

Why Middle-Sized Matters to Science and Religion: Editorial

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Abstract: This special issue explores both the metaphysical and theological significance of “middle-sized things” – everyday objects, persons, and sacraments – in light of developments in contemporary science and philosophy. Against prevailing neo-Humean and microphysicalist backdrops, where only microphysical entities are taken as fundamental, contributors interrogate the ontological reality and causal powers of the macroscopic domain through engagements with quantum physics, biology, the metaphysics of substance, and sacramental theology. Essays range from arguments for Aristotelian hylomorphism and critiques of reductionism to narrative theories of identity and teleological accounts of divine action. Together, they examine whether middle-sized entities can be causally efficacious, metaphysically basic, and theologically significant.

Keywords: hylomorphism, top-down causation, causal pluralism, ontological pluralism, middle-sized objects, science and religion.

In this special issue we consider the metaphysical and theological significance of “middle-sized things” – the everyday objects that populate our experience – in dialogue with the natural sciences. Human beings, animals, or religious sacraments—all of them middle-sized things—have often been treated as *non-fundamental* or merely *derivative* in modern philosophy. Under the prevailing “neo-Humean” metaphysics, the fundamental ontology is assumed to consist of elementary particles or fields, and everything else is supposed to be reducible to – or to supervene upon – these sparse microphysical constituents. From this perspective, it is our best physics which “carves nature at the joints”, giving us the “basic furniture” of reality. In such a framework, it’s easy to think of the human domain of religious practices as being somehow illusory or less “real” than the scientific world of atoms and fields. And yet the practice of science, no less than the practice of religion, is an activity of middle-sized things (human beings) using middle-sized things (instruments of measurement). So how do atoms, fields, measuring devices, human beings, animals, and religious sacraments all fit together within our picture of reality?

In recent years, there has been a resurgence of interest in hylomorphism—the ancient Aristotelian view that all physical substances are composed of both *form* and *matter*. On this view, matter provides the underlying potentiality, while form actualises that potential into a unified whole with structure, identity, and causal powers. Rather than reducing objects to their microphysical constituents, hylomorphism sees things like trees, animals, and people as *substances in their own right*, with internal principles of organisation. This is discussed, for instance, in Simpson’s *Hylomorphism* (2023), which offers a contemporary introduction to and defence of this approach, showing how it provides a robust metaphysical framework for understanding persistence, causation, and emergence in a scientific world.

At the same time, in the philosophy of physics, growing attention has been paid to the concept of top-down causation—the idea that higher-level systems can exert causal influence on their components. George Ellis, for instance, has long-defended the view that this kind of causa-

tion is not merely an epistemic shortcut but reflects a real, hierarchical structure of nature through which macro-level systems are able to modulate micro-level events (see eg. Voosholz & Gabriel 2021). These developments in contemporary metaphysics and physics point toward a broader shift: away from the assumption that reality is fully captured by its smallest parts, and toward a recognition that the middle scale — the scale of organisms, persons, and practices — may play an irreducible role in both ontology and explanation.

Against the backdrop of microphysicalist orthodoxy, this collection of papers explores the possibility of a *metaphysical and theological ressourcement* — an appropriation of a wider range of philosophical and theological resources — in order to re-centre the ontological and causal significance of middle-sized things. In some cases, this project takes the form of an attempt to recover a robust philosophy of substance inspired by Aristotle's doctrine of hylomorphism, expanding the toolbox of modern metaphysics. In other cases, theological concepts are enjoined to explain the persistence and reality of middle-sized things using a “binocular” approach that combines science and religion to view the world. In all cases, the essays in this special issue are concerned with engaging the natural sciences — quantum physics, cosmology, biology, etc — in discussing middle-sized things which matter to science and religion.

Below we offer brief summaries of each of the seven papers, focusing on their central theme, their scientific context, their metaphysical commitments, and their theological relevance. Along the way we highlight how these contributions compare and contrast — for example in their attitudes towards physicalism versus hylomorphism, or pragmatic versus metaphysical interpretations of scientific theories — and how they jointly illuminate the importance of agency, form, and purpose at the macroscopic scale.

Hans Halvorson – Fundamental Physics and Middle-Sized Dry Goods

Halvorson (2025) addresses the question of how fundamental physics relates to the realm of “middle-sized dry goods” (taking his title from Austin’s *Sense and Sensibilia*). He begins by noting a pervasive mindset: that what modern physics describes (fields, particles, wavefunctions) is real, whereas middle-sized things are less real or even just “convenient fiction[s]”. This reductionist view, held by some philosophers and scientists, is met by an opposing anti-reductionist intuition, often among the religiously minded, driven by the concern that devaluing everyday reality threatens the meaning of love, morality, and our lives. For example, Halvorson wryly asks: if your spouse were nothing more than a configuration of quantum fields, why would you offer them your undying love? Is the existence of children or trees “nothing more than a convenient fiction” created by chance? These questions frame Halvorson’s concern: how should we live if fundamental physics shows our familiar world is in some sense *unreal*?

