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EXTENDING THE FRANKENSTEIN METAPHOR: THE BARREN CREATURE OF THE REFERENCE CASE

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ABSTRACT

This paper extends the Frankenstein metaphor to offer a deeper critique of contemporary health technology assessment (HTA). While the metaphor has often been used to highlight HTA's assemblage from heterogeneous disciplinary fragments, economics, epidemiology, and administration, without methodological unity, its most illuminating feature lies not in the grotesque assembly but in the creature's barrenness. In May Shelley's Frankenstein (1818), the creature is not only malformed but infertile: he has no ancestry, no progeny, and no capacity for self-development. This absence of generativity provides a precise analogue for HTA's epistemic infertility. Like Frankenstein's creation, HTA is animated by procedural and administrative impulses rather than by the lawful methods of science. It moves and speaks in the idiom of empiricism but cannot reproduce the conditions for genuine knowledge growth.

Read as a philosophical case narrative, Shelley's novel dramatizes the consequences of creation without method. Victor Frankenstein's failure is methodological rather than moral: he constructs without theory, animates without understanding, and abandons his work without evaluation. The result is a being incapable of evolution because it lacks the structural principles of natural generation. HTA displays the same defect. Its conceptual components, utilities, quality-adjusted life years (QALYs), and cost-utility models, were assembled without reference to measurement theory or the axioms of scientific inquiry. The utilities that form its quantitative core are ordinal preferences, not true measures; when multiplied by time to produce QALYs, they yield numerical artefacts that cannot support arithmetic operations or hypothesis testing. Lacking measurable constructs, HTA cannot generate falsifiable propositions, cumulative evidence, or theoretical refinement. Each assessment is a self-contained artefact, an evaluative creature incapable of producing a lineage of reproducible findings.

Shelley's image of the barren creature thus becomes a model of epistemic sterility: a system that simulates vitality but cannot evolve. The metaphor exposes HTA's ontological limitation, its detachment from lawful measurement and empirical discipline. What appears to be scientific evaluation is in fact the repetition of methodological error, an elaborate choreography of numbers without attributes. To overcome this barrenness, evaluative science must begin where HTA did not: with measurable constructs, falsifiable hypotheses, and a commitment to reproducibility. Until then, HTA remains, like Frankenstein's creature, a vivid yet infertile creation; an artefact animated by administrative energy rather than by the generative power of scientific method.

INTRODUCTION

The Frankenstein metaphor has proved valuable in critiquing contemporary health technology assessment because it captures the essence of a creation assembled from disparate parts without a unifying method, animated by administrative demand rather than scientific design. Yet the metaphor can be developed further. Mary Shelley's novel does more than depict a malformed creation. It also presents a creature without lineage, without progeny, and without a developmental pathway. The creature has no capacity to reproduce itself, to evolve, or to give rise to new forms of knowledge or life.

This inherent barrenness can be used to deepen the analogy with HTA, for HTA too is a creation that cannot generate scientific hypotheses, cannot be refined through measurement, and cannot support cumulative understanding. Its outputs lack the structure required for progress, making HTA not only flawed in origin but sterile in operation. To explore this parallel, it is necessary to consider Shelley's implicit treatment of infertility and to trace the implications for a system built without regard to measurement, falsification, or the axioms of scientific inquiry.

MARY SHELLEY AND THE PHILOSOPHY OF SCIENCE: *FRANKENSTEIN* AS A PHILOSOPHICAL CASE NARRATIVE

Mary Shelley's *Frankenstein* (1818) stands as one of the earliest and most enduring reflections on the moral and epistemological dimensions of modern science [1]. Though not a philosopher of science in the formal academic sense, Shelley used narrative fiction to explore the ethical implications of scientific creation, the nature of responsibility, and the boundaries of human inquiry. Her contribution can be best understood through what may be termed a philosophical case narrative: a story that dramatizes abstract philosophical problems through the lived experiences of characters and events, allowing readers to test ideas about science, morality, and human nature in an imagined but intellectually rigorous context.

In *Frankenstein*, Victor Frankenstein's experiment in reanimating dead matter is more than a gothic curiosity; it serves as a thought experiment about the Enlightenment ideal of mastery over nature. Shelley stages the conflict between empirical curiosity and moral responsibility, portraying the creation of life as both a scientific triumph and a moral catastrophe. Through Victor's narrative, she questions whether knowledge pursued without ethical awareness can ever be truly progressive. The novel thus anticipates key themes later formalized in the philosophy of science: the social embeddedness of scientific inquiry, the problem of unintended consequences, and the moral obligations of the scientist toward both creation and society [2].

