mathematical objectivity for explaining normativity. Mathematical structures are discovered, constructed, or described, but they do not command, blame, or praise. They do not impose duties or generate guilt. Even if moral order were “isomorphic”³⁶ to a mathematical model, that model would remain normatively passive. It is persons embedded in relationships, guided by practical reason and capable of moral emotions who enact and sustain normativity. Christine Korsgaard emphasizes that moral authority arises

³³ Williams, B. (1985). *Ethics and the Limits of Philosophy*. Cambridge, MA: Harvard University Press., p 113.

³⁴ Kant, I. (1785). *Groundwork of the Metaphysics of Morals* (H. J. Paton, Trans.). New York: Harper & Row., p. 42

³⁵ McDowell, J. (1998). *Mind and World* (2nd ed.). Cambridge, MA: Harvard University Press, p. 72.

³⁶ Isomorphic comes from Greek roots meaning “same form”. Its meaning depends a bit on context, but the core idea is structural sameness despite surface difference



from reflective endorsement and the capacity for self-constitution.³⁷ Mathematics, lacking agency, rational will, or motivational force, cannot ground this authority.

Another revealing limitation of mathematical reductionism is its inability to account for moral transformation. Ethical life involves change: individuals learn, grow, repent, forgive, and reform. Moral agents are not static vectors; they are dynamic beings whose identities and values evolve. Mathematical models can track changes in preferences, but they cannot explain the transformation of character in a way that captures the existential depth of repentance or the moral power of forgiveness. Hannah Arendt underscores the human capacity for renewal and spontaneity as foundational to ethical freedom.³⁸ Such spontaneity resists mathematical determinism. Furthermore, moral motivation challenges mathematical monism. People often act rightly not because it maximizes some abstract value but because they perceive the intrinsic moral importance of the action. The mathematical reductionist must therefore insist that all moral motivation is either illusory or encoded within hidden optimization functions. Yet this is implausible. As Philippa Foot argues, moral reasons are connected to human flourishing and forms of life, not to mathematical operations.³⁹ To reduce such reasons to abstract structures is to sever them from the human goods that make them intelligible.

Lastly, there is the problem of normative authority. Mathematical truths do not care whether we obey them; they remain true regardless of our behaviour. Ethical truths, however, call upon us, demand something from us, and hold us accountable. If someone violates the Pythagorean theorem, nothing morally significant occurs; if someone violates a moral duty, they are rightly subject to blame or sanction. This asymmetry reveals that moral normativity carries an interpersonal dimension absent in mathematics. Stephen Darwall describes this as the “second-person standpoint,” in which moral obligations involve claims we can legitimately make on one another.⁴⁰ Such claims cannot be derived from mathematical relations alone.

The limits of mathematical reductionism in moral explanation expose the inadequacy of mathematical monism as a comprehensive metaphysical account. Ethical life is too rich, too contextual, too normatively charged, and too deeply human to be fully captured in the language of mathematics. While mathematical models may illuminate specific aspects of decision-making, they cannot substitute for the lived reality of moral experience. Instead, ethics points to a domain of normativity that is irreducible, *sui generis*, and ultimately incompatible with the flattening impulse of mathematical monism.

Ethical Normativity as Evidence against Mathematical Monism

Having examined the nature of mathematical monism, the limits of reductionism in ethics, we are now positioned to examine why ethical normativity itself constitutes a powerful

³⁷Korsgaard, C. (1996). *Creating the Kingdom of Ends*. Cambridge: Cambridge University Press, p. 101.

³⁸Arendt, H. (1958). *The Human Condition*. Chicago: University of Chicago Press, p. 236.

³⁹Foot, P. (2001). *Natural Goodness*. Oxford: Oxford University Press, p. 55.

⁴⁰Darwall, S. (2006). *The Second-Person Standpoint: Morality, Respect, and Accountability*. Cambridge, MA: Harvard University Press, p. 12.



counterexample to the thesis that all reality is fundamentally mathematical. We can demonstrate that the human moral realm cannot be fully captured by formal, quantitative structures, and therefore cannot be treated as merely a subset of mathematical reality by investigating the ontological, epistemological, and practical aspects of moral normativity.

The essential feature of ethical reality is normativity i.e. the property of moral truths or reasons to prescribe, guide and demand action. Unlike mathematical truths, which are descriptive or formal, ethical truths are characteristically prescriptive; they tell us what we ought to do, not merely what is the case. As Christine Korsgaard explains, moral obligations are not external facts but emerge from rational agents' reflective endorsement of principles governing their conduct.⁴¹ These obligations are binding in a way that mathematical truths are not; they involve accountability, responsibility, and interpersonal engagement. Consequently, the normative character of ethics is ontologically distinct from the purely structural, pattern-based reality that mathematical monism posits. While mathematics describes relationships between abstract entities, ethics prescribes obligations that command the will and shape the character of agents.