In the paper, Halvorson considers the efforts of Robert Koons and William Simpson, among others, to revive Aristotle’s doctrine of hylomorphism in order to reclaim the reality and causal efficacy of middle-sized things. He also critically evaluates a recent attempt to provide a new solution to the famous “measurement problem” of quantum mechanics, put forward by Barbara Drossel, and George Ellis, who are sympathetic to Koons’s and Simpson’s proposal. This solution – called the Contextual Wavefunction Collapse (CWC) model – claims that *middle-sized systems* (like cats or measurement devices) play an active causal role in collapsing quantum states. Drossel and Ellis have argued that thermal systems or macroscopic objects cannot be fully described by a quantum wavefunction defined in a single Hilbert space, and that this requires a non-reductive approach to quantum physics. Koons et al. have embraced this idea as evidence for an Aristotelian physics in which substances exercise top-down causation.

Halvorson sympathises with the spirit of this “causal pluralism” – the idea that not all causation reduces to the micro-doings of particles and

fields – but identifies conceptual problems in the CWC model. First, Halvorson points out that it has trouble *describing* middle-sized objects in physical terms. Second, he argues that it does not clearly solve the standard quantum puzzles either, since it leaves open how quantum objects themselves should be described. He wants precise answers about how physics represents things at both the microscopic and the macroscopic scales. He complains that CWC theory is vague about the boundaries between the quantum and classical domains, risking an incoherent dualism between quantum objects in high-dimensional space and classical objects in ordinary physical space.

His critique of Koons's and Simpson's hylomorphism is cast in the broader context of the reductionism debate: most metaphysicians agree now that middle-sized things are real; the issue is one of *metaphysical dependence*. Reductionists hold that middle-sized things are ontologically dependent on the fundamental physics description, whereas anti-reductionists, like hylomorphists, insist that there are fundamental things at the middle level. Halvorson's own metaphysical stance is somewhat ambivalent. He rejects the crude extreme that only particles are real, and claims to be sympathetic to the causal pluralism of the Aristotelian view. However, he believes “semantic pluralism” offers a middle-way in which middle-sized things can be just as real as particles and yet still reducible to physics.

Scientifically, Halvorson's focus is squarely on the foundations of quantum mechanics. Theologically, his paper highlights the stakes of this debate: if physics really does show that our loved ones and artifacts are less than fully real, then what room is there for love, meaning, or religious value?

Koons, Simpson, Drossel & Ellis – *The Two Faces of Semi-Physicalism*

Robert Koons, William Simpson, Barbara Drossel, and George Ellis offer a joint reply to Halvorson's paper (Koons et. al. 2025), in which Koons suggests that Halvorson may be sitting on the fence (metaphysically speaking), Simpson offers a partial response to the conceptual problems that

Halvorson raises for Contextual Wave Function Collapse theory (a theory put forward by the physicists Barbara Drossel and George Ellis), whilst Drossel and Ellis seek to clarify their approach to quantum physics.

Koons and Simpson focus primarily on the metaphysics. Koons humorously suggests that Halvorson is oscillating between two inconsistent perspectives: on the one hand, there is “Halvorstotle”, who has a hylomorphic and pluralist perspective; on the other, there is “Demovorson”, a staunch microphysicalist. Koons urges Halvorson to embrace his hylomorphic intuitions and shun microphysicalism. Simpson argues that CWC theorists can address Halvorson’s worry about dualism by combining hylomorphism with a primitive ontology approach to quantum mechanics, in which middle-sized things are made of matter fields which extend in ordinary physical space. Middle-sized regions of this field have causal powers to affect the microscopic level because their matter is suitably in-formed. In conceding some validity to Halvorson’s criticisms, however, he raises a novel point: if the classicality of a system depends on its environment, this could lead to an infinite regress. As a remedy, Simpson proposes a *cosmic form* – an intrinsic causal structure of the universe as a whole – to halt that regress.

