**CHRIST, CREATION, AND THE WORLD OF SCIENCE: AGAINST PARADOX**

**by**

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Abstract

Both the incarnation and quantum theory have been deemed paradoxical. Yet in investigating the paradoxicality of both issues, there is an implicit assumption that it is possible to divide the world into discrete binary categories such that something is either *A* or *not-A*. Whilst such Boolean logic has served the progression of modern science well it rests on the idea that it is only possible to make unambiguous statements if one has already suppressed and/or ignored the apparently “irrelevant” features. This particularisation of the world is not given *a priori* as an ontological “brute fact” but arises from our context dependent categorisation. In this thesis I argue that the metaphysical “paradox” of the incarnation is caused by an implicit adherence to binary logic, misrepresented as ontological fact. In contrast to this, the holistic ontologies provided by Michael Esfeld and Hans Primas’ interpretations of quantum theory offer a metaphysics more suited to accounting for the “fuzziness” of reality. In doing so they provide the theologian with two alternative accounts of reality, which are not only in line with current scientific understanding of the world but that offer opportunity to remove the charge of “unreasonableness” from one of the central Christian doctrines – Christ was fully God and fully human. This thesis examines the role that radically holistic, scientifically informed, metaphysics may have on our understanding of the connection and interaction between the divine and human “substances” in Christ. *How* the incarnation occurred rightly remains a mystery, but holism offers chance to reconsider the metaphysical claims associated with our interpretation of Chalcedon.

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# Introduction

Christian theology, […] cannot be content to deal only or even primarily with manifestations and functions, but must concern itself with ontology – that is, with the question of the correspondence between the expression of a thing and its reality. (Woodfin, 1972, p. 137)

The task of Christian theology must not only reconcile our understanding of God with our experience of the world, but also with the historical and theological person of Christ and His relationship with God[[1]](#footnote-2). As theologians we can no less come to study God without drawing on the revelation through Christ than we can come to study Christ without reflecting on our pre-existing understanding of the nature of God. The complex interrelation between our understanding of the Triune God and the incarnation as an act of revelation means that there isn’t a universal definitive starting point from which we are able to develop incarnational doctrine. Not only is there no clear starting point but ‘Christian doctrine *is always in the making*, in the process of formation’ (Wiles, 2011, p. 1 emphasis added). To claim that doctrine is in a process of continual change requires the Christian theologian to critically examine and develop their *understanding* of the central truths of the doctrines considering our changing understanding of the world and revelation.

Although for Maurice Wiles Christian doctrine may be in a continual process of change, this doesn’t refer to the content but the interpretation of the doctrine. Despite the continual “formation”, the doctrine of the incarnation has persistently been hailed as paradoxical – a doctrine that challenges the coherence and rigour of the Christian faith. As our scientific understanding of the world has progressed to ever more reductionist and materialist accounts of reality, the charge of paradoxicality has become increasingly pressing. However, in contemporary (quantum) scientific metaphysics the theologian and scientist both find themselves faced with a metaphysical picture of the world that is radically different to the wholly deterministic mechanical picture provided by Newton. Responding to the philosophical and metaphysical works of two leading scientists, Hans Primas and Michael Esfeld, this thesis will examine the extent to which this “new metaphysics” can provide a response to the charge of paradoxicality in the incarnation.

This is not to claim that reduction to quantum accounts of reality fully explain the nature of the macroworld. Rather, the issue both Hans Primas and Michael Esfeld grapple with, in the development of their holistic ontologies, is whether our accounting of the world into discrete, independently existent “parts” (i.e., parts that can exist in isolation as well as being mind-independent) is a matter of ontology, epistemology, or mere convenience. In chapter 4 I examine the role of primitive ontology in negotiating our understanding of the world from manifest (everyday) perception to the formalism of our scientific theories. I will argue that a similar mediation occurs in moving from manifest to divine or “ultimate” accounts of the world. Both instances require an ontological “starting point” or set of presuppositions, and a recognition that we may not be able to fully account for or access the world “as it is”. In neither case does this mean that one is dealing only in metaphor/analogy. The aim is to understand the ontological (metaphysical) commitments, whilst recognising where our interpretation and/or application starts to move away from the strict confines of what it is possible for our physical explanations (i.e., of physics) of the world to accurately describe.

The development of Christology can be understood as having two key directions. The first considers the relevance and expression of Christology today, in other words how can we express our knowledge of the person and substance of Christ in language that is accessible through our contemporary *epistemology*. The second requires a critical understanding of the *substance* of our belief, to investigate what is meant by credal declarations and interrogate the underlying theological and ontological assumptions that frame, and in some instances constrain our understanding. This distinction between exploration of the nature or person of Christ (his being) and the works and action of Christ in the world (his doing) highlight two distinct methods of Christological enquiry: ‘Functional Christology’ that focuses on the actions of Christ past and present and ‘Ontological Christology’ that focuses on the substance and being of Christ[[2]](#footnote-3) [[3]](#footnote-4). John Macquarrie argues that there has historically been a focus on understanding ‘Christianity in primarily practical terms and to avoid the more strictly intellectual and theological issues’ (Macquarrie, 1990, p. 7). However, there is an increasing move in contemporary work to acknowledge that our understanding of Christs’ being and doing are deeply bound up in our metaphysical and ontological understanding of the nature of the world. This thesis focuses on an “ontological” approach to examining the implications of our scientific metaphysics for Christology. The development of a coherent “ontological Christology” that can account for God becoming incarnate[[4]](#footnote-5) requires a critical approach to our metaphysical presuppositions and engagement with wider discussions on ontology and substance: ‘[C]harity has compelled the Christian community to engage in some serious metaphysics […] Good News indeed! But difficult philosophically’ (Rogers, 2010, p. 95).

## The Role of Chalcedon in Incarnational Metaphysics

In defending the early faith against heresy the councils and creeds were designed to establish the boundaries of orthodoxy but perhaps more pertinently to interpret and define the exact nature of the central claims of the doctrine (Cf. Anderson, 2007, chaps 2–3). Although the Niceno-Constantinopolitan creed successfully established the full divinity of Christ, it nevertheless remains a question whether it fell short in establishing the positive nature of the relationship between Christ’s divinity and humanity (Anderson, 2007, chap. 3). The associated debate stemming from the Nicene Creed and leading to Chalcedon gave rise to the development of two distinct Christologies: Word-flesh Christology and Word-man Christology. Word-flesh Christology (associated with the Alexandrian school) focused on preserving the unity of Christ’s personhood – if this meant it was necessary to play down some of the “unseemly” ‘biological rigmarole of incarnation’ (Rogers, 2010, p. 99) then so be it. However, for the Antiochene school (Word-man Christology) the central concern was to ensure the redemption of mankind through Christ’s full humanity – this focus raised other ontological/anthropological questions about what it means to be human. Although the Word-man Christology sought to manage the experiences of Christ it did so at the risk of dividing Christ in to two distinct wills or persons. The Chalcedon definition was designed to find common ground between these two schools and bring reconciliation to an orthodox position that could be agreed upon.

Despite the success of Chalcedon in finding common ground ‘it has been criticised for failing to solve (or worse, ignoring altogether) the knotty metaphysical problems’ (Anderson, 2007, p. 76) raised by harmonising the two schools in to a single position. However, Chalcedon was never intended to be read as a detailed metaphysical account of the incarnation. It should be understood as having ‘laid down the ground rules for future Christological theorizing’ (Anderson, 2007, p. 76). Whether one chooses to understand Chalcedon as a success, or not, there is no doubt that any interpretation of the creeds on incarnation requires us to make (perhaps irreconcilable) metaphysical claims about the nature of “God” and “humanity”. It is these potentially irreconcilable claims about what it is to *be* divine and human that gives rise to the claim that the incarnation is paradoxical. The central focus of this thesis is an examination of the alleged paradoxicality of the incarnation considering current scientific metaphysics. The claim isn’t that Chalcedon needs reimagining, but that a revision of the assumed metaphysics we place on to the definition can reduce the paradoxicality to the appearance of contradiction.

Whilst recognising that the definition of Christ arrived at within the Chalcedon account is the result of the need to navigate/unite the Alexandrian and Antiochene schools of thought, it is being used within this thesis due to its place (as noted by Anderson) in setting out the “ground rules” for Christological discussion. Further the accounting of distinction in unity as set out in Chalcedon provides an equivalent mereological challenge to that faced in holistic ontologies:

Jesus Christ one and the same Son […] truly God and truly man […]to be acknowledged in two natures, without confusion, without change, without division, without separation; the distinction of natures being in no way abolished because of the union, but rather the characteristic property of each nature being preserved[…] (Chalcedon statement of faith cited in Stevenson, 1995, pp. 352–353)

Irrespective of one’s views on the “content” of the ‘two natures’ the creed provides a clear declaration that “divinity” and “humanity” as they presented in Christ had their discrete natures (sets of properties) maintained. This points to a Boolean (sometimes termed binary[[5]](#footnote-6)) approach to categorisation and/or logic that means distinction is possible. The question then contained within the latter part of the Chalcedon definition cited above, is *how* is it possible to have distinction-in-unity? This is something examined in detail in relation to holistic ontologies in general and by Hans Primas and Michael Esfeld specifically. Therefore, the metaphysical question of the “paradox” of distinction-in-unity (or preservation of characteristic properties) is one that is common across both scientific holism and theological ontology.

## A Brief Historical Sketch of The Two Natures of Christ

In what follows I will follow Katherin Rogers’ (2010) model with a “quick sketch” of Christian thought on the categories “God” and “human”. For much of the conversation there has been a strong anthropological bias to discussion, where “human” has been examined in terms of mundane “personhood”. Assumptions around what it means to be human that focus on embodiment, souls, and causal interaction provide a microcosm of the thornier metaphysical questions of the incarnation. In the incarnation, issues that seem problematic for mundane beings (such as the emergence of mind from matter) take on new significance and challenge when applied (analogously or not) to divine beings (if the immaterial emerges from complex matter how can God precede the material world?). There is no question that our understanding of what it means for God to be made incarnate is fundamentally shaped by our ontological commitments regarding the nature of the world and human personhood. These have in turn been shaped by our scientific understanding of the world and our “enlightened” or “disenchanted” move away from substance dualism. If our understanding of what it means to be human has been fundamentally changed by our developing (meta)physical commitments then, as Christian theologians, we are called to critically examine how this impacts our understanding of the central truths of our doctrine and ensure that our Christology is still “reasonable”.

It is crucial to highlight that the question or definition of what it is to *be* a person does not form the focus of this thesis. Rather the focus rests on the kinds of “substances” that are considered to be involved in the constitution of a mundane person, and how shifting our ontological assumptions may start to remove the appearance of paradox. Such paradoxicality is rooted in assumed distinctions between the fundamentally “immaterial substance” of the divine and the at least partially “material substance”[[6]](#footnote-7) of humanity. Whilst related mereological issues will be examined (e.g., in relation to the constitutional account of Christ) the discussion is situated within the framework of issues related to substance rather than focusing on the “parts” required for personhood (e.g., the Christological discussion remains neutral on the necessity/existence of human souls). This is not to ignore the importance of such issues but instead allows the discussion to progress without assuming the metaphysical baggage of a particular account of personhood. This focus means the core of the thesis remains centred on the potential implications of a metaphysical shift to holism, over a change in the definition of personhood. However, whilst this limits the scope of the argument it does so because, as they currently stand, the metaphysical commitments set out by Primas and Esfeld require greater clarification before they can be brought into dialogue with detailed accounts of personhood. As noted in the conclusion, it is hoped that this thesis serves to start the conversation by bringing the metaphysics into dialogue with theology, but it certainly doesn’t exhaust or conclude the conversation[[7]](#footnote-8). Hence, I would welcome the application of the findings and discussions set out in chapter 6 and 7 to specific accounts of personhood (both mundane and divine), but to undertake that move within this thesis would extend beyond the bounds of what is possible in a single piece of work. As noted in §3.5.2 any definition of human or divine brings with it its own metaphysical assumptions that impact on where one understands the metaphysical paradox residing, and indeed the potential implications of the holistic ontologies discussed here. It is for these reasons that the following sketch, and the predominant theme within the thesis is structured around the characteristic properties of each nature.

Before undertaking a historical “sketch” of the two natures it is necessary for a preliminary note on terminology. As this thesis is a work in systematic theology (as opposed to philosophical theology) unless otherwise stated the God under discussion will be the God of “classical Christian theism”, who is active, personal and “through Whom all things were made”. In the initial instance it will be assumed that God exhibits the omni-properties, and the question of divine simplicity will remain open. All the scholars discussed in this section adhered to at least this minimal definition of God; however, their metaphysics is shaped by their approaches to personhood.

Those in attendance at Chalcedon would have defined human nature as something other than a single human being. A human *being* was composed of a material body and immaterial soul, whereas a human *nature* was that which *became* individuated in a human being. The existence, unity, and kinds of parts assumed to exist in Christ both then and now is heavily dependent one’s wider mereological position on persons, which itself depends on one’s stance on the nature of wholes, parts, and substances. In what follows I will offer a brief survey of how some different approaches to mereology and/or human nature have impacted on our understanding of Christology.

### Mereology and Christology

Strictly speaking mereology is the relationship(s) of the parts to the whole, and the relationships between the parts in a whole (cf. Varzi, 2019). For medieval theology, the “parts” involved in Christological discussion are often extended to include discussion of the relationships between substance and accidents too. In doing so they borrow from Aristotle’s understanding of accidents as properties that may or may not belong to a substance (the thing itself) without affecting its essence. When viewed in relation to Christology this understanding of substance-accident sees the human nature which is united with the second person of the Trinity as a (kind of) substance. Divine and human natures are entirely distinct, but although united within a single hypostasis (subsistent being) the two *natures* are not themselves combined – this implies an ontological distinction between *nature* and hypostasis which the medievals ‘generally understood […] to be consistent with the assertion that the human nature is a substance’ (Cross, 2002, p. 2).

Unless one assumes that a category mistake has been made and Chalcedon refers to little more than different ways of talking about things (an anti-realist position), then it is necessary to adopt a level of realism about Chalcedon meaning it is making ontological claims about the nature of reality. ‘[T]he way we spell out the ontological content will be in part driven by philosophical analyses of reality’ (Cross, 2002, p. 3). Even though a detailed exploration of the medieval approach to Chalcedon lies outside the scope of this thesis, it is useful to note two realist approaches to Chalcedon and their relationship to the medieval position (according to Richard Cross)[[8]](#footnote-9). The usefulness stems from the crucial role mereology has to play in the analysis of the implications of holistic ontology (§4.3, and chapters 6 and 7).

A realist interpretation of Chalcedon requires an ontological viewpoint that would appear to place natures and hypostases in different categories. This is because the creed states that (a) two natures are united in one hypostasis and (b) ‘something like the claim that the two natures are mixed together into one new nature’ (Cross, 2002, p. 2). The fact that both positions are true implies an ontological distinction between the kinds of things that hypostases and natures are. This “two-category” approach maintains Chalcedon makes ontological (realist) rather than merely linguistic (anti-realist) claims about the person of Christ. There are two major “two-category” strategies for understanding Chalcedon. The first focuses the categories on individuals and universals, whereas the second highlights distinctions between objects and properties.

The first (universalist) method adopts an Aristotelean approach to understanding human *nature* as a universal that can be exemplified by a *hypostasis*. On this approach persons are *natures* of a particular kind, and therefore Christ’s human nature is an ‘individual in the genus of substance’ (Cross, 2002, p. 6). As the divine person possesses the properties necessary for “human-kind” in the same way as you or me, Christ is to be understood as an individual substance that exemplifies human nature (as a universal). The second method, which Cross terms Lockean (2002, p. 5), denies the existence of real universals and instead places an emphasis on the irreducible distinction between “things” and “properties”. Under this model, both things and properties are individuals however they are distinguishable in relation their level of dependence. Things (or substances) are the subject of *dependent properties* that cannot exist without the substance existing. It is substances, not properties, which have independent existence even though both are to be understood as individuals that are ontologically fundamental[[9]](#footnote-10). Therefore, Christ is to be understood as an individual substance that has a necessarily dependent “human nature” (constituted by a particular set of properties).

Both the universalist and Lockean approaches understand the world as composed of two basic categories of reality. Peter Geach (1980) argues the alternative, a single category reality, is more problematic because if “humanity” refers to a concrete individual composed of a body and soul and this is carried over in to our Christological discussion, it leads to little more than ‘thinly disguised Nestorianism’ (Cross, 2002, p. 5). Despite the potential risks, Cross argues that many of the key Medieval theologians adopt a reductionist perspective (over a one- or two-category ontology) in which everything can be reduced to either things (substances) or properties, leading to persons being understood as natures of *a particular kind*, a similar parallel could be made to contemporary strict reductionism.

For example, for Duns Scotus, human nature is a substance (or accident-bearer). This means that, Christ’s human nature is a substance that supports accidental properties but is not an “*ultimate substance”* (the Divine which bears all properties including knowledge). Whilst the common nature that is humanness is expressed in part in each instantiation (in a person) there is a sense in which no particular exemplifies the “whole” – no one person fully exemplifies what it is to be human. The whole has “being” by virtue of its union with individuating haecceities (or thisnesses). Thus the common nature instantiated by each individual can *only* exist when instantiated, yet each *instantiated* being is formed of two “parts”: ‘its own intrinsic being, making it not nothing, and a being as instantiated’ (Cross, 2002, p. 14). This union of attributes in a “common nature” (that is real yet lacks numerical identity) is more than the sum of the aggregate parts, as the sum does not, and cannot ‘exhibit all of the features of that existential whole’ (Cross, 2002, pp. 14–15). There are clear links here to the language that Esfeld uses to describe his top-down account of holism. The challenges and opportunities this provides for the theologian will be examined in chapters 6 and 7.

Albeit incomplete, the above highlights the kinds of foundational discussions about the realist ontological content of Chalcedon that were being had by medieval theologians. The understanding of what is being unified, adopted, in-dwelling etc. turns on questions of how we are counting the kinds of things that exist and their relationships to and individuation from (possibly) each other. What cannot be denied is that in the medieval Christological debate matters of theology are inextricably bound up in matters of philosophy. Thus, for the purpose of *this thesis* the question of Chalcedon and the personhood of Christ are being discussed at a mereological rather than anthropological level.

## The Role of Metaphysics in Theology

In *Incarnation: Metaphysical Issues* (2009b) Robin Le Poidevin raises the question of the relationship between Chalcedon and metaphysics. As James Anderson cautioned, it is important not to consider Chalcedon as having been written as a metaphysical treatise, despite also needing to recognise that it *does* raise matters of metaphysical concern in its discussion of natures and persons. The authors of Chalcedon would have had particular metaphysical commitments in mind when setting down the definition, yet should this inferred fifth century metaphysics be used to inform our current discussion of the metaphysics of the incarnation? To reinterpret in light of our contemporary metaphysics argues Le Poidevin is to ‘risk distorting that content’ (2009b, p. 706), but to view the statement *only* in light of our contemporary metaphysics is to deny the continued relevance of Chalcedon to our contemporary theological discussion. He notes:

[T]o insist, […] that contemporary metaphysics is bound to provide an anachronistic slant […] is to assume that the statement itself is an exercise in metaphysics, which, arguably, it is not. It is certainly ontological, in that it makes assertions about what is real, but is it theoretically loaded? (Le Poidevin, 2009b, p. 706)

Peter Van Inwagen (1995, pp. 225–226) and Ian Barbour (1990, p. 32,36) both argue that the creeds play a similar role in our theology to theories in scientific thinking – they offer an interpreted account or explanation of the data (scriptural evidence). For Le Poidevin (2009b, p. 706) the creeds form an intermediate level between the “raw” biblical data[[10]](#footnote-11) and the theological and philosophical models that see us engage with metaphysics in our interpretation of the creeds. Even though I find Le Poidevin’s hierarchy a useful analytic tool, it fails to recognise that even the initial assumption that the biblical data refers to a realist God, is already to engage in metaphysics. In the same way the scientists’ assumption that conducting an experiment will tell them something about the nature of the world as it is (and not simply their perception of it) they engage, implicitly, in the adoption of a realist metaphysical position.

Whether one holds that metaphysics comes in to play only in the final analysis or within the writing of the Creeds, or any point in between, there is no question that metaphysics matters for theology[[11]](#footnote-12). But one should not be deciding which metaphysics to adopt on theological grounds, for Cross the exception arises when/if the implications of a certain metaphysical or ontological position has the potential to lead to heterodox theological consequences (Cross, 2002, p. 11 see also fn 30). Although I agree with Cross that we should not drive our metaphysics on the grounds of our theological commitments[[12]](#footnote-13), I side with Zachary Hayes, Rogers, and Macquarrie in holding that theology *does* require rigorous engagement with *theological* metaphysics, the implications of using purely mundane metaphysics for theology is exemplified in the Christological discussion, where what works for human persons may be problematic for divine persons.