Mathematical monism implicitly assumes that all aspects of reality are reducible to mathematical structures, yet normativity resists such reduction. Even if we model human behaviour in mathematical terms through game theory, decision theory, or utility calculus we do not capture why an action is morally required or wrong. The ontological gap is evident because normative force exists independently of quantifiable phenomena. Moral obligations are not emergent properties of physical systems; they are constitutive of human reason and practical deliberation. In this sense, ethics reveals a domain of reality that is irreducible to mathematics, undermining the universality claim of mathematical monism.

The epistemic claim of mathematical monism that mathematics provides complete and privileged access to reality is also challenged by ethical normativity. As illustrated above, mathematical models can predict behaviour or simulate strategic outcomes but cannot generate reasons for action. John Rawls, in his method of reflective equilibrium, demonstrates that ethical justification requires iterative reasoning, engagement with intuitions, and reconciliation of principles with considered judgments.⁴² Such deliberative processes are interpretive, context-sensitive and value-laden these are qualities that mathematics cannot formalize without losing essential content. Likewise, the epistemic gap becomes clear when considering moral understanding as participatory and relational. Darwall's "second-person standpoint" emphasizes that moral knowledge arises from recognition of others' claims and the capacity to respond to reasons addressed to oneself.⁴³ Mathematical monism lacks resources for accounting for this relational, dialogical aspect of ethical reasoning. Numbers, functions, and formal structures cannot issue claims or respond to appeals; they can only describe states or calculate consequences. The epistemic insufficiency of mathematics in this domain underscores the need for pluralistic modes of understanding.

⁴¹Korsgaard, C. (1996), p. 101

⁴²Rawls, J. (1971). *A Theory of Justice*. Cambridge, MA: Harvard University Press, pp. 20-22.

⁴³Darwall, S. (2006), p. 12



Ethical normativity is inseparable from human experience, which is rich with intentionality, emotion, and moral perception. Moral life involves guilt, remorse, compassion, indignation, and admiration, all of which inform our sense of right and wrong. Martha Nussbaum argues that emotions are forms of moral perception: they reveal the salience of values and orient us toward ethical action.⁴⁴ Mathematical monism cannot capture these qualitative dimensions; equations and models describe patterns but cannot express the felt significance of moral situations. Ethical experience demonstrates that reality includes dimensions that are not formalizable and that resist abstraction into universal, context-free structures. Moreover, ethical experience is temporally situated. Moral decisions unfold within narrative time: individuals remember past actions, anticipate future consequences, and reinterpret themselves and their commitments. Paul Ricoeur emphasizes that ethical life is structured through narrative identity, a process in which human agents understand themselves and their duties over time.⁴⁵ Mathematical models, by contrast, are timeless and context-independent; they lack the capacity to account for moral temporality, transformation, or personal growth.

Moral normativity is inseparable from practical reason and motivation. Ethical obligations are not merely descriptive regularities; they move agents to act even against self-interest. Kant's notion of the categorical imperative illustrates this: duties are binding irrespective of inclination or consequence.⁴⁶ Mathematics, by contrast, can predict outcomes but does not generate moral reasons or compel action. Human agents act morally because they recognize reasons, value obligations and cultivate virtues not because equations dictate a maximized utility. This distinction highlights the irreducibility of ethical motivation to formal structures and emphasizes that mathematics alone cannot capture the force of normative authority.

Ethical norms are also culturally and interpretively situated. MacIntyre highlights that moral reasoning occurs within traditions, narratives, and communities.⁴⁷ Different societies may emphasize justice, solidarity, or respect in distinct ways, reflecting pluralistic conceptions of human flourishing. Mathematics, by its nature, abstracts away from cultural, historical, and social contexts; it cannot accommodate interpretive diversity or the contingency of moral reasoning. Ethical normativity therefore demonstrates that human understanding is inherently pluralistic, challenging the monistic ambition to reduce all domains of knowledge to mathematics.

Ethical life is dynamic, involving moral growth, repentance, forgiveness, and transformation. Hannah Arendt describes the capacity for spontaneous new beginnings as central to human freedom.⁴⁸ Moral development cannot be predicted or fully captured by mathematical models. Transformation presupposes self-reflection, deliberation and responsiveness to moral reasons i.e. all dimensions inaccessible to formal abstraction. Ethical normativity, in this sense, exemplifies

⁴⁴Nussbaum, M. (2001), p. 23

⁴⁵Ricoeur, P. (1992), p. 147

⁴⁶Kant, I. (1785), p. 42–45

⁴⁷MacIntyre, D. (1981), p. 222–225

⁴⁸Arendt, H. (1958), p. 236



the irreducibility of moral reality to structural representation, reinforcing the claim that mathematical monism cannot encompass the fullness of human experience.