Drossel and Ellis adopt a more pragmatic stance in their response to Halvorson. Drossel suggests that quantum mechanics is “toolbox” rather than an axiomatic theory, and that physicists treat macroscopic objects classically because they have their own emergent, classical features which have causal significance. Thus, from their side of the conversation, one never attributes a wavefunction to a thermometer or a cat; one instead uses classical descriptions which are causally effective. The discussion thus displays an element of internal tension between the metaphysical approach of Koons and Simpson (quantum hylomorphism) and the more pragmatic approach of Drossel and Ellis (a quantum toolbox).

Collectively, Koons et al. seek to create conceptual space for the emergence of higher-level entities which have top-down causal powers, and hence a more robust metaphysics of middle-sized things. Their scientific focus is mainly on quantum mechanics and the measurement problem. Theologically, the outlook of Koons and Simpson resonates with a broad-

ly Thomistic view, although they do not explicitly discuss religion. By insisting that everyday objects (even bread and wine) are ontologically significant, they set the stage for later papers to explore the religious implications of the Eucharist, for instance.

Emily Qureshi-Hurst – Many Worlds and Narratives of Personal Identity

Turning from the external world of middle-sized things to the inner world of human persons, Emily Qureshi-Hurst's (2025) paper addresses personal identity in the context of Everettian (Many-Worlds) quantum mechanics; a quantum theory which, unlike the CWC model, admits no collapse of the wavefunction. Her goal is to develop a narrative theory of personal identity that makes sense even though the universe is continually “branching” into multiple “worlds” which contain multiple future versions of ourselves.

Qureshi-Hurst points out that even conservative Many-Worlds advocates like Simon Saunders and David Wallace accept that these “world-branches” are emergent patterns containing multiple copies of agents whose lives diverge over time. If so, a single world-historical individual is no longer uniquely identifiable; instead every person has many counterparts. She sets this puzzle against the backdrop of well-known counterpart theory puzzles (such as those in David Lewis's *On the Plurality of Worlds*). The question is: can we *narrate* a continuous identity for a person through branching quantum worlds?

Drawing on thinkers like Daniel Dennett and the theologian Paul Tillich, Qureshi-Hurst suggests that we think of the self in terms of embodiment. The phrase “the body keeps the score” (from psychologist Bessel van der Kolk) indicates that embodiment anchors identity in each branch. Although personal identity may fail to be transitive *across* world-branches, what counts as continuance of a person *within* each branch can be traced through the body and its psychological narrative.

In sum, Qureshi-Hurst's contribution is to bring a novel perspective to identity. Rather than treat many-world branching as a problem that

threatens the coherence of a many worlds perspective, she reinterprets identity in narrative/embodied terms that do not violate the *within-branch* reality of each person. Her use of Tillich shows that theological voices are present in her reasoning. Her paper reminds us that traditional views of identity (of the soul, the self, of continuity after death, etc.), such as those of Aquinas, may need rethinking if our best physics requires us to postulate branching worlds. By placing narrative and the body at the centre, however, she connects quantum theory with a picture of the person that has existential and even spiritual dimensions.

James Dominic Rooney – Hylomorphism and Persons in Odd Situations

Fr James Dominic Rooney's (2025) paper is also concerned with personal identity, though he defends a hylomorphic account of persons, in contrast with Qureshi-Hurst's narrative perspective. It is biology, neuroscience and analytic thought-experiments which comprise the material of his reflections, rather than debates about quantum theory. Rooney argues that a person is essentially a biological composite of matter and a single substantial form (soul) whose identity is grounded in natural kind (animal) membership rather than in streams of consciousness or narrative. In other words, Rooney affirms a kind of Aristotelian *animalism*, in which human beings are conceived as animals with a rational form, rather than purely psychological persons who inhabit physical bodies.

Rooney suggests Aquinas gave us “a robust hylomorphic animalism”, under which one could survive bodily destruction without denying that “the animal with which I am identical” survives. He then applies this hylomorphic framework to famous puzzle cases (“persons in odd situations”) such as brain transplants, fission/fusion of organisms, and identical twin cases. He argues that his Thomistic view handles these better than purely psychological theories. For example, Locke-style dualism might say the person follows memory and thought, but Rooney thinks the person is essentially the living animal, so certain intuitions about personal identity and continuity captured differently.

In contrast to Qureshi-Hurst's many-world, narrative-based understanding of a person, Rooney offers a single-world, substance-based understanding. Both contributors are concerned to preserve what matters about persons (the continuity of self, human dignity, etc.), but they advance very different metaphysical pictures.