The question of how the apparent paradox of Christ as fully human and fully divine can be reconciled requires engagement with issues of metaphysics. This is true even if one simply wishes to argue that the claim merely appears illogical, and that the “paradox” is only epistemic dissonance. The claim is only comprehensible on the grounds that we have certain pre-existent metaphysical commitments to the kinds of things or substances that can be understood as divine or human. Even Basinger’s claim that paradoxes may be understood as a “verbal puzzles” (1987, p. 205) is not to say that incarnation is solely a logical or linguistic challenge, because the nature of the challenge is based in our expectations of the perceived referent of the paradoxical content. For example, if I was to claim that Christ is both “*offety*” and “*passivels*”[[13]](#footnote-14) whilst you may have questions about the meaning of the words, there wouldn’t be an immediate claim that this was a paradoxical statement, because there is no metaphysical content to the referent. It appears one can only raise a valid claim of paradox once there is adequate understanding of the terms/statements involved that it is possible to claim that they are contradictory[[14]](#footnote-15). Our concepts of what it means to be human or divine, of the kinds of entities and/or substances that can designated as divine/human are *metaphysical* commitments (not purely linguistic or epistemic). This echoes Cross’ claim that many of the “traditional” difficulties associated with the incarnation (and the Chalcedon definition in particular) can be viewed as resulting from ‘the anomalous metaphysical position of an assumed substantial nature’ (Cross, 2002, p. 17).

This is not to require that our theological understanding of Christology *should* be directly underpinned (or led) by philosophical considerations; rather, it highlights that our understanding of the nature of reality (ontology), the composition of objects (mereology), and human “nature” have a direct influence on our comprehension of the meaning behind Chalcedon. As a statement of what is believed by the church about the incarnation Chalcedon is ‘a relatively transparent articulation of a theological ideal’ (Le Poidevin, 2009b, p. 207) and departing from its claim of full divinity and humanity creates its own theological problems. Yet there is equally no doubt that any realist interpretation appears to push the coherence of our metaphysics to its limits, even if one wishes to maintain that the metaphysics doesn’t enter until we start to *interpret* Chalcedon.

## The Role of Scientific Metaphysics in Theology

The role of metaphysics in theology, in general, is a necessary part of critically engaging with the implications of central doctrines, such as the incarnation, for how we are to understand the world. But even if we accept metaphysics should have a role in our theology, a further question is whether that metaphysics should be scientifically informed (setting aside the tangential question of whether science itself actively engages in metaphysics). John W. Cooper’s *Scripture and Philosophy* (2015) provides an interesting example of some of the interactions between theology and scientific metaphysics. In his account he examines three key approaches to the body-soul problem:

1. Historic Christian dualism(-in-unity)
2. Modern theistic naturalist monism
3. Historic Christian monism

Cooper focuses on the relevance of these positions to defend concepts of the soul and free will. However, the commentary he provides around these positions speaks to why the integration of scientific metaphysics in our theological discussion is relevant.

The difficulties of mind-body dualism are mirrored in accounts of the incarnation that focus on the Son of God as something that is “relevantly like” a soul becoming “embodied” in a human person (Cf. Leftow, 2011, p. 21). This view (of souls and divine beings) leads to a range of well-known problems including interaction and causality and is incompatible with contemporary materialist/physicalist approaches in the natural sciences. A “naturalist” metaphysics maintains anything that is perceived as extra-material is now or will eventually be reduced to physical phenomena. The perception that such properties are “more than” the physical is simply appearance based in ignorance. Although this may not seem an obvious endorsement for the interaction of scientific metaphysics and theology, the apparent incompatibility between metaphysical positions highlights *why* the interaction is *important*. The concern is that without engagement with scientific metaphysics Christian metaphysical accounts appear increasingly detached from contemporary understanding of the world.

In response to this criticism Cooper identifies a move to adopt a monistic metaphysics. At a metaphysical (rather than exegetical) level, both contemporary and historic monistic accounts share the same challenges. To highlight the scientific[[15]](#footnote-16) interaction they will be discussed together. Although monistic views are less prevalent, Cooper argues that a monistic (materialist) view is preferable because of its perceived proximity to the “correct” view of science – ‘as scientific research and education progress. They wish to show that the Christian faith is not tied to an outdated philosophy and science’ (Cooper, 2015, p. 40)[[16]](#footnote-17). Monism provides a closer alignment to a classical or physicalist understanding of the world. In addressing questions of the paradoxicality of the incarnation, it is necessary to address the relationship(s) between the “material” mundane world and an immaterial God. The Christian monist is not positing that God is “out there” in a material body, therefore the incarnation requires that ‘God [is] an immaterial being, [who] resides in and causally acts upon a human with a material body’ (Goetz, 2015, p. 135). The materialist who rejects substance dualism ‘because the concept of causal interaction of an immaterial soul on a material body faces insurmountable philosophical and scientific objections, […] would be even more hard pressed not to reject the idea [metaphysical possibility] of the incarnation itself for the same reason or reasons’ (Goetz, 2015, p. 135).

If we understand God as a genuine feature of reality and recognise that the world the Son of God became incarnate in is the world examined by the natural sciences, then the question of how science understands the fundamental nature of reality becomes relevant. As McGrath notes, if the natural world has status as God’s creation, then given the natural sciences engage most directly with creation they ‘are of direct relevance to the working methods and assumptions of a responsible Christian theology’ (McGrath, 2002, p. 245). The relevance arises not because to do otherwise diminishes faith’s claims considering science, but because God incarnate became subject to the same “materiality” (however that is understood) as that described by science[[17]](#footnote-18).

Chalcedon means that Christian theology must engage in a meaningful way with questions of metaphysics and ontology and thereby ensure that it does not limit itself to simply dealing ‘only or even primarily with manifestations and functions’ (Woodfin, 1972, p. 137). If Christology fails to engage with questions of metaphysics, it also fails to ensure that it is tackling the correspondence between our expression (of faith or reality) and reality itself. Thus the engagement of theology with scientific metaphysics becomes of central importance in ensuring that ‘metaphysical issues and the believer’s conviction *regarding the nature of divine reality are at least analogically comparable*’ (Woodfin, 1972, p. 138 emphasis added). In *Space, Time, and the Incarnation* Thomas F. Torrance argues that engagement with metaphysics is necessary to even *pose* questions as without ontological congruence between reality and experience our theological discourse is meaningless (1997, pp. 53–54).

## Method and Scope of the Thesis

### Statement of the Thesis

In light of the foregoing discussion of the interaction of metaphysics and theology for the development of a coherent ontological Christology, and noting the apparent dissonance between theological and scientific metaphysics, I will challenge the claim that the incarnation is a metaphysical paradox on the grounds of the following thesis:

Thesis: *One of the foundations for the claim of metaphysical incarnational paradox rests in adherence to an ontological commitment (at some level) to a duality of spirit and matter and its incompatibility with scientific metaphysics. Some contemporary (quantum holistic) interpretations of scientific metaphysics challenge the assumption of a fundamental ontological division of reality. Recognition of a scientifically valid unified ontology provides the grounds to positively reconceptualise our understanding of the kinds of “natures” or substances involved in the incarnation.* *The hypothesis is that reconceptualization of the “parts” involved in the incarnation will reduce/remove the appearance of metaphysical paradox.*

### Comment on the Thesis

The privileging of modern scientific metaphysics, combined with an orthodox interpretation of Chalcedon have created an environment in which belief in the incarnation only seems tenable if one is willing to concede that Christianity is an “irrational” faith. This runs contrary to the commitment to faith as a “reasonable” enterprise seen in Locke’s *Essay*:

For since no evidence of our Faculties, by which we can receive such *Revelations*, can exceed, if equal, the certainty of our intuitive Knowledge, we can never receive for a Truth any thing, this is directly contrary to our clear and distinct knowledge (Locke, 1979, bks 4, xviii, 5 original emphasis and capitalisation)

To claim that contrary revelations which go against our reason are “true” (even under the caveat of divine revelation) would be to destroy all knowledge:

Because this would be to subvert the Principles, and Foundations of all Knowledge, Evidence and Assent whatsoever: And there would be left no difference between Truth and Falsehood, no measures of Credible and Incredible in the World. (Locke, 1979, bks 4, xviii, 5 original capitalisation)

This concern over the rationality of belief is addressed in relation to Locke by Thomas Duddy (1999) and with specific concern of the incarnation in James Anderson’s *Paradox in Christian Theology* (2007). Whilst it may be argued that faith ‘cannot be known [by reason] and so must simply be believed by faith’ (Snyder, 1986, p. 199) there is a difference between accepting the mystery of that which we cannot know/understand and that which seems to go “beyond” reason. The incoherence of accepting doctrine that is genuinely paradoxical is made even more absurd when, as can be argued in the case of the incarnation, it is *our* assumptions that are creating the paradox. These assumptions can be challenged by some metaphysical interpretations of quantum theory and will be examined in chapters 3 to 7.

To investigate the relationship between doctrinal theology and scientific metaphysics the paradoxicality will be addressed on two fronts – the first examines the notion and implications of “paradox” for our theological discussion (including the relationship between paradox and mystery). The second investigates the “root” of the issue – examining two scientific ontologies that provide alternative metaphysics to the (scientific) physicalism versus (theological) dualism “conflict” that seems to fuel the claim of paradox[[18]](#footnote-19). This is not to deny that there are a myriad of other theological and scientific ontologies that may not lead to the appearance of paradox, however, as shown by Cooper in §1.4 there is a not insubstantial drive to align the “coherence” of theology with the “scientific image”. Both Primas and Esfeld, as scientists and Niels Gregersen as a theologian, challenge the idea of a traditional “materialist” scientific account of the world. However, the slight caricature of “physicalism" versus “dualism” allows the conversation about the root and legitimacy of the claim that the incarnation was/is a metaphysical paradox to get underway (although this will be addressed more fully in §2.1.2).

Much of the current discussion of the incarnation[[19]](#footnote-20) – outside pan(en)theistic[[20]](#footnote-21) approaches – seeks to address the kinds of parts and their relations in the person of Jesus (Crisp, 2011; Flint, 2011; Leftow, 2011; e.g., Chan, 2015; Peoples, 2015; Quitterer, 2015) or how we are to understand the nature of the union (e.g., Daley, 2004; Stump, 2004). There are obviously much broader questions raised by the incarnation outside the metaphysical issues (for example Niels Henrick Gregersen’s (2015) edited volume on whether the incarnation was “deeper” than simply the person of Jesus). However, when it comes to the personhood of Christ the questions have remained broadly the same for centuries – how can we understand the meaningful union of the two natures in Christ? How is it possible for something infinite and divine to become contained within a limited finite being? At their heart both groups of questions are wrestling with the assumption that the incarnation requires the reconciliation of two very different kinds of thing without reduction, conflation, or heresy. This thesis focuses on the first question of the meaningful union of natures in Christ.

Within this thesis I challenge the presupposition of this dialogue (i.e., that the incarnation necessitates the reconciliation of two very different kinds of *substance*[[21]](#footnote-22)). I argue that it is the assumption of two contradictory substances (for whatever reason) that leads to, at the very least, the appearance of metaphysical paradox. If an ontological account can be provided that is both harmonious with the findings of science and provides capacity for the incarnation to be a change of state rather than a change of substance, then there is potential to remove the metaphysical paradox (theological mystery regarding the mechanism etc. can be retained). Although I will focus on the metaphysics of Hans Primas and Michael Esfeld in the development of an holistic account of the incarnation, this will necessarily include contact and comparison with other theological and philosophical accounts of metaphysics. Before discussing the scope of the thesis in more breadth it is necessary to briefly address the place of “scientific” metaphysics and/or natural theology for our incarnational discussion.

This thesis is grounded in the premise that the metaphysics or ontologies discussed by Primas and Esfeld, based in their scientific examination of the nature of reality, can be meaningfully relevant to the theological and metaphysical questions raised by a commitment to the full humanity and divinity of Christ. Whilst there are many ways to examine/explain the nature of Christ’s being whilst incarnate, the fact that Christ was incarnate in the natural world appears to point to a role for our understanding of the natural world in conceptualising the nature of Christ. The interaction between our understanding of the natural world and theological questions has been referred to as either “natural theology” or a “theology of nature”. McGrath and Willem B. Drees provide critical engagement with what McGrath terms the ‘purpose and place of natural theology’ (Cf. McGrath, 2001, chap. 6)

Traditionally natural theology has been used to provide “proof” for the existence of God, however using “nature” to provide the evidential grounding has been heavily criticised by scholars because it undermines the authority of the bible (Barth), mistakenly assumes that belief in God requires an external evidential basis rather than being a basic belief (Pannenberg), or because it is being used incorrectly to “prove” God rather than reinforcing ‘the plausibility of an already existing belief’ (William P. Alston’s thought described in McGrath, 2001, p. 267). However, McGrath’s discussion of the interaction between natural and scientific theology provides a useful framework to discuss why scientifically informed holistic ontologies may provide a useful contribution to our understanding of the incarnation (introduced here but discussed in greater depth in §1.5.3D). At its centre is the conviction that nature is not providing “proof” rather we should recognise that ‘natural theology is to be […] conducted *within* the scope of revealed knowledge about God’ (McGrath, 2001, p. 295 original emphasis).

Thus, in what follows I will briefly outline some of the discussion found in McGrath, before turning to selected work from Drees (2003) to provide a contextual overview of the reason for seeking theological enlightenment in scientific metaphysics. Some of the issues raised, in this necessarily brief “note” are addressed more fully in relation to the role of holistic ontology in Christological discussion (§1.5.3D) and challenges to the direction and scope of this thesis (§1.5.3E).

In *A Scientific Theology: Nature* McGrath devoted an entire chapter to the nature and place of natural theology, including identifying its dichotomous roles as ‘a weapon by which the institution of the church may be undermined’ (McGrath, 2001, p. 246) and ‘as the basis for a critical theological engagement with both the world and the sciences which seek to give an account of it’ (2001, p. 296).

McGrath identifies that the natural theologies of scholars such as Aquinas, Augustine and Calvin can be understood as seeking to make sense of the natural world and the place of reason in Christian life. However, he argues that natural theology has taken on a different meaning (during and following the enlightenment) in which greater focus is placed on the natural world as ‘confirmation of the Christian revelation’ (2001, p. 242). This approach to theology was originally termed “physico-theology” and proponents used it to defend ‘the intellectual coherence of the Christian faith’ (2001, p. 243) particularly in the face of the Newtonian worldview that risked removing the “need” for God through an increasingly mechanised model of nature. Amongst other drivers to this shift in the meaning of “natural theology” McGrath notes:

The continuing success of the mechanical world-view prompted many to wish to gain a deeper knowledge of God through the intricacies of creation. The invisible God could be studied through God’s visible works (McGrath, 2001, p. 244).

This stronger claim which made use of the physics of the time to produce a socially motivated account of and for natural theology, is to be distinguished from the version proposed by Aquinas et. al. To understand the different approaches to natural theology it is necessary to understand what is meant by “nature” in the case of natural theology. The view of nature as the ‘world of star-studded night skies, plants and animals, landscapes and sunsets’ (McGrath, 2001, p. 249) in the likes of Aquinas and Augustine, expands with the enlightenment to include human rationality – ‘thus allowing humanity to gain at least some access to a knowledge of God through creation’ (2001, p. 253). More damaging is the extension of rationality to include human culture as the foundation of theology – with culture ‘being in some manner reflective of the divine will or character’ moving from biology to sociology where ‘the moral and spiritual evolution of humanity [is seen] as theologically luminous’ (McGrath, 2001, p. 255).

Barth argues that natural theology is untheological as it moves focus away from a biblically grounded faith. However, this challenge is contested by both McGrath and T. F. Torrance. McGrath identifies that the concept of coming to know God (in part) through God’s works can be seen in the Old Testament through both the Wisdom literature and the Psalms. Further Paul’s address to the Greeks at Athens (Acts 17) ‘presupposes some form of natural theology’ (McGrath, 2001, p. 261). This is echoed in Romans 1:20 ‘for since the creation of the world God’s invisible qualities – his eternal power and divine nature – have been clearly seen, being understood from *what has been made*, so that men are without excuse’ (emphasis added). However, the nature being discussed here clearly refers to the narrower account adopted by earlier Christian theologians, with no implication that this extends to human rationality and/or culture.

Plantinga rejects natural theology on the grounds that as an attempt ‘to prove or demonstrate the existence of God […] it depends on a fallacious understanding of the nature of religious belief’ (McGrath, 2001, p. 264). For Plantinga the concern raised by assuming one can ground religious belief in revelation from nature, is that it moves away from faith in God as a foundational belief. For the patristic writers ‘the existence of God was taken for granted. The purpose of natural theology was understood to relate to the question of the *specific nature*, not the existence, of God’ (McGrath, 2001, p. 266 emphasis added). This argument that natural theology should not be understood as providing “proof” is echoed in Aquinas’ discussion in *Summa Contra Gentiles* (Aquinas, 1259, bk. I, ch14) where he places his discussion of the “proofs” of God from nature *within* the context of an assumed pre-existing faith. This builds on his earlier comments that whilst reason can inform faith, faith cannot be arrived at through reason alone (Aquinas, 1259, bk. I, ch4). McGrath also draws on William P. Alston to examine the primacy of faith and its investigation through natural theology commenting that ‘properly speaking natural theology begins from a starting point such as a sense of the presence of God or the ordering of the world, and shows that *this starting point* leads us to recognize the existence of a being which would be called God’ (McGrath, 2001, p. 267). Thus, properly understood natural theology goes “beyond” proving God to examining the metaphysical reasons for the truth of theism and builds “bridges” or interactions between theology and science (and other disciplines)[[22]](#footnote-23).

McGrath is committed to a position more in line with Torrance than Plantinga or Barth (cf. 2001, p. 280), however it is worth briefly mentioning Barth’s criticism of natural theology and discussing a revised terminology that is less positionally loaded. Barth’s rejection is less about the “proofs” of God’s existence and more about the criticism of humanity “dictating” the time and place of revelation by prioritising a “theology of nature”. Such commitment to humanity’s autonomy challenges biblical revelation (as noted above) and is based in an indifferent or negative attitude towards the natural sciences. Barth’s rejection of natural theology rests in commitment to a theoretical framework that ‘natural theology is a self-sufficient and autonomous discipline, which leads to knowledge of God apart from and in opposition to revealed theology’ (McGrath, 2001, p. 281). If one does not accept this account of natural theology his rejections fail to carry the same weight. Thus, these are not valid critiques of what I shall term “naturalized theology” as exhibited by Aquinas and others where the natural world is not offering “proof” of divine existence, but insights into the nature of the divine for those who already perceive the Cosmos as a divine creation.

It is more accurate to understand this thesis not as trying to examine the substance of God through nature, but rather the substance(s) that constitute *humanity* and how these are understood in relation to God *within the incarnation*. There is no assertion in this thesis that metaphysics is the only way for us to gain full (or even partial) knowledge about God. But it does examine that fact that God the Son was incarnate *on Earth* in a human form. Both things (earth and humanity) can be at least partially explored by the natural sciences[[23]](#footnote-24). Therefore, questions regarding the substance (or nature) of “matter” including how the Christian may conceive of the possibility of an immaterial (non-physical) deity within this ontology become questions that should be informed by naturalised theology and, when appropriate, the findings and concepts associated with the natural sciences. This is examined further in §1.5.3D in relation to the role of holistic ontologies in incarnational discussion.

### Scope

This thesis spans three vast areas of literature: the interaction between science and religion; the development of a scientific metaphysics about the fundamental level of reality; and the nature and relationship of human and divine in Christ. Despite the temptation to range broadly across these conversations, time, space, and clarity require otherwise. This section will briefly set out the boundaries of the discussion and the literature will be examined in further depth in chapter 2.

The science-religion dialogue has moved, in the main, beyond the antagonistic framework revived by the new atheists. As such this thesis will assume, rather than argue for, the claim that there is a mutually enriching dialogue to be had between the two bodies of knowledge. The distinction made at the start that this is a thesis concerned with “scientific” metaphysics is perhaps a false distinction of context rather than ontology (to borrow from Primas). It is more accurate to state that this thesis is concerned with a scientifically informed metaphysics, drawing on the findings of contemporary science, but taking the metaphysics beyond the boundaries of what science alone can say. This leads to a related assumption that science and theology engage in, at the very least implicitly, but often explicitly, metaphysics. Finally in line with the critically realist approaches of scholars such as John Polkinghorne (2003, 2005b, 2008, 2010, 2011) and Alister McGrath (2001, 2002, 2011, 2019), I maintain that science and theology are fundamentally working to understand the same reality (especially in relation to the incarnation). In doing so I place myself against scholars such as Peter Hodgson who argues that despite modern science being able to shed light on the intricate structure of the created world to ‘suppose it can support traditional theology or provide new theological understanding is a chimera’ (2005, p. 226).