The "creature" functions as the moral mirror of scientific ambition. Deprived of guidance and compassion, he becomes the embodiment of knowledge alienated from empathy. Shelley's narrative thereby transforms a gothic plot into a philosophical investigation of the responsibilities inherent in technological power [3] . The novel's frame structure, layered narratives that reflect differing perspectives, also enacts a philosophical method: it multiplies standpoints, reminding readers that scientific progress is never value-neutral but always mediated by human interpretation.

Shelley's work, read as a philosophical case narrative, bridges the Romantic critique of mechanistic rationalism with the modern philosophy of technology. Long before bioethics and artificial intelligence debates, *Frankenstein* articulated a foundational question: what duties accompany the creation of new forms of life and power? In dramatizing this dilemma, Mary Shelley helped shape the ethical vocabulary through which science continues to examine itself.

SHELLEY'S CREATURE AS A BARREN CONSTRUCT

Shelley's novel does not explicitly state that the creature is biologically barren, but the idea is woven throughout the text. The creature describes himself as outside the chain of life; he has no ancestry and no descendants. He is a being conjured into existence without the slow, lawful processes of biological reproduction. Critics have often interpreted this infertile status as a symbolic indictment of creation severed from method or tradition [4]. The creature is not merely grotesque; he is fundamentally disconnected from the natural processes through which life evolves and acquires structure.

This barrenness is not a biological footnote; it is the central tragedy of the creature's existence [5]. Everything that develops in the novel, from the creature's longing for companionship to his attempts to understand his place in the world, is colored by the fact that he is cut off from generativity. He does not grow in the sense of acquiring stable traits or building a lineage of learning. His consciousness expands, yet he remains stuck in a static ontology: a single, unreplicable creation. His evolution is emotional rather than structural. He cannot produce a lineage that might improve on his initial form. There is no next generation of creatures, no lessons learned, no experimental refinement. His fate is thus determined at birth by the flawed method of his creation. Victor Frankenstein assembled him through a process devoid of empirical discipline, and the consequences of this methodological vacuum echo through every event in the narrative.

The interpretive literature often emphasizes that Shelley was challenging the Enlightenment confidence in limitless creative power, suggesting instead that the absence of method in creation carries epistemic and moral risks. Frankenstein does not follow a scientific program. He constructs without theory, animates without understanding, and abandons his creation without evaluation. The barren creature stands as both symptom and indictment of Frankenstein's methodological failure. In this respect, Shelley anticipates modern debates about innovation without epistemology, about systems built on appearances of knowledge without the substance of measurement, and about creations incapable of evolving because they were malformed at inception.

THE REFERENCE CASE AS A BARREN CREATURE

Extending this reading to HTA reveals a deep structural parallel. the reference case as currently formalized, is not merely imperfect. it is epistemically barren. it is a system incapable of generating testable hypotheses, incapable of supporting cumulative understanding, and incapable of producing valid measures; barrenness arises from the same methodological vacuum that haunts Victor Frankenstein's work. HTA's constructs were assembled without regard to measurement theory, representational rules, falsifiability, or empirical structure. Like the creature, HTA is a spectacular construction but not a scientific one. It can move, speak, and produce outputs that

resemble knowledge, yet it cannot generate new knowledge or support the growth of a coherent discipline.

HTA's infertility lies principally in its reliance on ordinal preferences presented as measures. Utilities derived from time trade-off or standard gamble tasks are not quantities. They lack unidimensionality, invariance, and interval properties. They cannot support arithmetic operations, yet they are treated as if they form the foundation of a measurement system. When these utilities are multiplied by time to form QALYs, the resulting construct is not a measure but a numerical chimera. This is the barren heart of HTA: a system built on non-measures cannot evolve scientifically because it has no lawful internal structure to refine.

The consequence is stark. HTA produces numbers, but these numbers do not correspond to attributes [6]. They cannot be interpreted as measures of anything. They cannot support hypothesis testing because hypotheses require quantities that can vary meaningfully and be compared on a lawful scale. Without such quantities, HTA cannot construct falsifiable propositions. It cannot propose that one therapy improves an attribute relative to another on a measurable scale. It cannot generate replicable or reproducible findings because there is no measurement foundation to replicate. Every output is a self-contained artifact, a single grotesque figure that cannot give rise to new knowledge or be tested across contexts.