Janice Chik Breidenbach & Daniel Sadasivan – *Quantum Action and Substance Causation*

Janice Breidenbach and Daniel Sadasivan (2025) return us to quantum physics with a Thomistic proposal: to resolve the measurement problem in a way that is metaphysically satisfying, we must take macroscopic substances seriously as genuine causal agents. Drawing on Aquinas's theory of substance causation and his “contact requirement” — the idea that cause and effect must be in physical or virtual contact — they argue that only hylomorphic wholes, not mere aggregates, can explain the collapse of the wavefunction.

Against the reductionism of figures like Jaegwon Kim, who sees all causation as microphysical, they contend that this leads to a regress: if every measuring device is just more particles, the collapse is never truly initiated. Instead, they propose that macroscopic bodies with substantial form — “thermal substances”, according to Koons — have the ontological integrity needed to cause definite outcomes.

Their metaphysics is explicitly Aristotelian, applying ancient principles to contemporary problems. Their scientific focus is the quantum-classical interface and the collapse of the wavefunction. Theologically, they suggest that a tradition-grounded ontology not only clarifies physics but also preserves the integrity of religiously significant entities — like persons and sacramental elements — as causally real.

Howard Robinson – Middle-Sized Objects, Hylomorphism, and Transubstantiation

Howard Robinson's paper (2025) shifts the focus of the discussion about middle-sized things to the theological domain of sacramental theology, specifically the Catholic doctrine of the Eucharist, in which the objects of bread and wine are said to become the body and blood of Christ. Robinson provides a critical examination of how hylomorphic metaphysics has been used (or, in his view, misused) in Catholic teaching to account for this ontological change, and seeks to offer an alternative interpretation.

He begins by addressing claims made by Robert Koons and David Oderberg that Aristotelian substance metaphysics and the doctrine of hylomorphism are *essential* to making sense of this Catholic doctrine. Robinson considers alternative historical proposals like "transsignification" (associated with Rahner and Schillebeeckx), which emphasise changes in meaning or significance rather than in substance. To evaluate these modern reinterpretations, Robinson insists that liturgical meaning must be grounded in divine authority rather than mere human convention. Official Catholic teaching (e.g. *Mysterium Fidei*, Vatican II) rejects transsignification as insufficient, insisting that there is a real change in the substance of the bread and wine even though the sensory appearances remain.

Robinson accepts the need for a real change in the Eucharistic elements, but he questions the traditional Aristotelian-Thomistic account of it. He proposes instead a teleological account that is more in line with modern thought. In his view, the substance of an object is not an intrinsic metaphysical layer beneath all of its accidents, but rather the role or purpose God has willed it to fulfil. In other words, bread and wine have meaning precisely because of God's design and purpose. He frames this in terms of divine teleology: our metaphysics should be grounded in God's intentions rather than outdated Aristotelian (meta)physics. His view reflects a kind of early modern voluntarism, where God's will determines the nature of things. For Robinson, the identity of middle-sized objects is defined by what they are divinely intended to fulfil, not by any particular arrangement of matter at the subatomic level.

Robinson thus represents a neo-Cartesian alternative to the neo-Aristotelianism of several of the other contributors to this special issue; in particular, of Koons. This reorientation has potential consequences for how one thinks of divine action and creation – for Robinson, God's intentions are causally constitutive in nature. He agrees that something real happens in transubstantiation, but he rejects that the only way to understand it is by importing an outdated medieval physics.

Robert Koons – Staunch Transubstantiation and the Metaphysics of Middle-Sized Things

In the final paper, Robert Koons (2025) responds to Robinson by reaffirming that a traditional hylomorphic account best fits Catholic doctrine whilst defending its relevance for modern physics. Koons argues that Robinson's teleological account of transubstantiation, which grounds sacramental identity solely in divine purpose, cannot sustain the metaphysical distinction between substance and accidents that Catholic doctrine requires. Without a robust substance metaphysics, Koons contends, there is no coherent way to explain how the outward appearances (accidents) of bread and wine remain while their underlying reality (substance) is transformed into the body and blood of Christ. Koons maintains that only a staunch kind of hylomorphism can make sense of this metaphysical possibility. He also highlights the usefulness of hylomorphism for quantum mechanics, appealing to Pruss's theory of "Traveling Forms" and to Simpson's hylomorphic interpretation of Contextual Wavefunction Collapse. In doing so, he ties the metaphysics of the Eucharist to the earlier discussion of quantum theory in this special issue.

Koons's metaphysical commitment in this paper is thus to a staunch and uncompromising hylomorphism. Theologically, he supports the Catholic dogma of transubstantiation. In contrast to Robinson, he insists we need something like Aristotelian categories to explain real change: although God is sovereign, the term "substance" is doing important explanatory work in both our theology and our physics. In his view, our best physics and traditional theology both ultimately converge on the same

picture. The middle-sized matters for science and religion because we live in a hylomorphic world.