Discussion of the two natures of the incarnate Christ is inherently and understandably drawn up into assumptions about the nature of the divide between material and immaterial, and between the nature of the mundane and the nature of divinity. It is the apparent irreconcilability of these sets of opposites[[24]](#footnote-25) that leads to the claim of paradoxicality. The challenge of current approaches to the problem of two natures forms one axis of the scope of this thesis. The second axis of the scope is drawn not on theological but scientific grounds. In claiming that our scientific metaphysics can and should influence our understanding of the incarnation it is necessary to draw a line that avoids scientific metaphysics in its entirety being brought to bear on Christology. With the scientific focus in this thesis falling on Hans Primas and Michael Esfeld’s contemporary discussions of quantum metaphysics, the logical demarcation point lies with the work of modern scientist-theologians who have productively examined quantum physics in relation to theology. Thus, the focus rests, barring a few exceptions particularly in the case of paradox and historical figures, on the contemporary debate following Polkinghorne’s publication of *Science and Creation* (1988). The following sections expand on the very brief comments made here to highlight key considerations and assumptions[[25]](#footnote-26) in relation the three themes addressed in the thesis, before I provide an overview of the thesis.

#### Science-Theology Dialogue

Much of the conflict narrative associated with the science and religion debate rests in the perception that science adheres to a Newtonian, atomistic and deterministic world view, where complex and seemingly indeterminate actions can be reduced to deterministic phenomena. Whilst it is possible to argue for such a position at the macro-level, for nearly a century, scientists have developed an increasingly complex understanding that the “implicate order” at the fundamental level of reality is anything but orderly. Between the unique properties of the quantum world and the increasing body of scientists arguing for emergent concepts of the “mind” and “consciousness” that often push their metaphysics to the very limits (if not beyond), scientific metaphysics has moved a long way from the Newtonian picture that left us in a “disenchanted” world with no room for the “other”. Thus, it might be argued strict materialism is under threat (for example see edited volumes by Koons and Bealer, 2010; and Davies and Gregersen, 2014). The move away, in many quarters, from the certainty of atomistic materialism and the rise of scientific accounts of holism that challenge our categories of “material” and “immaterial” means that science now raises deep and unavoidable *meta*physicalquestions, The language used around the interpretations of quantum theory, by scientists, can sound more akin to the language used by philosophers and theologians to describe the ineffable. Scientific metaphysics, as will be examined in relation to Primas and Esfeld, is potentially pointing towards an account of reality that is fundamentally relational (Esfeld) or a unified spirit-matter monism (Primas), which would fundamentally change how we interpret incarnational claims.

This potential shift in our metaphysics should not be understood as a claim that science is able to investigate/account for God, but rather that the discussion has always been framed by our mundane metaphysical commitments. After all the mundane world is the world in which God *became* incarnate. As Anna Marmodoro and Jonathan Hill note:

The growth of both philosophy of mind and cognitive science has developed […] in ways that just a few decades ago were unthinkable. As ideas from philosophy of mind begin to cross over into philosophy of religion, there is renewed interest […] about whether the incarnation itself might be articulated with the conceptual tools offered by the current research developments in the philosophy of mind as well as in metaphysics. (Marmodoro and Hill, 2011, p. v)

Although the application of scientific metaphysics to our theology provides opportunity it must be used with a note of caution. One of the biggest risks is the temptation to use scientific theories to analogously describe theological relationships/doctrines. This use of metaphysics across the two fields (whether uncritically or constructively) is only possible if it is assumed that they are addressing the same reality (at the same level). The view that Christian theology and the natural sciences seek to describe the same objective reality is advocated by Alistair McGrath in the three volumes of *A Scientific Theology*. In addition to holding that both views deal with the same objective reality, McGrath also examines the nature of scientific theology, emphasizing that science and theology can, and should, be understood as *a posteriori* disciplines thus they not only describe the same reality, but arrive at knowledge of it in a similar manner. This assumption that science and theology are realist disciplines is central to my investigation, I do not think that to hold such a view in general is controversial.

Moving on to how the truths in each field can be related, McGrath highlights two ways of approaching the fact that science and theology are investigating the same reality one is doctrinal and the other is methodological. The “doctrinal approach” seeks to reconcile particular Christian doctrines with particular scientific theories, whereas the “methodological approach” states that we need to clearly articulate the assumptions and methods that have shaped our language and beliefs about key doctrines i.e., we should take a “scientific” approach to theology learning from and informing our theological practice with the methods employed by the natural sciences.

It is the doctrinal approach that Polkinghorne is criticising in the claim he doesn’t want to see Christ in an electron[[26]](#footnote-27). By this he means that we should not be working under the misguided assumption that ‘the peculiarities of quantum theory explain the peculiarities of divinity’ (Polkinghorne, 1988, p. 93). There is not a one-to-one correlation between scientific theory and theological doctrine. The doctrinal approach has also been adopted by writers such as Simmons (2014) and Goswami (et. al 1993; 2008) who try to find direct correlation between scientific concepts such as entanglement, wave-particle duality, and nonlocality and theological concepts, such as the trinity, incarnation, and divine action, respectively. In doing so they make claims that move beyond the remit of our current scientific understanding and give rise to their own set of problems. Acknowledging that both theology and science seek to arrive at truth about the nature of reality does not make a claim about the role of natural theology in our understanding of God.

Given both the uncertainty regarding interpretating quantum mechanics and the epistemic gap between us and God the doctrinal approach is not appropriate. It would not lead to any real developments in the way we understand Christian theology – the resulting theology would simply be too unstable. Instead, I approach the issue as one of methodology. The current doctrine regarding the incarnation of the Son of God is based on certain assumptions and methods that have shaped our language and beliefs about the nature of the Son of God. What I seek to do in this thesis is to challenge the extent to which those assumptions remain valid given what we now know about the nature of the world and given the assumptions and methods of the natural sciences. That science and theology are dealing with the same reality lies at the very heart of this thesis. If one accepts this premise, then the development of a coherent Christology must be informed by scientific discourse. Otherwise, it becomes a purely philosophical exercise.

#### Science

A few preliminary remarks are needed on the selection and use of scientific sources within this thesis. The application of scientific metaphysics is strictly limited to two alternative forms of holism as expounded by Michael Esfeld[[27]](#footnote-28) and Hans Primas[[28]](#footnote-29). Primas and Esfeld are by no means the only scholars to have proposed holistic accounts of the world in response to quantum mechanics. Other holistic approaches, and the reasons for focusing on Primas’ and Esfeld’s works are discussed in chapter 2. Thus, this section serves to simply identify, rather than justify, Primas and Esfeld as providing the scope for the main thesis. Speaking of Primas’ wider contributions, in *Primas, Emergence, and Worlds*, William Seager notes:

[He] was of course famous first and foremost as a chemist and quantum chemistry theorist. But […] the more interesting aspect of Primas’ work goes beyond the philosophy of science. He was not afraid to extend his thought into the metaphysical implications of his views and what he took to be the deep philosophical lessons we should draw from the mysteries of quantum mechanics. (Seager, 2016, p. 90)

Michael Esfeld is a philosopher of science and has written extensively on the interaction of science and metaphysics both from a natural philosophy perspective and to argue for a science informed metaphysics. In a recent chapter he remarked that:

[T]here is no one-way road from physics to metaphysics. In a nutshell, there neither is a neo-positivist way of deducing metaphysics from physics, nor a neo-rationalist realm of investigation for metaphysics that is independent of physics. What we need is a metaphysics of science or a naturalized metaphysics […][where] physics and metaphysics [are] treated as forming a seamless whole. (Esfeld, 2018, p. 143)

Both Esfeld and Primas have, therefore been deeply committed to understanding the metaphysical implications of quantum theory – they adopt a realist stance to the interpretation of its findings. As should be clear from the above quotations the “scientific” concern within this thesis is that of scientific metaphysics rather than mathematical formalism or interpretation of experimental findings. Thus, for the purpose of this thesis is it assumed that the interpretations provided by Primas and Esfeld are an accurate reflection of their analysis/interpretation of the data. It is also necessary to note at this point that the interpretation of quantum theory is highly contested ground, including whether it can be said to speak to ontology over epistemology (this is addressed further in §2.1). The argument within this thesis requires an assumption that quantum theory is a realist theory, speaking to the way the world is, this is a “mainstream” approach to the findings of quantum theory. Yet, at present there is no empirical method to establish which interpretation(s) are correct. As Craig Callender notes ‘[q]uanutm mechanics is beset with notoriously difficult interpretational challenges. Different interpretations of the theory are compatible with the present data’ (2020, p. 57). Therefore, the reasons for scientists and philosophers privileging one account over another rests in their wider epistemological and metaphysical commitments. Some challenges to the scientific realist position that is assumed within this thesis, in line with Primas and Esfeld, are examined in §1.5.3E.

The aim within this thesis is not “prove” that a holistic ontology is the “correct” way to provide a more coherent interpretation of the nature of the incarnate God, but rather provide an analytical exploration of the implications of a scientifically informed, radically holistic metaphysics on our understanding of the nature of Christ as fully human and fully divine.

#### Theology

The challenge of Chalcedon acts as the starting point for this thesis. I deliberately use the term challenge because Chalcedon asks us to acknowledge the apparently contradictory. On any standard accounting, to claim that something is both two things and one, without separation yet maintaining distinction, would appear to be asking for the impossible. Hence the charge of paradoxicality. Our own metaphysical assumptions drive us to claim either “mystery” (something is humanly impossible yet was brought into being through God), or “paradox” (beyond comprehension and/or possible reconciliation) and therefore a central tenet of the Christian faith appears to be irrational. The solution appears to be to unpack the “components” of the problematic union (a compositional or reductionist approach to the incarnation) and then re-examine and re-define them so that the paradox may be removed without moving into heterodoxy. Such is the theological task that runs through this thesis, at the same time the assumption that there are in fact pieces to examine is also challenged.

In *The Humanity of God* Brian Leftow (2011) highlights eight metaphysical models of the incarnation that aim to explain the unity of the (immaterial) divinity and (at least partially material) humanity in the Son of God, without descending into either Nestorianism or Docetism[[29]](#footnote-30). What is common to all eight accounts is the reduction of the person of Christ to fundamental parts. Copper, Cross, and Leftow in different ways examine the inter-relation between matter and the immaterial for persons. These different approaches highlight various aspects of the metaphysical challenge posed by the incarnation: Cross through his historical analysis drives us to consider how we understand the relationship between substances and the properties they instantiate; Cooper examines the model(s) of anthropological constitution provided in scripture; Leftow examines how we understand the component parts in relation to one another. What all three broadly “compositional” accounts have in common is the assumption that the “parts” being examined are ontological, not simply methodological[[30]](#footnote-31). This belief in the reducibility of nature to distinct parts is based in a classical understanding of the nature of the world. The fact that this reductionist view is often held as a conceptual starting point for exploring the Incarnation assumes, *a priori*, that the world *is* so divisible.

The claim that the incarnate God is “a living paradox” rests upon ontological assumptions about the nature of substance and/or persons. For medieval theologians the difficulty of reconciling the human and divine natures of Christ rests on the premise ‘that the assumed human nature [of Christ] is something like an individual substance’ (Cross, 2002, p. 29). However, it can be argued that the premises for “paradoxes” in theology mirror our understanding that ‘the basic philosophical questions come from troubles with our ordinary conceptual scheme’ (Sorensen, 2003, p. xi). For all it might be argued that overcoming paradox is about challenging our existing conceptual or ontological scheme, it has taken on a significant role within our theological discussion that moves far beyond this. Within this thesis I will provide an overview of the use of paradox within theology before examining whether a holistic ontology that moves (at least partially) away from a reductionist and/or compositional account can overcome the descent into paradox.

The lack of development of holistic research in this area is significant because not only does a reductionist account leave one with some seemingly insurmountable obstacles to forming a coherent account of the incarnation, but it also refuses to acknowledge the fact that ‘more than eight decades after the downfall of classical physics, the idea that the physicalist conception of nature, based on the invalidated theory classical physical theory, might be profoundly wrong in way highly relevant’ (Stapp, 2011, l. 341) to this problem. This thesis seeks to provide a coherent Christological account, in line with Chalcedon that is also meaningful in a scientific context.

Finally it is worth making a brief note that Nadeau and Kafatos (2001) argue that quantum theory is in fact only able to provide us with ‘clues about possibilities of events’ (p. 192) and ‘that questions regarding the character of the whole no longer lie within the domain of science’ (p. 193). This sort of thinking highlights the challenges faced by theologian seeking a “theology of nature”. However, these are no more insurmountable than any other attempt to speak of God. The notion that God’s nature is inexplicable does not stem from the rise of scientific thought, and the idea that what is important in faith is the ineffable, personal, religious experience is not a new idea. Our religious experience is so different to our everyday empirical experiences that we cannot hope to explain it adequately and therefore, as Wittgenstein noted, perhaps we should remain silent. On the other hand, it is important to recognise the “otherness” that is associated with our understanding of the divine, if we take this to its conclusion, we find ourselves as theologians engaged in a pointless exercise. As Macquarrie notes ‘if the religious experience were absolutely inexpressible, then it would follow that the reflective attempt, called “theology”, to explicate the content of religious faith in words, is an altogether mistaken endeavour’ (1970, p. 24). If we are to claim a genuine sense of knowledge about the God we worship, then we need to put this “cognitive” understanding into words.

It has been argued that perhaps the best way to grasp at knowledge of that which is ineffable, is to speak only *via negativa*. It is only in speaking of what God is not that we are able to avoid reducing God to a finite entity. Yet there is a question as to how far speaking in *via negativa* terms can genuinely advance our knowledge of God. Whilst in some instances it is possible to gain much information from negative statements, such gains in knowledge rely, to a certain extent, on a Boolean (or binary) conception of the world. For example, if one were playing chess and said that they were “not white” the implicit assertion is that they are playing with the black pieces. However, if one were to be commenting on which colour of the rainbow their house was, and stated “not orange”, this doesn’t allow for the other person to gain any real knowledge about the colour of the house. The knowledge one can gain *via negativa* is dependent upon the number of alternatives available. To say that God is “not corporeal” doesn’t necessarily imply that God is a spiritual being (although this may be how we instinctively interpret it), scientific theories, imaginary numbers, dreams etc. are all non-corporeal but cannot be said to be “spiritual”. In fact, Macquarrie goes as far as to argue that the vagueness associated with *via negativa* statements about God appears to make them ‘wholly vacuous…scarcely indistinguishable from agnosticism’ (1970, p. 27). Despite being important to allow for a level of “reverent agnosticism” true and justified faith is possible ‘only on the basis that God has granted some positive knowledge of himself’ (Macquarrie, 1970, p. 27). Acknowledging the difficulty is different from saying we cannot talk of God in a meaningful way. Rather it acknowledges that the “experience” of paradox in the incarnation may at least in part be created by our linguistic limitations. The holism and nonlocality[[31]](#footnote-32) found in quantum theory points both to a challenge for our Boolean language and a need to reconceptualise how we can begin to understand (epistemologically and ontologically) the nature of parts within a holistic universe. As Pannenberg notes ‘in the concept of the whole as a whole of parts [..] the *particularization* [sic] of the parts […] cannot be understood simply from the general concept of the whole as such’ (1990, p. 149 original emphasis).

The fact that some interpretations of quantum physics points us towards a world that is holistic (whether that holism is universal or limited to the microphysical is not important, at this point) causes us difficulty in finding language to adequately describe the nature of our world. This is further heightened when it comes to meta scientific questions that are raised by our increasing knowledge, we find that it requires a ‘style of thinking… that initially might come more readily to a Trinitarian theologian than to a traditional scientist’ (Polkinghorne, 2005b, p. 47) and not just thinking, but language, to explain and conceptualise the reality. The point at which we start to see paradox is in describing complementary and non-Boolean accounts, not dealing with Boolean descriptions. Our challenge is to recognise the imperfection of our language and comprehension without writing off all talk as meaningless, as Jantzen states ‘whatever picture we paint of God must be inadequate because it is of human workmanship’ (Jantzen, 1984, p. 1) and our only other choice is to ‘refuse to paint altogether’ (Jantzen, 1984, p. 1).

To refuse to engage altogether would appear to return to the idea that the task of theology is a completely mistaken endeavour. Within this thesis I will re-examine our understanding of the incarnation in holistic terms to provide a new way to understand what we already affirm in the creeds. I am not seeking to provide a new explanation of *how* God and human were united, but a new way of understanding what is meant by saying both were *in* Christ. Thus, I do not seek to create something utterly new and unfamiliar, but instead to ‘portray the familiar in a novel way, so that some aspect of its true nature’ (Jantzen, 1984, p. 2) can be understood.

In what follows I will draw upon that which we already understand of the holistic nature of the world to show how our current comprehension of the union can move closer to a more truthful account. In this task, making use of the scientific understanding “outside” its remit is unavoidable, however this is only undertaken so that we can increase our understanding of what we mean when we say the Word took on flesh (*sarx*) where this is understood as ‘referring to the realm of materiality in its most general extension, without any prior evaluation, though with perhaps a special notes of something transitory and vulnerable to decay’ (this is "sarxmeaning3" in Gregersen, 2020, p. 256). Thus, it is important to note that even if the adoption of a holistic ontology requires us to find new language, or reimagine what is meant by our current language, the question of the nature of constituents of the hypostatic union is, for the purpose of this thesis, primarily a question of ontology and not semantics.

#### Role of Holistic Ontology in Christological Thought

The purpose of this thesis is not to argue that holism provides the only, or even the “correct” answer to questions raised in relation to the coherence and unity of Christ’s being. However, the intention is to interrogate (some of) the metaphysical assumptions and/or commitments that lead to the claim that the unified person of Christ is *metaphysically* paradoxical.

In examining the potential advantages for adopting holism within our Christological (and wider metaphysical) understanding, but not seeking to explicitly address the nature of the human soul or consciousness, this thesis is not to be considered a work of theological anthropology. Due to this there is a deliberate exclusion of content relating to the philosophical discussion of mind, instead there is greater interaction with matters of mereology and substance(s). The relations between persons, parts, and paradox will be examined in further detail in §3.4.

As noted in the introduction, the Creed presents us with a picture in which Christ’s ‘two natures’ remained discrete in the act of the incarnation. This (apparently) Boolean definitive distinction however is problematic as we are also told that there was a genuine unity of Christ’s divinity and humanity. Yet such unity would appear to be fraught with all the same problems that are embedded in the challenge of dualist interaction. As Velmans and Nagasawa note in their article on consciousness:

Yet if consciousness or mind [or the divine] is truly immaterial then the differences between the mental [or divine] and the material world seem to be more fundamental […] the causal interaction […] is literally inconceivable. (2012, p. 8)

Strict dualism is not the only option open to the theologian. Whilst Christian materialism has its own problems which will be examined in §3.5.4, Whiteheadian process theology, and Christian Idealism also seek to address the issue of distinction-in-unity. Thus, there is a need to defend the premise that holism provides a novel solution to the apparent paradox in Christ’s being.

The thing that the above positions have in common is that there are distinctions and exclusive relations between the kinds of substances being discussed (even if only to discount them). This is not the place to start to unpick what is meant by terms such as physical, material, immaterial etc, but rather to consider how we conceptualise the boundaries of these categories. It is the nature of the boundaries that marks out the distinction between Boolean and non-Boolean categorisations. For example Aristotle identifies ten ways of being that have traditionally been used to reconcile the apparent contradictions between Christ’s human and divine natures: ‘(1) substance; (2) quantity; (3) quality; (4) relatives; (5) somewhere; (6) sometime; (7) being in a position; (8) having; (9) acting; and (10) being acted upon’ (Studtmann, 2021, sec. 2.1). The kinds are then differentiated by species, meaning differences between Christ’s human and divine habits/dispositions come under a different category to qualities such as spatial location. Thus, the two natures belong to a different order of being in the single “person” of Christ.

Yet despite the richness of this approach to categorisation there remains a Boolean nature to the category structures ‘quantities are not substances; substances are not quantities, […] Aristotle’s decision to make quantity a highest kind appears well motivated’ (Studtmann, 2021, sec. 2.2.2). There are clear boundaries between whether something is a quantity or a relative, and there appears good reason to think that ‘categories are mutually exclusive and jointly exhaustive’ (Cohen and Reeve, 2021, sec. 2). This is further compounded when one also considers that the discussion takes place within the framework of Aristotle’s fundamental axioms such as the Law of Non-Contradiction (discussed further in §3.1).