The result is that HTA produces decisions but not understanding. It produces evaluations but not evidence. It produces outputs but not science. This is the very definition of epistemic infertility. The system cannot grow because its internal logic does not allow for growth. It cannot improve itself because it has no structured attributes to examine or refine. HTA has become a static creation whose lineage ends at the moment of its construction.

FAILED ORIGINS AND THE ABSENCE OF METHOD

The metaphor extends further when we consider the origin stories. Frankenstein's creature is malformed because he was built outside the lawful processes of biological reproduction. HTA is malformed because it was built outside the lawful processes of measurement. The creators of HTA did not engage with representational measurement theory, did not distinguish between manifest and latent constructs, and did not consider the requirements for interval or ratio scales [7]. They borrowed concepts from welfare economics and psychometrics without examining their measurement status. They embraced utilities because they were administratively convenient, not because they were scientifically valid. They adopted QALYs because they simplified decision-making, not because they measured anything.

This origin story mirrors Victor Frankenstein's methodological hubris. There is a striking parallel in the logic: a desire to bypass method in pursuit of an outcome, animated by the illusion that assembling parts is equivalent to constructing a system. The parts of the HTA creature include ordinal utilities, cost-per-QALY ratios, reference-case models, and sensitivity analyses that cannot correct for the lack of measurement. These parts were stitched together to create an evaluative apparatus that produces authoritative-seeming numbers. But the absence of lawful measurement rules means the creature is malformed from inception.

In Shelley's novel, the creature's barrenness is the inevitable result of its strange and unmethodical construction. Likewise, HTA's inability to generate hypotheses or support scientific evolution is the inevitable consequence of constructing an evaluative system without a scientific foundation. The epiphenomena of creation without method, sterility, isolation, and the inability to evolve, are shared by both the fictional creature and the real-world practice of HTA.

This structural barrenness leads to a distinctive consequence: HTA cannot correct itself. It has no internal mechanisms of error correction because it has no testable constructs. Its primary claims, cost per QALY, incremental ratios, and modeled projections of net benefit, are non-evaluable. They cannot be falsified because they are not empirical. When challenged, defenders of HTA often appeal to procedural robustness or administrative necessity rather than scientific validity. This response mirrors Victor's persistent refusal to confront the methodological problems in his creation. The absence of epistemic humility, the reliance on numerical ornament, and the escape into procedural rhetoric are characteristic features of systems that lack the means for genuine evolution.

THE DEEPER PARALLEL: A CLOSED WORLD WITHOUT DEVELOPMENT

The full power of the metaphor emerges when we consider the long-term trajectory of HTA. A scientific discipline grows through the refinement of constructs, improvement of methods, and accumulation of evidence. HTA has shown no such trajectory. After four decades, utilities remain ordinal preferences. QALYs remain non-measures. Reference-case models remain simulations untethered to measurement. Disease-specific instruments remain raw-score aggregations that fail Rasch requirements for latent trait measurement [8]. No progress has occurred because no progress is possible in the absence of measurement [9]. HTA has been confined to a static ontology, repeating the same methodological errors while generating increasingly elaborate versions of the same non-constructs.

The barrenness of HTA is therefore not simply the absence of progeny but the absence of developmental capacity. It is a system that cannot expand its intellectual lineage. It cannot be the basis of scientific programs because it produces no measurable attributes that such programs could examine. It cannot support cross-contextual validation because its constructs do not satisfy the axioms of invariance or dimensionality. It cannot respond meaningfully to empirical critique because it lacks the epistemic core required for critique to operate. What looks like methodological debate within HTA is merely the rearrangement of arbitrary conventions; it has no implications for knowledge growth because there is no knowledge at stake.

This infertile state is reinforced by the sociology of the field. Practitioners have been trained in the use of utilities, QALYs, and reference-case models without exposure to measurement theory. The audience for HTA outputs, formulary committees, pricing bodies, and policy agencies, has likewise been conditioned to accept numerical artifacts as indicators of value. There is no pressure for evolution because the institutional ecosystem rewards the production of administratively convenient outputs rather than scientifically valid constructs. The barren creature, in this context, survives because its sterility is mistaken for stability.