Themes and Tensions Across the Papers

The seven papers collected here share the conviction that middle-sized things — at the least, persons, but perhaps other things besides — are not mere aggregates or illusions, but bear causal, ontological and theological significance. Nevertheless, important differences emerge between the contributors. Below, we identify several thematic tensions that run across the issue:

- **Physicalism vs. Hylomorphism:** A core divide concerns whether middle-sized things are ontologically reducible to microphysical entities or whether they are irreducible substances in their own right. On one side stand Halvorson and Qureshi-Hurst, both of whom raise pressing philosophical and theological concerns about physicalism's consequences, yet stop short of endorsing a robust metaphysics. Halvorson proposes a form of semantic pluralism, while Qureshi-Hurst embraces a body-anchored narrative identity that avoids metaphysical substance claims. On the other side, Rooney, Koons, Simpson, Breidenbach, and Sadasivan embrace Aristotelian hylomorphism, arguing that only real, structured substances at the middle level can account for causal efficacy, personal persistence, and sacramental transformation.
- **Pragmatic vs. Metaphysical Approaches to Science:** A further contrast arises between those who treat scientific theories as tools and those who see them as windows into metaphysical reality. Whilst sympathetic to hylomorphism, Drossel and Ellis seem at times to exemplify a pragmatic approach to physics: quantum mechanics is a “toolbox” suited to different contexts, and classical descriptions are used because they work. By contrast, Koons and Simpson insist that explanatory coherence requires metaphysical clarity — for example, about how a wavefunction collapses, or what it means for a substance to persist. Halvorson straddles both positions: while he critiques microphysical reductionism and expresses

dissatisfaction with the more pragmatic elements of CWC theory, he is also cautious about metaphysical speculation. This debate mirrors larger tensions in the philosophy of science between instrumentalist and realist readings of scientific practice.

- **Theological Voluntarism vs Metaphysical Realism:** The divide between theology as interpretation of divine will and theology grounded in metaphysical realism also surfaces in this special issue. Qureshi-Hurst and Robinson both adopt frameworks that emphasise divine purposes — either in the construction of narrative identity (Qureshi-Hurst) or in the sacramental identity of bread and wine (Robinson). In this sense, both incline toward a kind of Cartesian voluntarism, where the identity of a thing is determined by God's will or by subjective narrative, rather than by matter and form. In contrast, Koons, Rooney, and others reject this implicit voluntarism, insisting that theology needs to be anchored in a real, intelligible metaphysics — one in which substances exist independently of divine fiat or psychological construction.
- **Quantum Mechanics as a Metaphysical Battleground:** Quantum theory is also clearly a battleground for many of the contributors. Halvorson frames the debate around whether quantum theory undermines belief in real persons and objects. Koons, Simpson, Drossel, Ellis, Breidenbach and Sadasivan, link the fate of middle-sized objects to how the measurement problem in quantum physics is handled. Breidenbach and Sadasivan appeal to substance metaphysics to explain measurement. Qureshi-Hurst favours the fragmented world of the Everettian, and wrestled with the implications of Everettian branching for personal identity. Even Robinson, though focused on sacramental theology, suggests that contemporary physics presents a challenge to traditional Aristotelian categories, whilst Koons argues precisely the opposite. That quantum theory should loom so large in all of these papers reflects its ongoing role as a philosophical stress test for metaphysics, and its importance for any theology that wishes to be conversant with modern science.

- **Middle-Sized Agency and Causation:** All seven essays share a commitment — whether explicit or implicit — to middle-sized agency of some kind. Breidenbach and Sadasivan's substance causation model, as well as Simpson's interpretation of CWC theory, both insist that macroscopic systems like detectors or organisms play active causal roles. Rooney argues that animals, being hylomorphic wholes, are the proper subjects of personal identity and moral agency. Qureshi-Hurst's narrative-persons are not epiphenomenal, but actors within embodied, temporally extended stories. Even in sacramental contexts, Koons and Robinson are concerned with how intentional agents — the priest, in *persona Christi* — confer or constitute reality through action. In different metaphysical idioms, these papers affirm that agency is not an illusion of scale, but an integral feature of the world.

Taken together, the contributions to this issue offer a richly layered map of contemporary metaphysical inquiry at the intersection of science and religion. The disagreements are real — about matter and form, substance and causation, voluntarism and the limits of physics — but so too is the shared conviction that the middle-sized realm is not a cognitive illusion or pragmatic convenience, but a realm of reality which holds deep significance to both science and religion.

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