Holistic ontologies in contrast prioritise an underlying unity (which may still be Boolean) but can arguably also be seen as foregrounding a level of complementarity in relation to the kinds of categories/substances/etc. that are under consideration. For example, in *‘“Complementarity” in Scientific and Theological Thinking’* D. M. MacKay argues:

Complementarity stands not for a physical theory but a logical relation, distinct from and additional to traditional ones like contradiction, synonymy, or independence […] Complementary statements are not logically independent. (MacKay, 1974, p. 226)

Drawing on Bohr, MacKay goes on to explain that complementarity can be understood as relating to ‘different modes of interaction’ (1974, p. 227). Furthermore, ‘the description found valid in one mode may be inapplicable in another, and *more than one description may be required to do justice* to the situation’ (1974, p. 227 emphasis added).

Holism, and its association with pan(en)theistic and process theologies is not the only, and certainly not the least controversial, way to address the apparent contradictions in the incarnation, and for some it may seem like a poor alternative. However, as will be discussed within the wider body of this thesis, it is an ontological position that is both consistent with our scientific understanding of the world and able to address the challenge of the apparent substantial change required in the incarnation. It undertakes a different role to Aristotle’s categorisation of ways of being, and Aquinas’ reduplicative strategy, and in doing so challenges the “inconceivability” of causal and substantial interaction between Christ’s humanity and divinity.

#### Challenges to the Scope and Direction of the Thesis

As with all intellectual endeavours there are numerous ways that I could have approached this project and not everyone will agree with the scope or direction this thesis has taken. In this section, I will raise several challenges to this project and establish why, whilst noteworthy, they are not fatal. In what follows I quickly identify some of the key weaknesses and limitations of this thesis and engage with potential critics[[32]](#footnote-33).

The need to progress the argument means that whilst these objections are taken seriously, they are not addressed exhaustively, and those who disagree with my positioning on the issues below are unlikely to accept the conclusions of this thesis due to holding different methodological and metaphysical commitments. The four key criticisms addressed below are (a) the place of natural theology, (b) the relevance of science to the theological enterprise, (c) the use of quantum mechanics at the macro-level/reduction to quantum explanation, and (d) science as a realist/metaphysical endeavour.

##### The Place of Natural Theology

In *"Religion and Science" Without Symmetry, Plausibility, and Harmony* (2003) Willem Drees questions the nature of the relationship or “consonance” between religion and science in providing explanations about the natural world. Due to Drees’ focus on the dynamic between natural theology and a theology of nature, the discussion chimes well with McGrath’s comments in §1.5.2 and fits within this narrower focus of natural theology.

Despite being a philosopher, theologian, and scientist Drees presents a deficit model of the relationship between science and theology arguing ‘theology is expected to provide an additional explanation where science leaves of [sic]’ (2003, p. 115). The enterprises of science and religion differ in their scope and their success[[33]](#footnote-34). Although he notes that they have ‘differences in function (explanatory?) and differences in relation to reality’ he also presents them in direct comparison: ‘neither at the level of ideas nor at the level of practices is there a similar record of specific convergence and fruitfulness for the religious traditions’ (2003, p. 114). Drees cautions against undertaking a project such as this thesis, arguing that whilst theological metaphysics may appear to be supported by advances in physics and cosmology these consonances can be problematic as they are ‘often highly dependent upon a particular tradition, or upon moving beyond the domain of validity of certain concepts or theories’ (2003, p. 115). However, I argue that this is an objection to what McGrath termed doctrinal methodology, especially where Drees goes on to consider the reliability or “solidity” of scientific theories. Here he argues that one must not base theological arguments on claims that science cannot explain. For example knowledge of the periodic table is “solid” and thus if our theological arguments are found to be in conflict with it, we should understand this knowledge as providing ‘constraints on our religious positions’ (Drees, 2003, p. 116). In contrast:

[M]any of the issues considered in natural theology, such as the nature of time and space, of causality and lawfulness, and so on, we deal with speculative ideas in science, not ideas integrated extensively into our web of knowledge and practice (Drees, 2003, p. 116)

Whilst he validly cautions on the need to recognise the speculative nature of the scientific discussion, this implies the need to adopt a critical approach to the realism of scientific theories and the entities they describe rather than abandon the conversation. In addressing speculative ideas (such as the nature of matter taken up in this thesis) ‘the sciences underdetermine the metaphysical speculations (while the scientific theories are themselves underdetermined by data)’ (Drees, 2003, p. 116).

This underdetermination or uncertainty can be understood as a challenge to any naturalised theology that seeks to engage in matters of metaphysics, however it also provides a level of promise:

[T]he sciences do not force a single best answer upon us. Theism, atheism, and pantheism are all defensible interpretations of contemporary cosmology[…] With respect to such issues, the sciences rule out some ideas, but lead to an agnostic attitude with respect to positive claims (2003, p. 116).

Thus, when, as in this thesis, theologians seek to understand the metaphysical and theological implications of scientific “speculation” they must be cautious. I have approached this thesis with an eye to the implications of speculative metaphysics. The incarnation requires a greater engagement with scientific speculations than other areas of theological concern because divinity is constrained by the metaphysics of creation. The purpose of this thesis is not to argue that quantum holism offers “proof” for God or an irrefutable “solution” to the paradox of the incarnation, but to examine the *implications* of the “metaphysical speculation”. Should the scientific explanation cease to be agnostic and instead rule out the feasibility of a holistic account of reality, then whilst this thesis may continue to have relevance via making what would be metaphorical claims, it will cease to be an accurate exercise in metaphysics. Yet this simply makes the importance of this thesis a time-sensitive matter.

A final challenge to the enterprise of naturalised theology raised by Drees is that trying to achieve consonance between scientific and theological accounts has the disadvantage that:

[It] assumes theology as a source of knowledge, [is] on equal footing with the sciences, […] But the more important problem is in the assumption that we are looking for harmony between theological and scientific ideas (2003, p. 117).

As noted in relation to Cooper, privileging science as having access to “the” or a “greater” truth is problematic. Even if one accepts science and theology have different explanatory/functional roles it is still disingenuous to both enterprises to place them in a hierarchy of success or knowledge value when such hierarchies depend on the criteria used. His claim that theology is often critical of reality and prioritises a distinction between the real and ideal neglects that Chalcedon is meant to contain realist claims about the nature of the person of Christ. In this sense where McGrath provides a critical but positive discussion of the possibilities for naturalised or scientifically informed theology Drees adopts a narrative that places theology as inferior knowledge to science.

Despite this Drees does capture an element of the view in this thesis that when we consider major transitions:

The way from the older to the newer view is not via a translation at the level of theories, but rather one of developing *new theories that do better justice to experiences and experiments* coded to a large extent also in the old theories (Drees, 2003, p. 119 emphasis added).

Thus, the aim of this thesis is not to reconceptualise the hypostatic union but explore if holism does “better justice” to the apparent paradoxicality of the incarnation. However, it is crucial to hold in mind the certainty/correspondence we assume between the model and the reality being described. Torrance cautions against the “improper” use of natural theology and ‘the introduction of “natural” concepts into theology without first establishing the warrant for doing so on the basis of revelation’ (McGrath, 2001, p. 283). The “proper” approach recognises the contingency of the world/cosmos and its dependence on God for its existence and order, this separation allows science and theology to be understood as separate but compatible enterprises. For Torrance and McGrath ‘the theologian who is thus a natural scientist (or vice versa) is thus in a position to make some critically important correlations’ between the natural world and its creator (McGrath, 2001, p. 284). Naturalised theology is a legitimate enterprise provided it rejects (in line with Barth’s challenge) a dualist epistemology and instead:

Constitutes a return to the kind of unitary thinking we find in classical Christian theology […] in which theology is committed to *one coherent framework of thought* that arrives with the unitary interaction of God with our world in creation and incarnation, and in which we are unable to make any separation between a natural and supernatural knowledge of God. (Torrance, 1980, p. 93 emphasis added)

In response to Barth and Drees’ challenges about the place of natural theology McGrath identifies two approaches to natural theology, but argues only the second is appropriate:

1. Nature provides a *foundational* resource for Christian theology. Nature is thus treated as an *explicans*, an agent of explication with potentially revelatory status.
2. Christian theology provides an *interpretative* *framework* by which nature may be interpreted. This approach takes nature to be an *explicandum*, something which requires or demands explication (McGrath, 2001, p. 294 underlined italics emphasis added).

It is the first kind that Barth rejects, and the second (naturalised theology) which is adopted in this thesis. I argue, given its bounds on the extent to which one can make theological claims from scientific explanation, this approach does not fall afoul of Drees’ bridge-making criticisms. This is because ‘[t]here is thus a fundamental *resonance* – but nothing more – between nature and theology, with the latter offering a prism through which the former may be viewed and understood’ (McGrath, 2001, p. 295 emphasis added). The world can only be revelatory if it contains a likeness or similarity to God even if this is imperfect (in execution or our interpretation). Nature has ‘an ontologically grounded capacity to reflect God as its makers and originator’ (2001, p. 297). This means natural theology provides the basis for critical engagement with the “legitimacy and consequences” of our theology, rather than proof.

The critiques presented by Drees and Barth against naturalised or scientific theology should more correctly be viewed as challenge to recognise the powers and limitations of scientific enquiry. When we use scientific evidence to inform our theological thinking, we must be aware of when we move explanation or evidence beyond its original area of applicability. As noted by Drees whilst there are things that science can emphatically rule out, there are many issues on which it remains agnostic. Thus, this thesis adopts a critical approach to what can be said in relation to the nature of an immaterial God using analogy from scientific explanation of the nature of the world. I proceed knowing that the natural world which is investigated and discussed by physics (and the life sciences) is the same world in which God was made incarnate. This means that it is possible to recognise the speculative or agnostic nature of theories regarding the fundamental structure of reality whilst also engaging in asking, if they are correct, what are the potential implications for our understanding of theological matters within the same metaphysical realm?

##### The Relevance of Science to the Theological Enterprise

The most obvious critique of the method and approach within this thesis is to argue ‘theology [is] unhelpful in all scientific matters […] [the] sciences without metaphysics or theology […] [are] the only reliable paths to knowledge’ (Henson, 2018, p. 103). However, I will address the more specific challenge of the use of scientific theory/metaphysics to inform theological metaphysics. In *Theology and Modern Physics*, Hodgson clearly articulates this challenge, and is worth quoting in full:

One of the difficulties is that it [quantum mechanics] invokes the results of experiments and uses the language of quantum mechanics. Inevitably this language uses philosophical terms and then it is easy to give the impression that the philosophical propositions are in some way entailed by the physical results. These in turn can influence theological thinking. In order to be quite clear which arguments are justified and which are not, it is essential to separate the three levels of discourse: physical, philosophical and theological. (Hodgson, 2005, p. 126)

This ties in to the question of whether quantum mechanics is describing the world as it is, McGrath goes as far as to make the following provocation ‘in one sense, the natural sciences could be argued to be methodologically anti-metaphysical, in that the sustained engagement with the world is not shaped or determined by metaphysical assumptions’ (McGrath, 2011, p. 267). Even if science is not “anti-metaphysical” it is questionable how much one can draw ontological conclusions from science into theology when ‘all assertions about reality, including both scientific and theological ones’ are potentially fallible (Henson, 2018, p. 8). If, as Pannenberg notes, we are dealing with ‘third order hypotheses: hypotheses about hypotheses about hypotheses’ (Pannenberg cited in Henson, 2018, p. 8) then there is a finite limit on what we can say regarding the theological implications of scientific theory, this leads Hodgson to conclude *Theology in Modern Physics stating*:

Quantum mechanics is but one step along a long road […] Modern science can certainly bring home to us more forcefully the incredibly intricate structure of God’s creation. It may also suggest ideas and analogies that have *some use* in theology. But […] *it does not change in any way our fundamental convictions* concerning the creation of everything by God, and the birth, death and resurrection of Christ. (Hodgson, 2005, p. 226 emphasis added)

These challenges go to the heart of this thesis – that the holistic paradigm discussed by Esfeld and Primas cannot or should not be brought to bear on the incarnation. However, this project is entered into aware of the third order hypothesising that is taking place. It is *not* attempting to supplant traditional theology.

I maintain both science and theology are (critically) realist enterprises, and our understanding of the nature of the world provided by science can inform our understanding of the nature of beings within that world. Hodgson’s concerns are more correctly applied to the “doctrinal” approach to science and religion. The aim of this thesis is a simpler proposition:

1. Scientists such as Esfeld and Primas argue that our common-sense intuition that the cosmos is fundamentally discrete particles or genuinely divisible into discrete categories (respectively) is flawed. The cosmos is foundationally holistic.
2. Iff they are correct, what impact does a holistic ontology have on our understanding of, and response to, the apparent paradox in the incarnation?

I adopt a metaphysical not metaphorical approach to our understanding of the incarnation, arguing that holistic metaphysics can change our understanding of what it means to say that ‘there is an intimate connection between the divine person and the human body, one that is not adequately captured by the concept of simple containment’ (Le Poidevin, 2011, p. 270). This is speculative systematic theology: it examines “what if” this metaphysics is correct whilst recognising that it may not be. Finally, this project references quantum mechanics precisely because that is what grounds the works of Esfeld and Primas, who do argue there is ontology to be found in the experimental results. This is picked up in Elise Crull’s ‘Interpretation Neutrality for Quantum Theology’ where she argues it is possible ‘with clear philosophical conscience, [to] access the majority of quantum theory’s tools, models and explanations while maintaining an interpretation-neutral yet realist stance toward this physics’ (2023, p. 247). Thus, to draw on scientific perspectives to *inform* our theological discussion, I argue, neither supplants traditional theology nor changes our fundamental convictions.

##### The use of Quantum Mechanics at the Macro-level/Reduction to Quantum Explanation

These challenges are linked enough to be addressed together. In many senses this thesis could be substantively the same without “reduction” to a quantum metaphysics. The metaphysical grounding is *holistic ontology*. Whilst it may seem counter-intuitive to argue that a central premise of the work is not necessary, that misconstrues where the axis of this thesis lies. This thesis and its conclusions could not have been proposed or written without the ontologies of Boolean and non-Boolean holism posited by Primas and Esfeld. However, the axis of change resides in *holism* not in the fact that Primas and Esfeld have grounded their thinking in quantum mechanics *per se*. If their theories had been grounded in cosmology, they could have led to similar implications for the incarnation.

Their holistic metaphysics is relevant to theology because it raises questions about the *nature and number of things or substances* that can be said to exist. It is also relevant because Primas has a deep commitment to the existence of an ontologically non-physical aspect of reality that applies to more than abstract objects. In contrast Esfeld’s work raises deep questions about whether we should even conceive of the “things” that exist as things, or if a “no-thing” ontology is more appropriate. Thus, I adopt a quasi-constitutional approach to the incarnation – however rather than examining how we understand the parts, I question the assumption that there are parts. Thus the “reduction” is almost accidental – it stems from the fact that as a scientifically-engaged theologian, I have assumed that Primas and Esfeld are “correct" in their interpretations of quantum mechanics despite their very different holistic metaphysics.

The concern of the use of quantum theory at the macro level, although linked to the above, raises distinct challenges. This is especially true if one adopts a reductionist account. For example, if it isn’t clear how the “quantum weirdness” of entanglement can be applied to the macroscopic world we inhabit, it may seem even more unclear how such matters could relate to the divine. The first response to such criticisms can be found in Diederik Aerts ‘Quantum Theory and Human Perception of the Macro-World’ (2014). He phrases the challenge as follows:

Why customary macroscopic entities appear […] as bounded entities occupying space and persisting through time, is a fundamentally puzzling question. […] such macroscopic entities are built from microscopic physical entities, […] and, following the quantum description, we know that these microscopical physical entities are ‘not at all bounded entities occupying space and persisting in time’ (Aerts, 2014, p. 1)

Yet experimental evidence shows that in certain conditions macroscopic objects *do* exhibit *aspects* of quantum behaviour. It requires such entities to be ‘pushed in delicate and specific ways to show quantum effects, such as entanglement, nonlocality and interference’ (Aerts, 2014, p. 1), but as Ornes notes, it is becoming increasingly clear that what classifies a quantum system ‘is less a matter of size than of complexity’ (2019, p. 22414). The second response is theological, it stems from an account of God that is pan(en)theistic and/or considers God to provide the underlying order or structure to the world. If one holds to such a belief the concern about whether quantum phenomena apply to “higher” or “more macro” levels of reality falls by the wayside. If God is in the foundation of all things, then it is surely more pertinent that we look to our foundational descriptions of the cosmos.

Ultimately, because this thesis does not draw on particular quantum properties to explain away the paradox these concerns sit alongside the generalised concerns above on the role for scientific (or scientifically informed) metaphysics in our theological discussion. Unless one wishes to argue that only revelation and biblical scholarship can provide insight into the nature of God and/or the incarnation this challenge is not fatal to this thesis.

##### Science as a Realist/Metaphysical Endeavour

In §1.5.3E (b) I referenced McGrath’s provocation that ‘the natural sciences could be argued to be methodologically anti-metaphysical, in that the sustained engagement with the world is not shaped or determined by metaphysical assumptions’ (2011, p. 267). However, such claims fail to account for the fact all science is based in metaphysical assumptions that impact on ‘the motivation for the scientific quest […] and on the manner in which it is undertaken’ (McGrath, 2011, p. 267). Within this thesis the major criticism relates to the assumption that quantum theory is describing the world as it is. Callender describes this in terms of the “quantum blight”: i.e., there is a lack of consensus over what is being described by the theory. As Callender says ‘we need to know the “word-world” connections. What do the terms in the formalism represent in the outside world, if they represent anything?’ (Callender, 2020, p. 58).

However, as Healey notes in *Pragmatist Quantum Realism* (2020) whilst “physical realism” is a purely metaphysical thesis, “scientific realism” includes ‘an epistemological, or at least axiological, component […] that incorporates Physical Realism’ (Healey, 2020, p. 125 original capitalisation). Scientific realism may have traditionally claimed our scientific theories present a literally true description but the epistemological content of scientific realism has shifted. Scientific theories present a story of the way the world is ‘and we should believe that story is *approximately true*’ (Healey, 2020, p. 125 emphasis added). To understand the picture provided by quantum theory one must select an interpretation of the theory whilst being faced with the fact that ‘today the field is littered with a proliferating variety of competing Interpretations of quantum theory in various states of health’ (Healey, 2020, p. 126 original capitalisation). It is enough to note here that if one disagrees that either science or interpretations of quantum mechanics are realist, then it is improper to bring the metaphysical assumptions to bear on theological matters. However, it is possible to use the holism of Primas and Esfeld’s metaphysics without requiring adherence to a particular interpretation of quantum mechanics.

I do not believe these challenges are fatal to the spirit of this current endeavour. However, it is important to hold to Hodgson’s exhortation and ensure awareness of movement between physical, philosophical, and theological descriptions/categories. I hope that I succeed both in this respect and in respecting, as Pannenberg noted, the third order hypothesising that occurs when one engages at the boundaries of science and religion.

### Method

Before outlining the wider method within the thesis, it is first necessary to make some preliminary remarks. I approach quantum holism with a mind to the “naturalized ontology” of W. V. Quine, as expounded in *Theories and Things* (1981), and noted in Esfeld’s naturalized metaphysics. Naturalized ontology combines Quine’s accounts of naturalism (‘the recognition that it is within science itself, and not in some prior philosophy, that reality is to be identified and described’ (1981, p. 21)) and philosophy (‘natural science trained upon itself and permitted free use of scientific findings’ (1981, p. 85)) to argue that natural sciences are able to say something genuine and meaningful about the nature of the reality they study and that these insights can be understood as having real metaphysical implications. However, there are numerous interpretations of quantum mechanics and not all of them arrive at quantum holism.

The key is that, at present, there is no empirically verifiable way to establish the truth of one interpretation over another. Each interpretation comes with its own metaphysical commitments that have implications for the nature of the world and our interaction with it. Therefore, my reasons choosing Esfeld and Primas rest in their interpretations’ “neutrality” and the minimal need to accept novel metaphysical properties.

Chapter two provides a brief survey of some of the pertinent theological literature and outlines both the context for this thesis and note where it departs from the existing literature. Continuing with the theological focus chapter three addresses the nature of paradox. I examine how paradox has been understood within our theological discussion and identify how the paradox may be understood as metaphysically rooted. I examine the reduplicative strategy as a “solution” to the appearance of paradox within the incarnation and set out my own fourfold account of how the incarnation may be understood as paradoxical.

Chapter four marks a departure in both theme and context. Here the focus turns exclusively to the issue of scientific metaphysics. In a necessarily abbreviated format, I extricate and examine the scientific metaphysics that grounds the work of Esfeld and Primas. In the case of Primas this is necessarily more piecemeal than Esfeld’s work as Primas never wrote a metaphysical treatise. In chapter five I draw out the distinct approaches of two scientifically informed metaphysical programmes that can both be described as “holistic”.