THE DRIFT NORTHWARD: HTA AT THE LIMITS OF KNOWLEDGE

The symbolism of "going north" in *Frankenstein* adds a further dimension to the metaphor of HTA as a barren creation. In Shelley's novel, characters move north not simply because the plot demands it, but because the Arctic represents the furthest reach of human ambition, the point at which established structures collapse and knowledge loses its bearings. Walton's decision to chart an untraveled path into the polar ice and Victor's dogged pursuit of the creature across this desolate landscape both express a desire to push beyond the limits of method and understanding. The north is the boundary condition where human reason confronts its own illusions. It is the place Shelley chooses to reveal the consequences of creation without scientific discipline. The creature, who ultimately withdraws into the Arctic to end his life, is drawn there because the terrain mirrors his ontological emptiness: frozen, infertile, and hostile to development.

This symbolism offers a powerful parallel to the trajectory of HTA. Once utilities, QALYs, and reference models had been accepted as the lingua franca of evaluation, the field embarked on its own drift northward. It moved toward increasingly elaborate but increasingly barren constructions. As guidelines mandated cost-utility analysis and agencies institutionalized thresholds, HTA entered a conceptual Arctic where numbers floated free of the attributes they purported to measure. Without measurement theory, without falsifiable constructs, and without any mechanism for empirical evaluation, HTA found itself operating at the limits of knowledge, producing decision tools that looked authoritative but could not support scientific understanding.

The Arctic setting in *Frankenstein* is not a site of discovery but of revelation. It exposes Victor's methodological failure and Walton's near complicity in repeating it. In the same way, the conceptual north of HTA reveals the foundational error at the heart of the discipline: the belief that arithmetic can be performed without measurement, and that quantities can be conjured from preference statements. The further HTA has travelled into this terrain, the more isolated it has become from science. The field has drifted into a place where structure collapses, where constructs cannot grow or evolve, and where political necessity masquerades as epistemic authority. Shelley's north is the landscape where the consequences of creation without method become unavoidable. HTA stands in the same frozen expanse, a system confronting the barrenness of its own design.

THE BARREN CREATION IN PRACTICE: SPECULATION AND PRICING

In health technology assessment (HTA), the claim to scientific authority collapses most visibly in pharmaceutical pricing negotiations. These exercises are formally presented as rational evaluations of therapeutic value, supported by quantitative evidence that enables payers and manufacturers to agree upon a fair price. Yet, beneath their procedural veneer, these negotiations operate in a conceptual vacuum. The key inputs, utilities, quality-adjusted life years (QALYs), incremental cost-effectiveness ratios, and modeled projections, lack empirical content. They are not measurable quantities but numerical artefacts assembled through assumptions and conventions that cannot be verified or falsified. The entire process therefore functions less as an empirical inquiry than as a performance of scientific legitimacy, a theatre of reason sustained by unmeasurable constructs.

Within this framework, manufacturers begin by presenting cost-per-QALY models, replete with sensitivity analyses meant to suggest robustness. However, the parameters varied in these exercises are themselves unmeasured: utilities are ordinal preferences masquerading as interval data, and trial outcomes are often mapped across incomparable endpoints. The resulting projections of lifetime benefit combine these non-quantities into pseudo-quantitative scenarios, further abstracted through discounting conventions. Payers, in turn, do not interrogate the empirical status of the quantities involved, since none exists, but rather audit the internal coherence of the model and its compliance with procedural guidelines. These guidelines institutionalize cost-utility analysis and QALYs without requiring demonstration that the underlying constructs meet the standards of scientific measurement. Negotiation thus becomes a bureaucratic ritual of methodological conformity rather than a contest of empirical evidence.

Both sides sustain the illusion. Manufacturers accept the QALY framework because it legitimizes access to market; payers accept it because it provides a defensible rationale for pricing decisions. The appearance of quantitative rigor protects agencies from charges of arbitrariness and gives firms a standardized idiom in which to assert value. Yet this mutual convenience hides the absence of scientific substance. The numbers exchanged are symbolic rather than empirical, tokens in a closed linguistic economy that rewards procedural fluency over measurement validity.

This symbolic economy reaches absurdity when disputes hinge on fractional differences in modeled QALYs, 0.15 versus 0.23, as if such differences were measurable. Because utilities are ordinal, arithmetic operations on them are meaningless; addition and subtraction cannot yield interpretable results. The cost-utility framework, therefore, is built on an arithmetic illusion. Its ratios and thresholds cannot be empirically tested, and its conclusions about value cannot be corroborated by observation. Pricing decisions derived from these ratios are consequently unfalsifiable: once a product is priced on the basis of cost per QALY, there exists no empirical pathway to confirm or disconfirm the justification. The QALYs that supported the decision are unobservable in real patients, leaving the rationale scientifically inert.