Ethical normativity thus provides compelling evidence against the universality claim of mathematical monism. Ethics is ontologically distinct, epistemically irreducible, phenomenologically rich, motivationally compelling, culturally situated, and temporally dynamic. These features collectively demonstrate that moral reality cannot be captured by formal, quantitative, or algorithmic models. While mathematics remains a powerful tool for understanding physical phenomena, it cannot serve as a complete framework for all aspects of existence. Ethical life through its prescriptive force, relational character and experiential depth exposes the limits of reductionism and underscores the necessity of pluralistic approaches to human understanding. Ethical normativity thus functions not merely as a critique of mathematical monism but as a positive affirmation that human reality is multifaceted, requiring conceptual frameworks that extend beyond the reach of mathematical formalism.

Conclusion

This paper has examined the relationship between ethical normativity and mathematical monism, arguing that the irreducibility of moral reality poses a significant challenge to the notion that all reality is fundamentally mathematical. Beginning with an analysis of mathematical monism, we saw that its proponents, such as Penrose and Tegmark, claim that mathematics is not merely a descriptive tool but the very fabric of existence.⁴⁹ From this foundation, the paper explored the limitations of mathematical reductionism in accounting for ethics, demonstrating that moral reasoning, obligations, and values resist formalization into purely mathematical structures.

Subsequently, the paper highlighted the phenomenological, relational and temporal dimensions of ethical life. Moral experience is first-personal, deeply embedded in narrative and social contexts and rich with evaluative perception, emotion and deliberation.⁵⁰ Ethical reasoning is not a static or algorithmic process; it involves interpretive judgment, reflection and ongoing moral negotiation. These features of moral life are fundamentally incompatible with the universalizing and timeless formalism that mathematical monism entails.

The is–ought problem further demonstrates the logical and epistemic limits of attempting to mathematize ethics.⁵¹ Descriptive or quantitative knowledge, no matter how precise, cannot generate normative prescriptions. Even sophisticated models such as game theory or utilitarian calculus describe tendencies and outcomes without providing grounds for moral obligation.⁵² Consequently, the prescriptive authority of ethics cannot be derived from mathematical structures alone, highlighting a critical domain of reality that exists independently of formal abstraction. Ethical normativity is also fundamentally motivational and relational.

⁴⁹Penrose, R (2004), pp. 19–21; Tegmark, M. (2014), p. 11–13

⁵⁰Murdoch, I. (1970), p. 55; Ricoeur, P. (1992), p. 147; Nussbaum, M. (2001), p. 23

⁵¹Hume, D. (1740). *A Treatise of Human Nature*. London: John Noon, p. 469; Moore, G. E. (1903). *Principia Ethica*. Cambridge: Cambridge University Press, pp. 11-13.

⁵²Axelrod, R. (1984). *The Evolution of Cooperation*. New York: Basic Books, pp. 12-15; Mill, J. S. (1861). *Utilitarianism*. London: Parker, Son, and Bourn, pp. 43-45



Human agents act on moral reasons, guided by principles, commitments, and the recognition of others' claims.⁵³ Mathematics lacks the capacity to generate such normative force. Moral transformation through repentance, forgiveness, or growth reveals the dynamic and creative character of ethical life.⁵⁴ These experiences emphasize that ethical obligations are not merely descriptive or structural facts but constitute a domain of reality in which human freedom, responsibility, and value are central.

Taken together, these observations demonstrate that ethics provides a robust counterexample to mathematical monism. Ethical normativity is ontologically distinct, epistemically irreducible, experientially rich, temporally situated and relationally embedded. It cannot be fully captured by mathematical description, structural modeling, or formal abstraction. While mathematics remains indispensable for understanding physical phenomena, its explanatory scope is limited when confronted with the prescriptive, lived, and value-laden dimensions of moral reality. Ethics, therefore, reveals the pluralistic nature of human understanding that the universe may be comprehensible through multiple conceptual angles, of which mathematics is only one.

Thus, the study of ethical normativity not only challenges the universality of mathematical monism but also affirms the richness, complexity, and irreducibility of human reality. Moral life demonstrates that understanding the world and our place within it requires more than formal precision; it demands engagement with norms, values, and human experiences that elude mathematical encapsulation. Ethical normativity, in this sense, serves both as a critique and a corrective proposition to metaphysical reductionism, reminding us that the fullness of reality cannot be captured by a single stance, no matter how elegant or powerful.

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⁵³Korsgaard, C. (1996), p. 101; Darwall, I. (2006), p. 12

⁵⁴Arendt, H. (1958), p. 236



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