Chapters six and seven apply Primas and Esfeld’s models to the incarnation and critically examines whether they can remove the appearance of metaphysical paradox. Chapter six examines the impact of Esfeld’s two models of holism (top-down and bottom-up) on our conceptualisation of the incarnational paradox. Chapter seven examines the implications of Primas’ truly part-less ontology. Making use of some of Harald Atmanspacher’s excellent edited volumes[[34]](#footnote-35), alongside Primas’ original works. Due to the more fragmentary nature of Primas’ ontology his metaphysics is examined in light of the doctrine of simplicity and panentheism, as models for/of the incarnation.

Finally, in chapter eight I conclude by examining the extent to which holistic ontology can provide, at least an initial, response to addressing the challenge of metaphysical paradox within the doctrine of the incarnation.

A final methodological note which bridges methodology and the literature survey refers to the accessibility and referencing of “classical” texts. I am following in John Cottingham’s esteemed footsteps in my approach to citing the *original* dates on all non-contemporary works (as far as these are known). In his introduction to *Cartesian Reflections* (2008) he notes this is a policy he has ‘consciously adopted for some years in the hope that the habit will spread’ (2008, p. vii). Further he argues that ‘quite apart from issues of pedagogy […], there is something unappealingly parochial about a citation method that reduces the entire sweep of Western thought to a set of modern English editions’ (2008, p. vii). Swayed by his plea and reasoning, the works of scholars such as Aquinas, Nicolas Cusanus, and Kierkegaard are referenced via their original dates, in text. The editions used and their publication dates are listed in full in the bibliography.

# Literature Survey

This literature survey builds on the discussion in the introduction and provides a broad overview of the context in which this thesis has been written. This includes, for example, discussion of the role of critical realism in the science-religion dialogue. Whilst critical realism does not feature explicitly within this thesis it provides the theoretical grounding in which it is possible for this thesis to take place. The other areas of the literature review are more clearly related to the thesis themes: metaphysics and the incarnation, theology and quantum theory, and Christology and quantum theory. The survey engages with select key thinkers in each of these areas and I highlight where I depart from as well as engage with the existing literature. There is a broad range of literature on theology and metaphysics both generally and in relation to the incarnation. There is a small body of work examining the import of quantum theory for our theology, of which a minority has Christology as a key or substantive focus. Finally, I offer a brief framing of the existing discussion of paradox and the incarnation. As noted in the introduction the starting point which frames my discussion is John Polkinghorne’s *Science and Creation* (1988). This is because Polkinghorne’s work represents the first serious attempt to bring theology into constructive dialogue with quantum physics. The work offers a critical realist engagement with the relationship between science (particularly quantum theory) and the Christian faith. It doesn’t provide ‘a bestiary in which I look at an electron and think of Christ’ (2006, p. 111) nor a view in which quantum theory is able to explain theology, but rather a worldview in which ‘each testifies to the rich idiosyncrasy of its own subject’ (2006, p. 111). The works of Polkinghorne, Arthur Peacocke, and McGrath mark a move to a scholarly understanding of the constructive implications of scientific worldviews on our theological discourse.

## A Scientific Prelude

Before engaging with the broader literature is it is necessary to sketch out the scientific context of this thesis. Following Esfeld’s approach in *Holism in Philosophy of Mind and Philosophy of Physics* (2001), the following sections introduce ‘important conceptual features of quantum theory that are new in comparison with classical physics […] the exposition […] is entirely conceptual’ (2001, p. 195). As a theologian drawing on the metaphysical implications of Esfeld and Primas I make use of Esfeld’s conceptual approach, alongside other authors such as Jeffrey Bub (2023), Richard Healey (Healey and Gomes, 2022) and Sisir Roy (2011, 2016) who provide conceptual discussions of the features of quantum theory.

### Entanglement and Measurement

Quantum holism appears to point towards a world that is holistic. This “holism” stems from features of the quantum systems that are ‘first and foremost objects of quantum theory’ (Esfeld, 2001, p. 195). The reason holism is an integral part of quantum theory irrespective of interpretation is because quantum theory resists (metaphysical) division ‘into parts, whose states and properties determine those of the whole they compose’ (Healey and Gomes, 2022, sec. 1). The question is whether this is a methodological, epistemic, or metaphysical thesis. Healey and Gomes describe the metaphysical thesis as:

The extent to which the properties of the whole are determined by the properties of its parts: property holism denies such determination, and thereby comes very close to a thesis of nonseparability. In turn, nonseparability can be analyzed [sic] either as state nonseparability, or as spatiotemporal nonseparability (2022, sec. 1)

It is nonseparability that is the key feature of quantum entanglement. The base “unit” of quantum description is a “quantum system” (these systems include electrons, photons, whole atoms etc.). A system is something that can have either “generic” or “specific” properties. Generic properties cannot be held simpliciter – it must have further description e.g., something doesn’t have mass simpliciter rather it has a certain amount of mass. Specific properties don’t require any further description. All physical properties are generic, however generic properties can also be time dependent or time independent. Those that are time dependent can change during the system’s lifetime (e.g., position, spin, momentum) but time-independent properties cannot (e.g., charge – an electron couldn’t become positively charged without ceasing to be an electron). Time-dependent variables of quantum systems are called “observables”.

The “state” of a system in classical physics consists of an (exhaustive) list of the system’s properties or observables. As Bub notes ‘it is the specification of a set of parameters from which the list of properties can be reconstructed’ (Bub, 2023, sec. 1). Yet in a quantum system it ‘never has a definite numerical value for all its observables at once’ (Esfeld, 2001, p. 197). This means that one cannot provide a definite value for the state of a quantum system *at a given moment in time*. Instead, we can only provide the ‘probability distributions for all state-dependent properties of the system at this point in time’ (2001, p. 197).

Before examining how this relates to measurement and entanglement, it is first worth clarifying what Esfeld means by “incompatible observables” - incompatible *time-dependent* properties e.g., ‘position, momentum, energy, and spin in any direction’ (2001, p. 196). The observables usually described as incompatible (in terms of measurement) are position and momentum. Classically, position and momentum are entirely independent states from one another, restricting or altering one does not impact on the other. The same cannot be said of position and momentum in quantum physics. Not only is it impossible for either to be described using a definite value, the extent of the fuzziness of one is dependent on the value for the other. ‘If the position of the system is such that it has nearly no dispersion, the momentum of the system necessarily has a great dispersion (and *vice versa*)’ (Esfeld, 2001, p. 198). This is known as the Heisenberg inequality. Whilst this is often referred to as the uncertainty or indeterminacy principle, Esfeld argues that such terminology is deeply misleading as it implies an epistemic element to the “fuzziness”. The functionality of position and momentum remain independent in a quantum system yet are interdependent in the sense that only one will have a definite value. This means they are “incompatible observables”.

#### Spin and Measurement

The spin of a particle is a property that a particle has ‘in addition to their location in space’ (Susskind and Friedman, 2014, p. 3). The “spin” of a quantum system (an electron is a quantum system) is best explained through an experimental example as follows[[35]](#footnote-36).

In classical determinism a coin toss is a two-state system (it can show either heads *H* or tails *T*). Within formalism the uncertainty of showing *H* or *T* is called a “degree of freedom” (spin) or $σ$ and it can have one of two values +1 and -1. Each state (*H* or *T*) then becomes represented as $σ=+1$ (Heads) or $σ=-1$ (Tails). In a *classical* system the only states possible for our system are $σ=+1$ or $σ=-1$. For this system between one moment of time $(n)$ and the next $(n+1)$ if nothing happens the system evolves as follows:

$$σ\left(n+1\right)=σ(n)$$

Equation 1

If nothing acts on the system, it stays the same. For now, continuing to focus on a classical two-state system, to measure its state it is necessary to introduce a measuring apparatus $A$. When $A$ comes in to contact with the system $σ$ it records either +1 or -1 and displays this result in a window for us to read, ‘there is also a “this end up” arrow on the apparatus. The up-arrow is important because it shows how the apparatus is orientated in space’ (2014, p. 5).

Initially the apparatus is placed with the up arrow pointing along the $z$ axis. The aim of the experiment is to establish the value of $σ$. Assuming the law in Equation 1 is correct, if we ‘reset the apparatus to neutral, and without disturbing the spin, measure $σ$ again […] we should get the same answer as we did last time’ (2014, p. 6) thus a reading of $σ=+1$ would be followed by $σ=+1$ for *any number* of repetitions, with the same being true for an initial reading of $=-1$ . This is because the ‘first interaction with the apparatus $A$ *prepares* the system in one of two states. Subsequent experiments *confirm* that state’ (2014, p. 7 original emphasis). As such classical and quantum systems are the same *to this point*. Likewise, if, *without disturbing the spin*, we flip the apparatus over by 180o (so the “this end up” arrow in now pointing down) and measure $σ$ again the system that was originally prepared as $σ=+1$ will now read $σ=-1$, and vice versa. If we assume that $σ$ refers to direction in space (or a vector), this is an obvious result of $A$ measuring ‘the component of the vector along an axis embedded in the apparatus’ (2014, p. 8). However, if it referred to a genuine direction in it should be possible to measure three components of $σ$: $σ\_{x},σ\_{y},σ\_{z}$ i.e., it should be describable in terms of 3-dimensional space.

Using the initial set up of $A$, “this end up” points upwards along the $z$ axis, we prepare a new system where $σ\_{z}=+1$. When $A$ is rotated so the arrow points along the $x$ axis, if it were a genuine vector description, we would expect $σ\_{x}=0$. However, when $σ\_{x}$ is measured it still produces a measurement of $σ=\pm 1$. If the experiment is carried out repeatedly, the results appear inconsistent: ‘the repeated experiment spits out a random series of plus-ones and minus-ones’ (Susskind and Friedman, 2014, p. 9). Yet, when the results are examined in their entirety the $σ=+1$ and $σ=-1$ are equal, meaning that the *average* result for measurement of $σ\_{z}=+1$ along the $x$ axis ($σ\_{x}$) is 0. If the experiment is repeated enough times the *average* of those results will equate to the expected classical result *‘at least up to a point’* (2014, p. 11 emphasis added).

A major difference between classical and quantum systems is highlighted in the interaction between the measurement and the system (this is *not* referring to the “measurement problem”[[36]](#footnote-37)). For classical systems a measuring apparatus can have a ‘vanishingly small effect on the system it is measuring’ (Susskind and Friedman, 2014, p. 12). Yet, the sensitivity of quantum systems means that it impossible to measure the system without having an effect – to learn about one aspect of the system you must sacrifice knowledge about another.

For example, if instead of simply repeating the experiment above along the same axis ($z$ axis for example), we measured the spin along the $x$ axis before “confirming” the original measurement, we would be unable to confirm the original measurement. ‘The intermediate measurement along the $x$ axis will leave the spin in a completely random configuration’ with respect to the next measurement (2014, p. 13). The measurement does not destroy the information, rather we cannot *simultaneously* know the spin along more than one axis.

The challenge of measuring a quantum system can be highlighted through a thought experiment testing the truth values of Boolean statements[[37]](#footnote-38). Boolean descriptions are used to describe states in classical systems, a classical system is viewed as a (discrete) mathematical set, with discrete boundaries. If the classical system is a coin, it has two states Heads or Tails, mathematical set: $\left\{H,T\right\}$. If the system is more complex, such as a die, the mathematical set is $\left\{1,2,3,4,5,6\right\}$. Boolean logic doesn’t allow for anything other than true or false (*A*, or *not-A*). Boolean descriptions allow for subsets. ‘Roughly speaking a proposition is true for all the elements in its corresponding subset and false for all the elements not in this subset’ (Susskind and Friedman, 2014, p. 13). For example, it is possible to establish two overlapping propositions[[38]](#footnote-39): $A:The die shows an odd number$; $B:The die shows a number under 4$.

Both propositions deal with subsets of $\{1,2,3,4,5,6\}$. Both subsets have 3 elements: subset A $\{1,3,5\}$ , subset B $\{1,2,3\}$. In Boolean logic it is possible to combine these statements using $ or$, $and$, and $not$. $Not$, only applies to single propositions (or subsets) to describe the negation of a proposition: $not A:The die shows an even number$. $And$ when applied to pairs of propositions, entails both propositions are true. For subsets, it identifies elements in both subsets. For example, $A and B$ would be $\{1,3\}$ as these are the elements that are both odd and under four.

Where Boolean logic moves away from our everyday usage is $or$. In everyday usage an “or” statement is *exclusively* true: i.e., “the ball is on my desk, or the ball is in the garden”. The conjunction is true if one of the statements is true. The Boolean$ or$is true if *either* or *both* propositions are true. This becomes crucial when discussing quantum systems. Borrowing three examples from Susskind and Friedman (Cf. 2014, p. 15):

* 1. Albert Einstein discovered relativity$ or$Isaac Newton was English.
	2. Albert Einstein discovered relativity$ or$Isaac Newton was Russian.
	3. Albert Einstein discovered America$ or$Isaac Newton was Russian.

In (SF1) both propositions are true, therefore the combined statement is true; in (SF2) one of the propositions is true therefore the combined statement is true; (SF3) is the only situation in which the inclusive$ or$is false because both propositions are false.

Therefore, returning to the die $A or B$ produces the subset of $\{1,2,3,5\}$ which contains everything in both original subsets. Crucially Boolean propositions are compatible iff they can be combined into a common classification where the order does not matter i.e., iff $F\rightarrow G=G\rightarrow F$ then the classifications are compatible. However, if the results are dependent on the order i.e. $first F then G$ then the classification is said to be incompatible. The importance of ordering propositions becomes apparent in the worked example below.

To return to the challenge of measurement, initially for a classical system. The experiment uses apparatus $A$ to establish the truth value for the following statements:

$$A^{'}:σ\_{z}=+1$$

$$B^{'}: σ\_{x }=+1$$

These propositions make a Boolean statement regarding the spin along a given axis. $A'$ can be tested by orienting $A$ along the $z$ axis, and $B'$ can be tested by orienting $A$ along the $x$ axis. Both statements also have a negation:

$$not A^{'}:σ\_{z}=-1$$

$$not B^{'}: σ\_{x }=-1$$

It is possible to combine $A'$ and $B'$ into the following propositions:

$$A^{'}or B^{'}:σ\_{z}=+1 or σ\_{x}=+1$$

$$A^{'}and B^{'}: σ\_{z}=+1 and σ\_{x}=+1$$

I will focus on $A^{'}or B'$ for a “classical” spin. To establish the truth of $A^{'}or B'$ one first measures $σ\_{z}$, if the result is $+1$ the proposition is true, and the experiment stops. If $σ\_{z}$ measures $-1$ the experiment continues to gain a value for $σ\_{x}$. Without disturbing $σ$ $A$ is lined up along the $x$ axis and another measurement is taken. If $σ\_{x}$ measures $+1$ then the proposition has been proven true, if $σ\_{x }=-1$ the proposition has been proven false (the measurement produced $not A'$ and $not B^{'}$).

Boolean descriptions are compatible if the classifications are not dependent on the order. For example, if the experiment was reversed, and the $σ\_{x}$ was $+1$, the proposition is true. If $σ\_{x}$ measured $-1$ the experiment needs to continue to gain a value for $σ\_{z}$. If $σ\_{z }=-1$ then the proposition is false, and the same answer has been achieved despite the reversed order.

The same experiment on a quantum system produces radically different results. Prior to the experiment the system is prepared so $σ\_{z }=+1$. $A$ is set up to measure along the $z$ axis, and measures $σ\_{z }=+1$, $A^{'}or B^{'}$ is true. However, if we then measure $σ\_{x}$, the result would be random, but due to the Boolean $or$ , the proposition $A^{'}or B^{'}$ is true. But what happens when we measure $B^{'}or A^{'}$? $A$ is aligned along the $x$ axis and the results for $σ\_{x }$are random. If, the result is $σ\_{x }=-1$, with the system having been prepared $σ\_{z }=+1$, we are in a different situation to the classical system. Once a measurement is taken for $σ\_{x }$ it is no longer possible to confirm the original measurement. This means that as *a direct result of our first measurement* the spin is no longer $σ\_{z}=+1$, but a new state $σ\_{z }=\pm 1$. When $A$ is rotated along the $z$ axis for the second measurement there is a 25% chance that the overall outcome of the experiment will be $σ\_{x}=-1 and σ\_{z}=-1 $and consequently $B^{'}or A^{'}$ will be *false* even though the system was prepared in such a way that the proposition was true.

The key is that in respect to *this* quantum system $A^{'}or B^{'} \ne B^{'}or A^{'}$, the description is not symmetrical. The propositions aren’t compatible because the ordering matters. We cannot simultaneously know both $σ\_{z}$ and $σ\_{x}$ and this means these pairs of properties cannot be held in a single Boolean description – they are *complementary* properties that can both be known, but not simultaneously.

#### Entangled States

Quantum entanglement is the concept that the state of a system cannot be wholly described only in relation to its own properties. In *Quantum Entanglement and the Philosophy of Relations*, Sisir Roy describes entanglement as a nonlocal connection in which two or more ‘constituent objects are linked in such a way that it is not possible to describe the quantum state of a constituent […] without fully mentioning its counterpart, even if those individual parts are spatially separated’ (2011, p. 117). Esfeld adds that in the case of entangled systems we must consider “global observables” of the combined systems. ‘Entanglement means that two or more systems are related in such a way that only these systems *taken together* have properties of certain kinds [global observables] with a definite numerical value’ (2001, p. 204 emphasis added).

Whereas in classical physics systems could be fully described in relation to the properties of their own parts, in what Schrödinger described as *the* characteristic trait of quantum mechanics:

When two systems of which we know the states by their respective representatives, enter into temporary physical interaction […] and then after a time of mutual influence the systems separate again, they can no longer be described in the same way as before. (Schrödinger cited in Maudlin, 2019, p. 55)

This means that whilst we may be able to gain good knowledge of the “whole”, doing so does not provide us with the “best possible” knowledge of the parts (cf. Schrödinger cited in Bub, 2023, sec. 1). However, it is important to note that the consensus definition of entanglement is as a mathematical not metaphysical relationship. For non-entangled systems it is possible to represent the state of two particles within configuration space by multiplying the wavefunctions to produce a single combined *‘product state* of the two-particle system’ (Maudlin, 2019, p. 54 original emphasis). In this situation the behaviour of the two systems are uncorrelated. Mathematically speaking product states are ‘very scarce […] most wavefunctions cannot be expressed [in this way] […]any wavefunction that cannot be so expressed is called an *entangled state*’ (Maudlin, 2019, p. 54 original emphasis).

The *metaphysical* implication of this mathematical challenge is that it implies ‘quantum theory exhibits a form of nonlocality. That is, entangled quantum systems behave as if they can affect each other instantaneously’ (Massar and Pironio, 2012). Precisely what this means is dependent on the interpretation of quantum theory. Michele Caponigro argues ‘the concepts of entanglement and nonlocality are much more subtle and multi-faceted than earlier analyses […] realized’ (Caponigro, 2017, p. 3). It is important to recognise that entanglement (as a mathematical relationship), non-separability, and nonlocality are *not* directly interchangeable. For this thesis, and in line with the positions adopted by Primas[[39]](#footnote-40) and Esfeld[[40]](#footnote-41), entanglement will be taken to imply at least a degree of non-separability and nonlocality. Esfeld qualifies the distinction between non-separability and nonlocality ‘whereas separability refers to the states of physical systems *at a given time*, local action concerns changes in the *states of physical systems* in time’ (2001, p. 208 emphasis added).

Giuliano di Francia exemplifies the challenge posed by entanglement in *A World of Individual Objects?* (1998). At the end of the chapter di Francia briefly addresses the issue of inseparability. He highlights that whilst the EPR “thought” experiment was designed to discredit the Copenhagen interpretation the “actual” experiments undertaken by Bell and Aspect in the sixties and eighties ‘decreed the victory of orthodox quantum mechanics’ (1998, p. 28). Fundamentally the work of Aspect and Bell showed that two particles which had previously interacted, continue to be part of an entangled system, irrespective of spatial distance. They share a common mathematical description meaning ‘a measurement on one of them consequently entails an instantaneous influence on the possible result of a measurement on the other’ (1998, p. 28).

To understand why quantum entanglement is “the” characteristic trait it is worth briefly considering what “classical entanglement” or correlation might look like. This description makes use of aspects of Susskind and Friedman’s description of “classical correlation” (2014, chap. 6). Alice and Bob both have systems that can be described as having various states (*SA* and *SB* respectively). If both systems exist and can be combined into a composite system, there would a combined state space, *SAB,* for the composite system. This would be formed as the product of the states of *SA* and *SB*.