The same epistemic emptiness permeates budget impact analyses, which purport to forecast real-world costs and uptake. These, too, depend on speculative assumptions linked to cost-effectiveness models. Patient numbers, adoption curves, and displacement effects are parameterized through non-measures and subjective utilities that fail the requirements of measurement theory. The result is a simulation of empiricism, a numerical narrative that mimics evidence without producing it. Probabilistic modeling and scenario testing become stylistic gestures toward scientific reasoning, not its enactment.

From this simulation emerge the field's most enduring myths: pricing thresholds such as $50,000 or $100,000 per QALY. These figures, treated as objective standards, have no empirical origin; they persist by convention, providing bureaucratic stability rather than truth. They anchor negotiation outcomes globally, yet they rest on foundations devoid of measurable content.

Consequently, pharmaceutical pricing negotiations reproduce the barrenness of HTA itself. Without measurable constructs, the process cannot yield scientific knowledge; it can only generate numerical narratives that simulate evidence. The tragedy, echoing Shelley's *Frankenstein*, is that the system's creators cannot escape their creation. To reject QALY-based evaluation would be to

repudiate the institutional structure of HTA altogether. Thus, like Shelley's scientist confronting his barren creature, the participants remain bound to a framework that performs science without achieving it; an elaborate bureaucratic life-form animated by numbers that measure nothing.

CONCLUSION: THE POWER AND PRECISION OF THE BARRENNESS METAPHOR

Extending the Frankenstein metaphor to emphasize barrenness illuminates a dimension of HTA's failure that is often overlooked. HTA is not merely flawed, inconsistent, or inadequately refined. It is epistemically infertile. It cannot generate new knowledge because it has no measurable constructs. It cannot evolve because its origins lie in creation without method. It cannot support hypothesis testing because its quantities are not quantities. It cannot mature into a scientific discipline because it was never built on scientific foundations.

Shelley's creature embodies the consequences of creation without method: isolation, sterility, and the inability to form a lineage. HTA embodies the consequences of evaluation without measurement: non-evaluable claims, numerical storytelling, and an inability to form a scientific program. The metaphor is therefore both vivid and precise. It is not simply a rhetorical device but an analytical tool that captures the structural impossibility of progress in HTA as currently conceived. Just as Frankenstein's creature cannot reproduce because he was never brought into the world through lawful biological means, HTA cannot generate evidence because it was never constructed through lawful measurement.

This metaphor does not imply that evaluative systems are impossible. Rather, it suggests that any future system must begin where HTA did not: with measurement, with falsifiable claims, and with the distinction between manifest and latent attributes. Only a creation built through lawful rules can grow, evolve, and support the development of knowledge. Until such a system exists, HTA will remain what Shelley's creature became: a barren construction whose tragic flaw is embedded in its very conception.

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More detail on program content and access, including registration and on-line payment, is provided with this link: https://maimonresearch.com/distance-education-programs/

REFERENCES

[1] Shelly M. Frankenstein; or, the Modern Prometheus. 1818 E M Butler. Oxford: Oxford University Press, 1994

[2] Schmidgen H. The Helmholtz Curves: Tracing Lost Time. New York: Fordham University Press, 2014

[3] Gigante D. Facing the Ugly: The Case of *Frankenstein*. 2000. ELH67(2)565-587

[4] Baldick C. In Frankenstein's Shadow: Myth, Monstrosity, and Nineteenth Century Writing. Oxford: Clarendon Press, 1987

[5] Jordan C. Second Nature: The Pathetic Fallacy in Nineteenth Century Fiction. Albany: State University of New York, Press, 1984.

[6] Stevens S. On the Theory of Scales of Measurement. *Science*. 1946;103(2684):677-80

[7] Krantz D, Luce R, Suppes P, Tversky A. Foundations of Measurement Vol 1: Additive and Polynomial Representations. New York: Academic Press, 1971

[8] Rasch G., Probabilistic Models for some Intelligence and Attainment Tests. Expanded edition. Chicago: Chicago University Press.1980 [first published 1960]

[9] McKenna S, Pesud0vs B. Quality of Life Assessment: Can we really Measure Human Need. Brit J Ophthalmology. 2011; 95(1):1-2