To simplify this example, both systems will be a coin, and courtesy of Susskind and Friedman Alice and Bob will be joined by Charlie. Charlie has two coins (a pound and a penny) and gives Alice and Bob a coin each. No one looks at either coin, and Alice and Bob get on trains travelling in opposite directions (Alice to Canterbury and Bob to Dover). With watches synchronized Alice agrees to look at her coin at 12:52 and Bob at 12:52:02. As soon as Alice looks at her coin, she knows which coin Bob has. If this took place over multiple trips and both kept a record of their results, it would be possible to see a (statistical) *correlation* between the observations. The statistical correlation and probability distribution from the experiments are used because ‘we are ignorant about something that is, in principle, knowable’ (Susskind and Friedman, 2014, p. 159). For example, if Charlie had looked at the coins before passing them on to Alice and Bob the probability distribution would have remained the same. Knowing the state of each part of the system we arrive at knowledge of the state of the whole, knowledge of *SAB* provides knowledge of *SA* and *SB*. As Susskind and Friedman note ‘it would not make any sense to say that Charlie knew everything that could be known about the system of the two coins but was missing information about the individual coins’ (2014, p. 159). However, when it comes to quantum entangled states this is precisely the challenge with which one is faced. But quantum entanglement is not an epistemic challenge. As Esfeld identifies ‘we have to go beyond Bohr’s interpretation to some sort of an ontological interpretation if we are to make a case for holism in quantum physics’ (2001, p. 235).

Just as we can calculate the probability of what will be seen by Alice and Bob in a classical system, the same is true within a quantum system. The mathematical formalism provides a ‘precise […] empirically accurate algorithm for calculating the probabilities of observables’ (Ismael and Schaffer, 2020, pp. 10–11). As Ismael and Schaffer note precisely what this formalism *means* ontologically is a question of debate. The strength of Ismael and Schaffer’s work is that they are ‘for the most part neutral on the accompanying dynamics […] leaving matters of interpretation […] open to the extent possible’ (2020, p. 2). Their focus on nonseparability cuts across a range of interpretations because the nonseparability arises within the mathematical formalism *not* the metaphysical interpretation.

In quantum entanglement states can be assigned to the simple systems of Alice and Bob, but also to complex systems: pairs of electrons, an object and the apparatus used to measure it, even ‘an observer and her physical environment’ (Ismael and Schaffer, 2020, p. 11). Such entanglement isn’t just seen within the formalism, but also the empirical work of Aspect and others. Entanglement only becomes “challenging” ‘in trying to arrive *at a physical understanding*  of how entangled components manage to exhibit such coordinated randomness’ (2020, p. 11).

To return Alice and Bob’s system, if their systems were prepared (in line with the EPR thought experiment) to be $σ=+1$ or $σ=-1$, the total spin of the system *as a whole* is 0. *SAB*is in a singlet state – it is equally weighted that the system is: (s1) Alice Heads ($Aσ=+1$ ) and Bob Tails ($Bσ=-1$) and (s2) Alice Tails ($Aσ=-1$) and Bob Heads ($Bσ=+1$). If Bob and Alice were unentangled systems one would expect the probability to be evenly distributed 0.5 for $σ=+1$ or $σ=-1$ for Alice and Bob individually (or 0.25 for each combination – H:H, H:T, T:H, T:T). However, the system was prepared so that as a whole $σ=0$. This means that some combinations of results *cannot* occur. Alice and Bob cannot both have Heads, or both have Tails. This means that instead of the probability being 0.5 across all outcomes the probability of both H:H and T:T is 0. This can only be the case if *SA* and *SB* are not independent but are entangled as *SAB*. There are three possible explanations for the results with *SAB*: incompleteness of quantum theory (the argument that underpinned the EPR paper), nonlocality and near instantaneous action at a distance, or nonseparability.

The incompleteness theory (proposed in EPR and similar approaches) argues that *SA* and *SB* have definite states throughout the experiment. There is some “hidden variable” which if we were to know it would mean ‘without in any way disturbing the system, we can predict with certainty […] the value of a physical quantity’ (the EPR ‘reality criterion’ cited in Healey, 2020, p. 126). There must be an element of reality that corresponds to the fact that revealing the state of *SA*allows me to know the state of *SB* (without disturbing *SB*). Thus, as this is not included within our current theoretical/mathematical description then quantum theory must be incomplete (cf. Esfeld, 2001, pp. 209–212). Furthermore, if we were able to fully describe the components of an entangled system (*SA* and *SB* in relation to *SAB*) then this would remove the entanglement, or correlation between the two component systems. On this approach the entanglement isn’t a metaphysical feature but an epistemic limitation.

The EPR, incompleteness hypothesis, is generally understood as being incorrect due to the experimental results of Aspect et. al. that shows there is no way to account for the correlations without ‘positing some sort of superluminal signalling or some form of non-local influence’ (Ismael and Schaffer, 2020, p. 13). Furthermore, the idea of incompleteness being caused by our lack of knowledge is ruled out on mathematic grounds as ‘hidden variable theory cannot consistently assign values to *all quantum observables at all times’* (2020, p. 13 emphasis added).

If nonlocality is implied by EPR and could account for the appearance of entanglement why is this not a suitable solution? Nonlocality implies a *causal* relationship between observing the state of *SA,* and *SB* coming to be in the “appropriate” state. Alice measuring *SA* as $σ=+1$ *causes* *SB* to be in $σ=-1$ irrespective of the distance between the two systems. Such “signalling” would require the existence of either instantaneous or “backwards” causation. Instantaneous causation would require a preferred space-time reference frame, ‘which looks to violate the spirit if not the letter of relativity’ (Ismael and Schaffer, 2020, p. 14), whilst backwards causation has no evidential basis.

Esfeld (2001, pp. 219–223) argues the appearance of nonlocality can be explained without the need for superluminal signalling, because in performing the measurement on *SA*we are not making a *local* change. Thus, the interaction with *SA* doesn’t influence *SB* but rather impacts *SAB* of which *SB* is a part. There is no “local” change in *SB* – the “local” changes only occur when a local measurement occurs on *SB* directly. The measurement of one part influences the *probability* of the result of a measurement on the other, but that is all.

In the case of both nonlocality and incompleteness physicists must add to the formalism of quantum mechanics to overcome the appearance of problematic metaphysics. This is even though the formalism both theoretically and experimentally is incredibly successful and only requires use of quantum states of systems (without additional variables etc). Thus, it seems pertinent to assume that quantum entanglement is caused neither by incompleteness nor nonlocality, but instead due to an ontological holism.

The following section will discuss the metaphysical implications of entanglement, especially why this may mean that irrespective of Esfeld’s and Primas’ interpretations of the metaphysics, quantum theory may be inherently holistic. The holism stems from the fact that if “entanglement” is caused by mere interactions, and, as seems incontrovertible, any particle in the universe has previously interacted with other particles ‘the world [apparently] turns out to be *nonseparable* into individual and independent objects’ (di Francia, 1998, p. 28).

#### Entanglement “as” Holism

There are two linked terms associated with entanglement: holism and nonseparability. The extent to which these terms are synonymous depends on the definitions and context in which they are being applied. If holism is the thesis that “the sum is more than its parts” then nonseparability is the thesis that ‘the state of the whole is not constituted by the states of its parts’ (Healey and Gomes, 2022, sec. 1). Within a classical framework a system can be broken down into parts whose properties and states determine the properties and states of the whole of the complex system. Within a quantum system the “state” describes the ‘chances of [the system] exhibiting various properties *on measurement*’ (Healey and Gomes, 2022, sec. 1 emphasis added). If states are solely understood in terms of mathematical specification of probability this isn’t metaphysically problematic. However, if state descriptions also have a role in defining metaphysical (or categorical) properties of the system, then state nonseparability may imply ‘*metaphysical* holism and nonseparability’ (Healey and Gomes, 2022, sec. 5 emphasis added).

Metaphysical holism, within physics generally, maintains that physical objects/systems are not ‘wholly composed of basic physical parts’ this does *not* imply that physical systems include a nonphysical component. Instead, the challenge to metaphysical reductionism rests in objecting that there are basic, discrete, parts for objects/systems to be reduced to. This ties into Ismael and Schaffer’s definition of nonseparability, which in line with Healey, and Esfeld uses separability to refer to space-like separation. The nonseparability thesis maintains that all there is to know about *SAB* is contained within the description of the whole system, and that the description of *SAB* contains information that is not within the descriptions of (and spatial relations between) *SA* and *SB*individually.

Ismael and Schaffer argue this leads to nonseparability and the events of *Alice-up* and *Bob-down* are modally connected with neither being able to occur without the other. They argue this provides evidence for *Alice-up* and *Bob-down* having a common holistic and non-causal ground. It cannot be causal as these are fundamentally asymmetrical, unlike the relationship between the events *Alice-up* and *Bob-down* in which there is a symmetrical instantaneous connection. In this “grounding” relation, the whole (*SAB*) must ground the parts. The entanglement is explained by the system as a whole and they go as far as claiming that the wholes are *fundamental* not the composite parts - *SA* and *SB*‘exist derivatively, as fragments of the whole’ (2020, p. 20).

This metaphysical interpretation of the implications of entanglement is not limited to contemporary accounts. Whilst the use of “hidden variables” was discussed as an approach which avoids genuine holism, ‘the most elaborate […] approach in terms of hidden variables [Bohm’s] […] is associated with holism too’ (Esfeld, 2001, p. 235). Bohm’s interpretation has been recognised as implying an ‘undivided holism’ (Maudlin, 1998, p. 49) at the metaphysical description of reality. Bohm’s view can be understood as a general metaphysical holism, in which the system cannot be understood as a discrete physical object that is an ‘independently existing component part of the apparatus-object whole’ (Healey and Gomes, 2022, sec. 9). Such an approach allows for the genuine existence of physical objects, but views these objects as being somewhat "relative” they are not ‘many independent entities, but […] diverse manifestations of a single and unbroken reality’ (Smith, 2005, p. 77). Bohm’s approach recognises that the quantum system (such as *SAB*) is an undivided whole that cannot be described in terms of the (predetermined) relationships between the parts. However, Esfeld argues that Bohm falls short of endorsing metaphysical holism as he ‘identifies non-locality with indivisible wholeness and non-separability’ (2001, pp. 237–238). Thus, failing to account for the distinction between non-separability and non-local action. Because this account introduces a “hidden variable” the relationship does not become one of holism, the new variable (quantum potential) does not mean interaction is (or requires) holism.

In addition to Bohm, Healey and Gomes (2022, sec. 9) identify Niels Bohr’s account as holistic. Bohr’s account proceeds from a different direction by arguing that because we can only ascribe definite measurements within an experimental context then nothing can be meaningfully said about the properties of a quantum system outside the experiment. Although the phenomenon itself is physical ‘it is not composed of distinct happenings involving independently characterizable physical objects’ (2022, sec. 9). Whilst Bohr held that quantum mechanics is an epistemic rather than ontological theory, his work arguably proposes a form of holism as one cannot refer to the ‘measured system without referring to the measuring instruments’ (Esfeld, 2001, p. 233). Despite this his adherence to an epistemic view of quantum mechanics prevents it being a truly metaphysical proposition.

Whilst this discussion is not exhaustive it starts to highlight the way in which “textbook” quantum mechanics can be viewed as holistic and the role that a realist interpretation of entanglement plays creating a need to posit ontological holism at some level.

### The “Waning of Materialism” and the Existence of the Immaterial in the World of Science

Within this thesis there are frequent distinctions between material/immaterial and/or physical/non-physical. There are two reasons for reinforcing these dichotomies. Firstly, holism as a metaphysical position stands in contrast to positions like dualism for which an essential distinction is made between the “material” and the “other”. Secondly, realist theologies assume that divinity is, in a meaningful sense “non-material” and this is true even within positions such as “materialist” Christianity. The purpose of this section is not to discuss the (non-)existence of abstract objects such as numbers, nor whether entities hypothesised by our scientific theories exist. Instead, I will discuss the distinction between the corporeal and physical world, before focusing on the question of whether our physics is grounded in an ontology of “matter”. The following is not exhaustive but highlights the contested nature of terms such as physicalism/materialism and some of the issues associated with informational reality.

The term materiality is more contested now than in previous centuries. Works such as *Information and the Nature of Reality: From Physics to Metaphysics* (Davies and Gregersen, 2014) and Koons and Bealer’s (2010) *Waning of Materialism*, highlight the changes in the “perceived” incontrovertibility of the world being made up of “stuff”. In *The Quantum Enigma* (2005), Wolfgang Smith distinguishes the “corporeal” world that is ‘the sum total of things and events that can be directly perceived by a normal human being’ (2005, p. 27), from the “physical universe”, or the world seen by the physicist. The two are epistemically distinct. The physical universe unlike the corporeal universe is viewed via *measurement*:

Physical objects are then known by means of a suitable model, a theoretical representation of some kind […] object and representation do not coincide […] one cannot know or even conceive of a physical object except by way of a model, or theoretical construct. (Smith, 2005, p. 31)

Whilst contemporary physics does not require us to adopt a seemingly Kantian approach to ontology, we *are* faced with pertinent questions about the nature of the material/physical realm[[41]](#footnote-42). Because of this the terms materialism and physicalism have become contested. When we speak of physicalism as ‘the idea that all existent entities in the world are of a physical nature’ (Ludwig, 2018, p. 285) – with the consequent implication that *all* the properties of those entities are also physical (or can be related to physical properties) – there is an implication that one must adopt a strictly reductionist view in which the objects of the special sciences will be describable in terms of fundamental physics, despite the ‘explanatory limits of the scientific theories at any given moment in history’ (2018, p. 313).

Smith’s distinction between the corporeal world of sense perception and the “moderated” world of the physical (of the physicist) universe which ‘“comes into view” by way of measurement’ (2005, p. 31) highlights the role of models in our scientific understanding, and the reasons why some may adopt an instrumentalist approach. Despite a lengthy discussion that scientific observation only provides data about the interaction between a “sub corporeal” instrument and the object in question, Smith doesn’t really address the question of the nature of the “physical” in scientific thought. The idea of the unobservable in science is also picked up by Chakravartty. He notes that science is “littered” with metaphysical inferences ‘because most sciences appear to take a very strong interest in unobservable objects, processes, and properties that are hypothesized to underlie the phenomena that scientists observe’ (2020, p. 40).

However, the current challenge, is how one responds to our ever-changing understanding of “matter”. In *Universe from Bit* Paul Davies describes the problem as follows:

Apparently solid matter is revealed, on closer inspection, to be almost all empty space, and the particles of which matter is composed are themselves ghostly patterns of quantum energy, mere excitations of invisible quantum fields, or possibly vibrating loops of string living in ten-dimensional space-time. (Davies, 2014, p. 83)

He goes on to argue that with first relativity and then quantum theory physics moved away from having the “physical universe” as the fundamental ground of reality to mathematical formalism. As such our only option is to ‘treat the physical universe as if it simply *is* mathematics’ (2014, p. 86 original emphasis). As seen with Gregersen’s work, it may be that the fundamental “stuff” of reality is not matter, but information. Conversely Richard Wang notes an increasing body of literature describing information *as* matter, thus complicating the demarcation. Wang argues that whilst our information *processes* and *representations* may be physical the information is not. Non-physical entities are clearly distinguishable from the physical world as they do not obey the laws of physics (Wang, 2022, p. 4).

Although slightly outside the chronological scope of this thesis, Charles Minser perhaps most accurately captures the challenge of defining “matter” in his paper *The Immaterial Constituents of Physical Objects*. “Material substance” is on the defensive: ‘reduced at most to scattered specks in the emptiness, its garrisons pulled together in isolated posts’ (1978, p. 2). Furthermore, it has been “spatially” diminished, and our understanding of it has also reduced. Our understanding has shifted from its nature, to ‘the interactions among them [the particles]. We do not say, what an electron is, but we do write laws for how it interacts with photons and other electrons’ (1978, p. 2). Misner goes on to argue that it is both this fundamental relationality and the role of fields in our contemporary understanding of science that give rise to a picture that is ‘radically anti-materialistic’ (1978, p. 4). The explanatory power lies in ‘immaterial constituents – the design relationships – in the object it [science] analyses’ (1978, p. 4).

Whether one wishes to stand with Misner and grant that our “physical” objects are constituted by the non-physical, there can be no question that what we mean by “matter” now is very different to the implied material/immaterial distinction in Chalcedon. Thus, whilst the scientific discussion may have become more open to the acknowledgement of the non-physical, this appears to be within a different frame of reference to the kind of immateriality implied in discussion of the divine as “non-material”. There is no escaping that material and physical are contested terms, but the metaphysical baggage they contain is, I argue, one of the reasons that the incarnation has the appearance of paradox. Therefore, within this thesis I will use the terms (material/physical) interchangeably to imply an entity or substance that is scientifically observable. As Smith noted it has to be recognized that there is an ontological distinction between the corporeal and physical worlds that ‘cannot be closed through the mere aggregation of so-called particles’ (2005, p. 51), particularly when the former exists ‘in relation to the totality which includes also […] a conscious or subjective pole’ (2005, p. 13). Primas supports this line of argument stating that the ‘well-confirmed holistic character of the material world casts severe doubts upon the consistency of the Cartesian separation’ (1994c, p. 611) and yet every experiment requires a fundamental dualism to distinguish between subject and object. Therefore, he argues, a (scientific) materialist ontology is incomplete because it is ‘incapable to deal with the *complementarity* of matter and spirit’ (1994c, p. 611). Whilst both Primas (explicitly) and Esfeld (more implicitly) point towards the existence of the non-physical, both view this as “beyond” scientific investigation. However, given Misner’s inclusion of fields within the non-physical it may be argued that Esfeld ends up addressing the non-physical more directly than Primas.

### The Challenge of Interpreting Quantum Mechanics: Primas and Esfeld in Context

One of the challenges of extrapolating the metaphysics from the formalism of quantum mechanics rests in the number of interpretations. The key distinction that needs to be addressed is whether one views quantum formalism as a predictive tool (instrumentalism) or as a description (to some extent) of reality (realist). For holistic quantum theory to have relevance for our theological discussion one must adopt a realist interpretation.

Beyond the requirement for a realist interpretation, the various interpretations of quantum theory can have radically different implications for theology. For example Emily Qureshi-Hurst’s work (e.g. 2023) addresses the particular challenges for soteriology and identity in light of the Many-Worlds interpretation, whereas Jeffrey Koperski focuses on the Copenhagen interpretation to support his discussion of divine action (2015, chap. 4). Whilst some interpretations contain their own degree of holism such as de Broglie’s pilot wave theory (sometimes referred to as Bohmian mechanics, discussed above) the challenge of basing one’s (theological) approach on a specific account resides in the fact that the entire argument can be dismissed with appeal to an alternative interpretation. This is where the true strength of both Primas and Esfeld’s ontological interpretations lie. Esfeld acknowledges that ‘not any ontological interpretation of quantum theory implies holism’ (2001, p. 235). However, provided that the interpretation is realist and does not allow for hidden variables Esfeld’s approach does not require us to ‘have to commit ourselves to one specific ontological interpretation of quantum theory’ (2001, p. 239). This is re-emphasised later on:

To speak of holism in the domain of quantum physics, we have to endorse a *minimal ontological interpretation* of quantum theory […] an ontological interpretation regards the probabilities in quantum theory as objective probabilities. *But in order to make the case for holism, we are not* committed to a particular version of an ontological interpretation of quantum theory or a particular conception of objective probabilities (Esfeld, 2001, pp. 242–243 emphasis added)

Likewise, Primas’ work focuses on distinguishing between ontic and epistemic interpretations of quantum theory (in particular Atmanspacher and Primas, 2003 although it is a repeated theme). However, he does not require the adoption of any singular interpretation. His commitment to the contextuality of interpretation means that he agrees with Bohr’s lack of a formal definition of complementarity (Primas, 2007, p. 17), although he doesn’t commit himself to Bohr’s interpretation. From a formalism perspective Primas does disregard Bohmian, GRW, and Many-Worlds interpretations as they ‘make use of ad hoc assumptions such as hidden variables or quantization procedures’ (Atmanspacher and Primas, 2003, p. 3 Cf. Primas 1994 p. 617) however whether these are fundamentally incompatible or simply disregarded isn’t addressed. Given that for both Esfeld and Primas the major requirement is a realist account of entanglement that allows for ‘wide-ranging holism’ that goes beyond just pairs of quantum systems, it is arguable that Primas has a similar breadth of applicability to Esfeld. In much the same way as Ismael and Schaffer’s discussion of nonseparability was strengthened by its breadth of applicability, it is the breadth of potential application across realist interpretations that underpins the decision to focus this thesis on Primas and Esfeld’s approaches rather than a single interpretation.

## Critical Realism and the Science-Religion Dialogue

It is not necessary to offer a broad history of the role of critical realism for theology here (a task already undertaken by Andreas Losch (2009)). However, I will address the work of Polkinghorne and his contemporaries on the role it plays in framing a constructive dialogue between science and religion. Polkinghorne refers to the need for critical realism in many of his works, yet the clearest arguments are to be found in *Belief in God in an Age of Science* (2003) where he argues that ‘in their different ways and in their different domains, each is concerned with the search for truth’ (2003, p. 100). It is this belief in critical realism in relation to both science and theology that allows for the use of scientific metaphysics in our theological thinking. The place of critical realism isn’t unique to Polkinghorne however and can be seen in the earlier works of Barbour (1971, chap. 6) and Peacocke[[42]](#footnote-43) as well as contemporary work by McGrath (2019, chap. 2).

Of relevance here are Barbour’s comments on the symbolic nature of scientific language. He highlights the need for a non-literal understanding of scientific theories and a recognition that scientific theories/language (particularly in relation to the description of theories in physics) have often been understood considering *naïve* rather than *critical* realism. It is the ‘*abandonment of picturability’* (1971, p. 157 original emphasis) within contemporary science that speaks to the relevance of our scientific metaphysics and language to our theological discourse. Within science we are dealing with a world that speaks of a reality different to our everyday understanding, where only the use of ‘highly abstract symbolism’ can describe a “world” which is ‘inaccessible to direct observation, and inexpressible in terms of the senses; we are unable to even imagine it’ (Barbour, 1971, p. 158). This has distinct echoes of the challenges faced by the theologian. In *The Territories of Human Reason* McGrath speaks to Roy Bhaskar’s critical realist framework as affirming ‘the ontological unity of reality, whilst recognizing that this unity expressed itself at different levels’ (2019, p. 67). These different levels not only refer to knowledge that can be gained through different disciplines but also the methods that are available at each level. Baskar’s approach has echoes of T. F. Torrance’s comments that science and theology can and should each give an account of (their) reality ‘according to its distinct nature’ (1969, p. 10). Although both approaches accept and reaffirm a stratified account of the nature of reality, neither seeks to claim a reductionist model in which the lower levels determine the nature of those above. Again, the key message is that ‘the complexity of the world requires the use of multiple levels of explanation, both within the natural sciences and beyond’ (McGrath, 2019, p. 66).

It may appear that such models of critical realism sit directly in opposition to the need for theological metaphysics to be informed by scientific ontology, precisely because of this call that each discipline can and should focus on its correct “object of study”. However, to adopt this position is to fall into a category mistake that the objects of study for science and religion (the very realities they seek to describe) exist in entirely distinct and unrelated spaces. Instead, critical realism should be understood as offering a conceptual framework in which our discussions can take place that allows for a deeper understanding than that provided by a reductionist model (when the natural sciences sit in a hierarchy of explanation with the higher-level strata of emotions/consciousness etc, being explained/determined by more fundamental levels). To develop a full and rich understanding of the nature of our reality we must understand that these perspectives or levels of enquiry are bounded by *our* conventions not the intrinsic nature of the reality they describe. The “object” of Christian theology’s study is ‘God’s self-revelation in Christ’ (McGrath, 2019, p. 68). This revelation took place in and through the world described by the natural sciences. Therefore, our theological framework needs to find a way to hold the reality revealed by and through Christ in correlation or integration with the reality of the world He came in to (described by the natural sciences) so that we can develop a richer, more nuanced understanding of our reality that doesn’t try to reduce or explain away its richness.

The key to the use of critical realism in both theology and science rests neither in a claim that everything can or will be adequately explained, nor in a claim that analogy does not serve a valid descriptive role in our discussions. Instead, critical realism requires the scholar to acknowledge the incompleteness (and limitations) of our current understanding of the nature of reality. Thus, when applying scientific metaphysics to the “paradox” of the incarnation a critical realist framework cautions us to recognise that scientific metaphysics allows for as much “ontological openness” as our theological metaphysics: we must recognise that we are not ‘limited solely to the description offered by a methodologically reductionist physics framed only in terms of the exchange of energy between constituents’ (Polkinghorne, 2005a, p. 35). The strict mechanistic reductionism proposed by Newton gave ontological priority to the “lowest level”, or most fundamental building blocks. Contemporary science, on the other hand, has shown that ‘“reality” is not confined to the physico-chemical alone’, entities at “higher" levels are just as real and ‘there have long been good grounds for not granting any special priority to this [lower level] of description’ (Peacocke, 2009, p. 259). Critical realism, therefore, recognises the challenge of both disciplines in striving to adequately explain the nature of reality – both science and theology are subject to a level of analogy and incompleteness within their descriptions. Acknowledging this incompleteness also recognises that science does not have privileged access to reality “as it is”[[43]](#footnote-44).

## Incarnation and Metaphysics

As noted in in the introduction the incarnation requires engagement with our mundane metaphysics. The focus of this metaphysical engagement is often the nature or composition of persons (in many senses an implicit drive to address the “paradox” of Christ’s full humanity and divinity). Recent and notable works by Le Poidevin (2009a, 2009b, 2011), Thomas Senor (2007, 2011), Brian Leftow (2004, 2011) and Michael Gorman (2014) to name a small sample, have focused on trying to align our doctrinal account of Christ as fully God and fully human with a metaphysically coherent view of personhood.

These discussions along with the work of Eleanor Stump (2004) on Aquinas’ metaphysics show a scholarly return to an examination of the reduplicative strategy or *Qua* propositions. The reduplicative strategy is the process of attempting to reconcile the apparent incompatibility of Christ having both divine and human properties. On this approach individual properties are attributed to him “in light of” (*qua*) his being divine or “in light of” his being human. The qua propositions will be examined further in chapter 3, however, both the reduplicative strategy and compositional accounts attempt to make sense of the incarnation by dividing properties into discrete ontological categories that are viewed as mutually exclusive. This adherence, even if assumption rather than proclamation, to an ontological binary identifies why it is important to move our discussion beyond these terms. The reduplicative strategy highlights the unquestioned nature of our assumption that the world is divisible into parts. For example in his abstract to *Identity and the Composite Christ* Le Poidevin states that the *only* solutions to avoiding paradox when viewing Christ as a composite being are: ‘[1] to choose between modifying the orthodox understanding, adopting a philosophically and theologically contentious perdurantist account of persistence through time, or [2] rejecting altogether the idea of a composite Christ’ (2009a, p. 167). Despite challenging the notion that it is the ascription of properties to parts that is problematic for understanding Christ holistically, it is still the case that none of these “solutions” challenge the idea that it is the reductionist ascription of properties of parts that is problematic in and of itself. The metaphysics that drives Le Poidevin’s claim that one must either adopt a contested account of time/identity or deny the composite Christ places divine and human in discrete categories. It is this categorisation that holistic metaphysics challenges.

The commitment of contemporary theology to clarify and reconstruct its metaphysics is evidenced by edited volumes such as Marmodoro and Hill (2011) and Davies et al. (2004) as well as monographs such as those by Cross (2002). A cursory glance at these volumes shows that responses to the metaphysical paradox of the incarnation range from questioning how we are to understand “natures” (Cross, 2002; Daley, 2004; Swinburne, 2011); to how are we to understand the relationships between the different “parts” of the incarnation (Cross, 2002; Stump, 2004; Crisp, 2011; Flint, 2011; Leftow, 2011) and whether some form of “emptying” of properties (Kenosis) offers a solution (Evans, 2004; Davis, 2011; Senor, 2011). Kenosis produces a unique set of challenges that move beyond the scope of the thesis. Likewise, the question of what is meant by “natures” and hypostases focuses more on concerns relating to medieval theology and therefore doesn’t support the development of theological metaphysics in relation to contemporary thought.

For these reasons the question of metaphysical paradox (in chapter 3) is informed by Leftow’s categorisation of eight possible identity relationships between three ‘concrete objects: God the Son (GS), i.e. the second person of the Trinity, a human body (B), and (if there are such) a human soul (S)’ (Leftow, 2011, p. 20). The eight accounts identified sort into two broad categories: first those in which GS becomes wholly or partially constituted by matter/a material object; second those in which GS becomes wholly or partially constituted by a soul (or something “relevantly like” a soul). Thus, we are faced with an apparent choice between a materialist metaphysics (akin to the one presented by Newtonian science) or a dualist metaphysics that implies a Rylesian Ghost in the Machine and/or a particular understanding of the relationship between body and soul such as seen in Swinburne that requires a “person” to be a ‘body-soul composite’ (Leftow, 2011, p. 22). The wider literature including whether materialism or dualism is a preferable metaphysics for incarnational discussion is examined in chapter 3 and therefore won’t be pre-empted here.

Whilst much of the literature on the incarnation focuses on the traditional dualist-physicalist dichotomy there are an increasing number of monographs and edited volumes that provide different perspectives on incarnational metaphysics, either directly or through their engagement with divine metaphysics more broadly. Notable texts that have adopted an alternative theistic approach include James Dolezal’s *God Without Parts* (2011) that involves a metaphysical exploration of God’s simplicity including questions of God’s composition. Despite the text not engaging with scientific metaphysics, its discussions of mereology (Dolezal, chapter 2) provide a pertinent counterpoint to the examination of Primas’ own part-less metaphysics in chapter 7 of this thesis.

The edited volume by Davies and Gregersen *Information and the Nature of Reality* (2014) examines the implications of a radical shift of metaphysics to reality as information, including for theological concepts of matter and Christology. As Clayton notes in his contribution:

No “primary matter” serves as the basic stuff out of which all else is composed […] the deeper one pursues the explanations, the more non-materiality reveals itself in (or behind) the solid objects around us. […] no over-quick leaps into metaphysics will help […] only a partnership of scientists and philosophers will make it possible to formulate an adequate post-materialist theory of the natural world. (Clayton, 2014, p. 73)

Similar themes are found in Gregersen’s own chapter that addresses the impact of a move away from an assumed cartesian dualism: ‘the concept of matter is undergoing serious revisions. The visibility, indivisibility, and locality of old-style materialism have gone’ (2014, p. 418). How Gregersen applies this to his own incarnational metaphysics is explored in chapter 8 of this thesis. The conception of information as the fundamental building block to reality gives rise to its own set of metaphysical questions, including the anticipated interactions in the God-information-creation relationship.

A final alternative approach is offered in Paul Tyson’s *Returning to Reality* – Tyson opens by arguing ‘we avoid thinking about metaphysics at our very great practical peril. And where theology is concerned with reality, and with primary reality; it is *inescapably metaphysical*’ (2014, p. 12 original emphasis). He argues strongly against a physicalist account of reality, despite also acknowledging that:

Functionally […] there is no practical difference between the assumed realisms of a materialist non-Christian and a “supernaturalist” Christian – to both the here-and-now world operates within an entirely natural, entirely non-spiritual realm as known by objective science (Tyson, 2014, p. 88)

There are potential echoes of Primas’ non-physicalist metaphysics. However, whereas Dolezal maintains a focus on metaphysics as ontology, Tyson focuses on the need for the Christian community to re-develop their account of reality structured around meaning and value (attributed to Logos and the goodness of God respectively). Although providing an interesting contrast to Christian materialism, this work doesn’t address the kind of metaphysics that is being discussed within this thesis (although it has the potential to be brought into an interesting dialogue with Gregersen’s work on “deep” incarnation). Many of the alternative metaphysics’ noted above have informed my outworking of the implications of Primas’ and Esfeld’s metaphysics into the theological context. However, this work doesn’t present a direct adoption of the alternative metaphysical positions above, rather they have shaped my conclusion about the possible nature (and challenges) of Primas’ part-less ontology and Esfeld’s (potentially) radically relational ontology.

## Theology and Quantum Theory

Broadly speaking quantum mechanics and theology are brought into dialogue through three key themes: (a) the role of scientific theories/concepts as analogical tools; (b) the role of emergence in challenging purely reductionist metaphysics; and (c) more generalised discussions about the implications of quantum ontology for theology. If we understand Christian theology to be the disclosure of an objective reality, then our creeds may be understood as the theological equivalent of scientific theorems – neither creed nor theorem can be assumed to be correct ad infinitum, each must be checked and tested against our changing understanding of reality to ensure continued validity. This is not to say that faith is to become grounded in mere societal norms, subject to be changed at a whim, but rather to acknowledge that our understanding of the nature of reality has changed since the creeds were originally written.

### As Analogy

The first theme, exemplified by theologians such as Simmons, is a purely analogical engagement with aspects of quantum theory. Simmons’ work is discussed because it is both scientifically and theologically rigorous, which cannot be said of all works (for example, those by Goswami). An indication of the rigour of Simmons’ short volume is that it is endorsed by both Philip Clayton and Ian Barbour. Simmons’ approach is more in line with McGrath’s “doctrinal” method and maintains that ‘major concepts in physics [should be used] as metaphors for reflection on a panentheistic model of the Trinity’ (2014, p. 143). This kind of modelling approaches quantum theory as a conceptual tool that acts as little more than a temporary “psychological aid” (Cf. Barbour, 1984, chap. 4 for a discussion of Braithwaite). Although it is important to recognise the role that analogy and metaphysics play in the development of religious language regarding the ineffable, purely analogical approaches to scientific metaphysics are problematic. In the case of Simmons, it has led to a focus on the conceptual rather than metaphysical content, whereby our understanding of each hypostasis ‘depends on what we are seeking’ (2014, p. 152) because ‘divine reality expresses itself in multiple ways’ (2014, p. 153) that we are only able to partially access.

This response not only appears to border on modalism, but also dismisses the *ontological* implications of the shift in scientific understanding of reality. Even though I ultimately ascribe primarily conceptual usefulness to Esfeld’s ontological model, this rests in part on the need to further examine how “relational” ontology can be understood, and not on any dismissal of the metaphysical value (see chapter 6). This is not to say that Simmons doesn’t adopt a realist approach to the *interpretation* of quantum mechanics; but by only treating the science-theology relationship as conceptual, he misses the more radical (and profitable) interaction. Simmons takes up d’Espagnat’s account of the inaccessibility of reality to argue that it ‘seem[s] that in relation to both the ultimate character of physical reality in physics and the nature of God in theology, human comprehension is driven to analogy and metaphor’ (2014, p. 140). When viewed considering Clayton’s cover endorsement of *Entangled Trinity* that ‘these pages interweave the *mystery* of God who is Three in One with the *mysterious* new insights of quantum physics’ (emphasis added) there is a risk that purely analogous use of scientific concepts is intended to avoid the need for further investigation. This has echoes of P. J. Fitzpatrick’s concern that mystery (and I argue potentially analogy) is sometimes invoked when an appeal for greater intelligibility/clarity around the concepts discussed would be more useful (2006, pp. 83–85). I am undertaking an entirely different approach to the interaction between quantum theory and theology by investigating the implications of the metaphysical rather than conceptual shift brought about by the “new physics”.

### And Emergence

The second theme focuses the on the potential opportunities provided by emergence. The scientific account of emergence addresses the “emergence” of new properties or phenomena at the macroscopic scale that cannot be accounted for at the microscopic scale. Emergence isn’t unique to quantum mechanics; however, emergence is often held in opposition to a strictly reductionist ontology - all properties/laws etc can be explained by the (interaction of) the lower-level properties that constitute the higher-level entity. The novelty provided by quantum mechanics is the appearance of indeterminism and a potential ontological and/or causal break between the micro and macro realms (see Kronz and Tiehen, 2002 for a detailed discussion of emergence and quantum theory). For this discussion, it is not necessary to examine the details of this relationship except to say that the indeterminism-quantum theory link is often implicit in theological examinations of emergence which draw on physics. The broader emergence and mind-matter interaction (including the work of Murphy, Clayton and Gregersen) tends to focus on the emergence of consciousness and although this raises interesting theological questions, it falls outside the scope of this thesis.

In *Science and Creation* Polkinghorne clearly highlights the place of emergentism (with respect to novel creation) and reductionism within our understanding. He argues that whilst the universe may be formed of fundamental particles (such as quarks, gluons, etc.) with the increase in complexity at each level, new possibilities such as life or consciousness that couldn’t have been formed by the quark in isolation, become possible. To claim that life, or consciousness can be reduced to the levels below (as a strong reductionist would require) is ‘inadequate to describe the world of our experience’ (Polkinghorne, 2006, p. 47). This is a theme picked up again in *Exploring Reality* (2005a) where he builds on the discussion with regards to causal relationships in the world.

Because of the focus on the metaphysics of Primas and Esfeld this thesis does not explicitly engage with emergence. However, under the remit of Esfeld’s systems approach, the discussion of properties and their relationship between the whole and its constituents raises similar issue to those seen in the emergence debate. Indeed, it would be possible to argue that the top-down account, discussed in chapter 6, is an example of emergent metaphysics. Whether the “emergent” interpretation remains if one adopts a fully relational ontology requires further investigation, yet it serves to highlight how this thesis opens the dialogue for further research.

### Broader Ontological Interaction

The final area of engagement between theology and metaphysics that is relevant to this thesis are those works that engage more broadly with the implications of a quantum ontology for theological discussion. Texts within this theme tend to take a more generalised view – rather than focusing on specific theories or doctrines. But they can highlight matters relevant to incarnational discussion. Polkinghorne’s work will be returned to in this section alongside the work of Jeffrey Koperski (2015, 2020) and (briefly) David Alcalde (2019).

Surprisingly for a physicist and priest, Polkinghorne’s explicit remarks on ontology and metaphysics are few and far between. His works spend much of their time (re)iterating the constructive dialogue to be had between science and theology. This is the case in the opening pages of *Science and Creation* when he states:

[It is] as idle to suppose that one can satisfactorily speak about the doctrine of creation without taking in to account the actual nature of the world, as it would be to think that the significance of the world can be exhaustively conveyed in the scientific description of physical processes (1988, p. 2)

When he does engage in the issues explicitly, it tends to be within the context of (dis)order, indeterminism, and questions around causality. In *Exploring Reality,* he discusses the challenge (for the physicist) of there being no empirical grounds to decide between the different accounts of quantum probability – whether probability is an epistemological or ontological feature of quantum mechanics. In deciding between the two accounts the decision-making criteria ‘shows very clearly that questions relating to causality cannot be settled on strictly scientific grounds alone, but they call for *acts of metaphysical assessment*’ (2005a, p. 14 emphasis added).

His greatest level of engagement with metaphysics is to spell out that science *is doing* metaphysics, even when this is only implicit in the scientists’ thinking (1994, pp. 9–10, 2011, pp. 22–25). Polkinghorne tends to skirt around the “hard” metaphysical questions of this interaction to focus on the more pastoral or exegetical questions. However, there are two exceptions. In *The Faith of a Physicist* he engages more extensively (1994, chap. 1) with the material-immaterial divide. Here after emphasising the inadequacies of both materialism and dualism he adopts what he terms a “dual-aspect monism”. Under this model:

[T]here is only one stuff in the world […] but it can occur in two contrasting states (material and mental phases, a physicist would say) which explain our perception of the difference between mind and matter (Polkinghorne, 1994, p. 21)

This account becomes all the stronger when he links it to the idea of complementarity. Arguing that embedded interrelation between “mental” and “material” (despite their qualitative differences) ‘is strongly reminiscent of the quantum phenomenon of complementarity’ (1994, p. 24). He goes on to claim that when used correctly complementarity ‘succeeds in linking together concepts which otherwise would seem to be categorically disjoint’ (1994, p. 24). This brief statement of ontology is strongly echoed, in implication if not approach, in Primas’ writing about the move away from dualism.

The second place in which he engages further with the ontological implications is in *Exploring Reality* where he examines the question of causality in a quantum world that allows for indeterminism (2005a, chap. 2). In this later work, after examining the challenges posed by ontological reductionism, he argues that the nature of causality is a question for metaphysics. If the uncertainties of quantum physics are not simply due to our epistemic limitations but ‘correspond to an actual ontological openness’ (2005a, p. 33) then causality can be broadened to ‘at least include holistic effects’ (2005a, p. 35). The move to a holistic understanding of causality that allows for openness over determinism stems from his desire to move towards a form of dual aspect monism (the position that Primas *does* adopt). The question of causality falls outside the scope of this thesis except to note the link to the question of divine-human interaction within Christ. As with the issue of emergence this is an area for further research regarding the theological implications of adopting a holistic metaphysics.

In *Cosmology Without God* Alcalde examines the fact that the modern interaction between science and religion has led to a view in which both scientists and theologians “diminish” God to fit within a scientistic[[44]](#footnote-45) account of the world. For Alcalde the challenge is that this diminishing of God leads to theological extrinsicism in which ‘divine and natural causality are no longer located on different ontological levels but on the same level and, therefore, they are made competitors’ (2019, p. 25). Much of Alcalde’s work falls outside the scope of this thesis, however, like Polkinghorne he draws on the transformed understanding of causality brought about by quantum theory. Additionally, his challenge that not only scientists but theologians diminish God to make the concept fit within the bounds of a reductionist, materialist scientific ontology is incredibly relevant to my enterprise of reformulating our understanding of Christ through a consideration of scientific metaphysics. Whereas the content of Alcalde’s work doesn’t closely align to this thesis, the maxim to not pre-empt the nature of God in light of *reductionist* metaphysics does. Which is why there is in an openness within this thesis to the nature of the theistic God that may be understood within a holistic ontology.

As a philosopher of science, much of Koperski’s *Physics of Theism* is devoted to a wide survey covering issues such as fine tuning, divine action, and free will. This is emphasised in his introduction where he states that he is more of a cartographer than an explorer – creating ‘a map of an unfamiliar terrain and a guide through it’ rather than standing ‘on the cutting edge, breaking new ground and offering fresh insights’ (2015, p. 1). The joint questions of divine action and free will form a key focus of his work; however, despite examining the issue of divine action his discussion doesn’t even touch upon the question of the ontological nature of reality. Ontological reductionism, we are told, is not the success it is lauded to be, and we should instead move to an emergentist approach to nature (Koperski, 2015, chap. 6). We should maintain a (critical, although Koperski does not use this term) realism about our scientific theories and religious claims. But the *implications* of this for the required existence of at least a limited number of divine immaterial beings (even if one wishes to maintain a materialism about human persons) is not addressed. Koperski argues that it is biology more than physics that has been brought in to “conflict” with theology (2015, chap. 5).Yet, as was seen with Simmons, this fails to account for the radical *metaphysical* shift that has been brought about by quantum theory. It is in addressing the fundamental question of holistic ontology (and its implication for the incarnation) that I depart from the more generalist literature on the interaction of quantum theory and theology.

## Christology and Quantum Theory

There is much written on Christology and dualistic understandings of the world, and scholars such as Oliver Crisp (2007, 2011; Crisp and Rea, 2011), MacQuarrie (1970, 1990, 1998), Senor (2007, 2011), Gregersen (2000b, 2000a, 2013; 2000), John Honner (1991), and Le Poidevin all influence this work in understanding the existing challenges and “solutions” to comprehending the nature of Christ. However, even Polkinghorne focuses his Christological work on the historical Jesus rather than any attempt to unpack the implications of a non-Newtonian ontology for our understanding of Christ. The closest he comes is arguably in his *Gifford Lectures* (1994, chap. 7) but even there it is more a survey of current ways of addressing the problem rather than placing anything new on the table. Although he argues that ‘a coherent Christianity requires a strong doctrine of the incarnation’ (2003, p. 111) there is an implicit assumption that we do not need to re-examine our understanding of the creeds in light of our deeper, richer, non-Cartesian understanding of the nature of the world.

Christopher Kaiser (1976) does examine Christology in a quantum world. His work develops Barbour’s comments in *Issues in Science and Religion* and challenges the validity of using (quantum) complementarity in theological discussions. Complementarity, he argues, refers to different modes of a single entity rather than two different entities as is found between creature and Creator. However, although he challenges its use for creature-creator relations he argues that it *is* appropriate to discuss complementarity and Christology as ‘Christ is said to be one single being, one *hypostasis*, in a way that God and the world are not’ (Kaiser, 1976, p. 38). Kaiser comes at the use of theological language from the opposite perspective to Hodgson[[45]](#footnote-46) arguing for the importance of using familiar terms in a new way to allow the original (and ongoing) communication of the message and person of Christ in an accessible way. Kaiser notes eleven comparable relationships between quantum complementarity and orthodox Christology. However, it is the first four (unity of being; common properties; individual completeness, and co-exhaustiveness) that provide the greatest ontological parallels not simply with Bohr’s account of complementarity but also with non-Boolean accounts of ontology. Problematically, it can be argued that the description of individual completeness still rests on a binary account of either/or divine/human wave/particle, rather than acknowledging that “duality” refers to wave, particle, and an infinite number of states in between (see Primas, 2007, p. 15). Even though it is possible to challenge the details of the parallels he draws between complementarity and Christology, he nevertheless provides a framework in which scientific ontology is brought to bear on Christology that avoids reducing either side to a poor facsimile of itself.

The fact that it is necessary to turn to Kaiser to find a discussion of the ontological significance of scientific metaphysics for our theological understanding underscores the current gap in contemporary literature of meaningful engagement in this matter. The contemporary work that comes closest to addressing directly the interplay between scientific metaphysics and Christology is F. LeRon Shults’ *Christology and Science* (2008). In chapter 2 Shults examines how the categories (his term) of body and soul have shaped theological and scientific discussions of personhood. Shults covers much of the same territory already discussed around the metaphysics leading up to and coming out of Chalcedon. However, in relation to evolutionary biology he focuses his discussion on the relationship that ‘soul is to body (in anthropology) as divinity is to humanity (in Christology)’ (2008, p. 32). This discussion leads him to conclude that:

The most important point about these scientific developments is the way in which they challenge the categories of substance metaphysics and faculty psychology as no longer adequate for making sense of the human experience of feeling enfleshed. They have been replaced by more relational and holistic conceptions of personhood (2008, p. 37)

Whilst I feel that Shults may be correct within some of our theological discussion, it is certainly not evidenced within the general timbre of scientific discussions of personhood. These adopt a predominantly physicalist account (even if this allows for a level of emergence rather than pure ontological reduction). In his concluding chapter on *Parousia and Physical Cosmology* Shults returns to the question of matter and spirit (2008, pp. 125–130). He does not hold back when he states:

The way in which Greek (Platonic) and especially early modern (Cartesian) substance dualism have structured all of these philosophical questions [about body and soul] *has had a crippling effect on Christology* (2008, p. 125 emphasis added)

Even though his discussion is framed in terms of *parousia* there are strong overlaps between metaphysical matters that impact on understanding ideas of Christ’s presence and incarnation, which Shults draws out in his discussion. It is the focus on a dichotomous metaphysics that is problematic. When matter and the immaterial (or spirit etc) are placed in opposition we appear to have to address the question of whether Christ’s divinity (Shults speaks to “presence”) is a material, immaterial, or perhaps mixed substance. With the reconfiguring of what is meant by “matter” to something arguably more correctly understood as energy or information, and the rise of emergence, there is, Shults argues, no reason to call on alternative kinds of substance to explain our phenomenological experience (2008, pp. 129–130). Although I do not agree with his assessment of the completeness of emergence, particularly for theological matters, I do agree that:

For our purposes the main point is that most physical cosmologists no longer rely on the categories of material and immaterial substance to make sense of complexity in the organization of patterns of energy. This does indeed challenge many traditional formulations of the doctrine of parousia [and incarnation]. (Shults, 2008, p. 130)

It is this challenge of the problematic natures of both dualism and strict materialism, that underpins the purpose of this thesis to challenge the notion of metaphysical paradox in the incarnation by adopting a holistic ontology. Although neither Esfeld nor Primas examine the importance of holism for our theological debate, their explanations of how physicalism should better be understood as holism (Esfeld) and that the world only appears atomistic at a local level (Primas) are relevant to our theological discussion of the metaphysics of the incarnation. This thesis takes their philosophical work, and metaphysical assumptions and uses them to analyse the relationship existent in the hypostatic union. In this endeavour, I am supported by M. M. J. Basson and J. H. Koekemoer’s (1997) work *From Quantum Theory to Quantum Theology* which examines the need for multivalued logic in relation to our theological epistemology; Macquarrie’s work on theological language and Christology; and scholars such as Cooper, Nancey Murphy, and Polkinghorne writing on the implications of current physics for key theological issues. This work departs from the existing literature in examining the notion of ontological holism, specifically, in relation to the incarnation, and in doing so I am assuming a critical realism about both science and theology. Whilst recognising that there are limits to the extent to which our knowledge of the creaturely world can tell us of the nature of God, I do believe that a space exists between the “veiled reality” of Bernard d’Espagnat[[46]](#footnote-47) and Wittgenstein, and the naive direct correlation between the world and God of Goswami. This is not to say that the mystery of the divine is lost through the world but that emergentist/naturalist theories about the mind can only offer broad analogy to the divine-human relation in Christ, and a holistic account of the world appears to offer a more nuanced picture.

Boolean and non-Boolean holism offer accounts that are only similar due to their lack of materialism[[47]](#footnote-48) alone, when it comes to the details, two very different pictures emerge. Boolean holism, with the focus on a relational understanding of the whole, provides a Christology that recognises the hypostases of Christ as markedly distinct yet unified by the fact that the unity (“more than”) touches on the very nature of Christ himself. In other words, it is not possible to comprehend the “parts” of Christ without understanding them as part of the complex system of “God the Incarnate Son”. The “more than” required by Boolean holism is a “more than” that speaks to the very nature of the thing itself. Boolean holism offers a new way of imagining the personhood of Christ. However, it speaks mainly of the mechanism behind the unity – it offers a new way to understand how ‘rational soul and human body’ may exist in unity. Non-Boolean Holism, on the other hand, offers a new way of understanding the incarnation, by providing a radical challenge to our current understanding of what it means to be “divine” and “human”. Non-Boolean holism provides a model into which the atomism or bivalence of our current theological ontology becomes a misunderstanding or misinterpretation of the world based on our limited epistemology. It is non-Boolean rather than Boolean holism that risks the descent into panentheism and yet offers some of the most interesting opportunities for the theologian. Philip Clayton (2003, 2004a, 2005, 2006) and Steven Crain (2006) have defended a panentheistic view of God, and edited volumes such as *In Whom We Live and Move and Have Our Being* which speak to the fact that even though panentheism may not be *sought* by the traditional theist, it is not a fatal challenge to the existence of a personal God.

## Theological Discussion of Paradox

There is extensive engagement with key texts examining theological paradox, and to a lesser extent mystery, in chapter 3 and therefore the same ground won’t be covered here. This section of the literature survey will instead provide a brief overview of the theological discussion of paradox. There is no consensus regarding the meaning or use of “paradox” within theology, and this is compounded by the lack of consensus whether paradoxicality arises due to (implied) metaphysics, or logical paradox. In other words, do the paradoxes of the Christian faith rest in the limitations of theological language? Our metaphysical assumptions? Or the nature of reality itself? Fundamentally “paradox” implicitly contains a notion of tension between two components, which is problematic if, as it may be argued of the incarnation, we don’t have enough knowledge about the two components to *know* that they are in tension[[48]](#footnote-49).

Particularly in relation to Christology the tension narrative can be seen to be fundamentally based in our metaphysical assumptions. The final term that becomes bound up within paradox and mystery is that of contradiction[[49]](#footnote-50). Whereas mystery speaks to theological (and mundane) things that we do not understand, contradiction refers to that which cannot be resolved by humanity (and possibly the divine) because it violates the Law of Non-Contradiction (LNC). It is important to note that these terms (paradox, mystery, and contradiction) are not designed to be placed on a hierarchy, nor should they be conflated, although as examined later some definitions of paradox appear to include a definition of mystery or contradiction. Given the complexity around these three terms it is perhaps unsurprising that Douglas McGaughey seeks to avoid our presuppositions and speak of aporia/the aporetic over paradox. Aporia acknowledges the “unknowingness” or mystery that lies at the heart of human experience and in doing so denies the rationalist/empiricist propensity to elevate the role of reason in human experience, or indeed to place reason at the heart of faith. Aporia then, recognises ‘a dialectical interaction between irreducible yet contradictory components’ (McGaughey, 1997, p. 40) rather than privileging one side of the tension over the other acknowledges the necessity of both components as well as their “irreconcilability”.

In this sense, the aporetic in theology speaks to the experiential nature of faith – McGaughey draws on the declining role of Christian Platonism in addressing the credibility of our spiritual lives and the fact that faith is ‘an un-knowing at the core of all that we are, know, and do, not a kind of epistemic faith in the Cartesian God’ (McGaughey, 1997, pp. 110–111). McGaughey speaks directly to the “tension” of paradox when he argues that aporetic theology cannot just acknowledge the experiential but:

[M]ust go one step further to ensure that both the spiritual and the material are recognized *in tension within one another* and not engage in a metaphysical reduction of “reality” down to one side or the other (1997, p. 112 emphasis added)

### An Historical Development of Paradox

To understand the metaphysical assumptions that underpin claims about the paradoxical nature of the incarnation it is necessary to understand the worldview(s) that have influenced the development of our response to theological “paradoxes”. For the first 1300 years Christian theology was rooted in a shared paradigm of Greek, particularly Platonic, dualism. Scholars have gone as far as to argue that all the major debates (or paradoxes) are so rooted in this experiential dualism, that without it the paradoxical nature of (and debates surrounding) the Trinity, incarnation, Gnosticism etc. are incomprehensible (McGaughey, 1997, pp. 22–23). This “traditional” dualism shared by both laity and clerics was not understood in the absolute sense of privileging one side over the other. The dualism of spirit and flesh was part of the lived human experience.

However, with the increasing dominance of Christianity in the West, the loss of the Greek influence, the introduction of Aristotelean metaphysics followed by the rise of nominalism, the implicit connectedness of the material to the spiritual/eternal was lost. The divide between the metaphysics of the laity and clerics was increased with the Copernican revolution and the work of Descartes and Galileo because the eternal laws of the heavens now resided within the material world. The preference for the material/physical over the spiritual led to the implicit understanding that what is “real” or “actual” as that which is material, ignoring the diversity of the human experience and its inclusion of the spiritual/mental realm. This is not to imply that we should return to the metaphysics of the Greeks but rather to acknowledge the current ‘victory of materialism over spirituality’ (McGaughey, 1997, p. 32). This highlights the need for theological discussion to acknowledge the experiential nature of the human condition so that we can fully engage in the descriptive task of theology which ‘indicates the inescapable role of paradox at the core of human experience’ (McGaughey, 1997, p. 32). But what is meant by “paradox” at the heart of the human experience and what is the relationship between this experiential paradox, and the “paradox” of Christ?

Whilst the biblical use of paradox is taken to mean strange or wonderful (discussed further in chapter 3), it is also possible to translate it as meaning “beyond opinion” (para-doxa) or that which is concerned with ‘some foundational level of experience free of the arbitrary perspectives of opinion’ (McGaughey, 1997, p. 45). Indeed, there is a body of literature (Hepburn, 1960; Tracy, 1996; McGaughey, 1997; Anderson, 2007) that examines relationship between paradox as “beyond opinion” and the rise of nominalism for which ideas are not eternally existing but mere abstractions. In adopting such an approach, we move away from the integration of the spiritual/eternal and material in our lived experience. God, Christ, Spirit etc. are beyond “reality” because they are not part of the physical/material world. Ironically, although it removes the reality of the spiritual, it can only do so by adopting a dichotomous understanding of material-spiritual in which the two can be easily and cleanly separated. Therefore “paradox” implies a metaphysical state that combines (or attempts to combine) dichotomous states of affairs. Particularly in relation to theological questions these metaphysical assumptions rest upon dualistic opposition, in which one part of the dichotomy is raised above the other: material-immaterial, pure-sinful, simple-complex, good-evil. When it comes to the “paradox” of the incarnation it is the divide between material and immaterial that is brought to the fore but, as I will argue, this assumed dichotomy rests upon the privileging the material world (accessible to our senses) over that which is inaccessible.

### Contemporary Lack of Consensus

Even within the theological literature there is a lack of consensus on the exact meaning of paradox. For example Kierkegaard states that ‘paradox is not a concession but a category, an ontological description expressing the relationship between a personally existent spirit and eternal truth’ (Kierkegaard citied in Grounds, 1964, p. 5). According to Grounds, R.B. Kuiper argued that paradox does not refer to contradictory or difficult to reconcile truths as Barth argued but rather ‘when two truths, both taught unmistakeably in the infallible Word of God, cannot possibly be reconciled before the bar of human reason’ (R. B. Krupier cited in Grounds, 1964, p. 5). Whereas Cornelius Van Til is adamant that paradox cannot refer to an actual contradiction (to do so would not only imply that our thinking lacked coherence but that God’s thinking did too), he goes as far to say that if it is a real contradiction ‘we have *destroyed all human and divine knowledg*e; if we say that the idea of paradox or antinomy is that of seeming contradiction we have saved God’s knowledge and therewith our own’ (Cornelius Van Til cited in Grounds, 1964, pp. 5–6 emphasis added). Anderson’s definition of paradox resembles Van Til’s as he states that ‘“paradox” thus amounts to a set of claims which taken in conjunction appear to be *logically inconsistent’* (Anderson, 2007, pp. 5–6 emphasis added). However, it is defined, whether apparent or “actual”, paradox is presented as an insurmountable obstacle – something that cannot be overcome without disposing with intellectual or doctrinal rigour. In chapter 3 I argue that the claim of *metaphysical* paradox need not be synonymous with an incoherent faith. Even if one claimed that the creeds provided a *logical* paradox – I argue that this claim still resides in metaphysical assumptions. To treat doctrinal paradox as a discussion of “logical” language statements is to assume that we have enough knowledge about the categories involved to emphatically state that they are mutually exclusive. It is to these issues that I will now turn as I begin the thesis proper with an examination of the nature and extent of theological paradox.

# The Nature and Extent of the Challenge of Paradox

To say that Christ is a single hypostasis who joins together two wholly distinct and unequal natures – the transcendent, infinite, foundational reality of God and the limited reality of a historical human being – in a ‘mode of union’ which constitutes his present personal reality is to say that he is a living paradox (Daley, 2004, pp. 194–195)

The incarnation is frequently described as one of the greatest paradoxes of the Christian faith. In *God was in Christ* D. M. Baillie argues that ‘the Christian faith, when thought out, conceptualized and put into human language, runs into paradox not only in the doctrine of the Incarnation, but at every vital point’ (Baillie, 1963, p. 110). In a recent monograph,Patricia Ranft notes:

The doctrine of the incarnation is a doctrine of precise balance between two opposites. The balance is the paradox and the heart of the doctrine […] too heavy an emphasis on the divine or on the human, the paradoxical balance is lost (2012, p. 61)[[50]](#footnote-51)

When viewed alongside Daley’s claim (above) of Christ as living paradox and Kierkegaard’s claim that Christ was the absolute paradox (see Philosophical Fragments 1845, chap. 3), there is no doubt that the incarnation provides a particular challenge for the coherence of the Christian faith. In a newly published monograph Cyril Orji argues that ‘just as paradoxes are unavoidable in logic and mathematics, paradoxes are inevitable in religious and theological discourse’ (Orji, 2022, p. 19)[[51]](#footnote-52). The proclamation of paradoxicality raises two key issues (a) what is meant by paradox and how does this differ from mystery? (b) What key metaphysical assumptions give rise to the claim of paradox? Whilst this chapter will briefly draw a distinction between mystery and paradox, the focus, in line with this thesis, will be on the metaphysical assumptions that give rise to the claim.

Parádoxos (παράδοξος) is used once in the entirety of the Bible (Luke 5:26). In that instance it is often translated as “strange” or “remarkable” things[[52]](#footnote-53). It is used to point beyond the ordinary, and yet within Christian theological literature it has subsequently taken on a far more challenging connotation. There is a temptation to conflate the challenge of paradox with ‘the notion that traditional Christian conceptions of God and his relation to the world suffer from *internal logical difficulties*’ (Anderson, 2007, p. 1 emphasis added). The theological significance of this alleged embedded logical conflict, for Anderson, rests in the ‘potential implications for the epistemic status of Christian beliefs’ (2007, p. 1). Moving us away from Locke’s description of faith as a “reasonable enterprise”, the use of paradox has moved to mean something is so deeply contradictory it cannot possibly be rationally reconciled.

## Theological Paradox

The discussion in the literature survey highlighted the challenge of providing a cohesive overview of the nature of theological paradox. In this chapter dictionary definitions, alongside a brief discussion of Wainwright’s categorisation of mystery, will be used to provide a framework for the discussion of metaphysical paradox. However, first it is necessary to understand how the concept of “paradox” relates to the Aristotelean concepts of the Law of Non-Contradiction (LNC) and the Law of Excluded Middle (LEM).

### Non-Contradiction and the Excluded Middle

LNC states that a (logical) statement cannot be both true and not-true at the same time. At most either the statement or its negation can be true (although both could be false) e.g., The Son of God was omniscient, and The Son of God was not omniscient (in Thomistic language these claims could be appended with *qua* [in virtue of] divine and *qua* human respectively). The Law of Non-Contradiction makes a logical claim something cannot *be* both the statement and its negation (at the same time and in the same sense) – i.e., the statement cannot be both true and false.

In theological discussion there is often an implicit conflation of paradox and LNC. This leads to doctrines or revealed truths that are understood as being internally or logically inconsistent. In contrast to Brian Daley’s comment cited at the start of the chapter, incarnational paradox can be argued to refer to what David Basinger called “verbal puzzles” in *Biblical Paradox* (1987, p. 205). In *Paradox in Christian Doctrine* Anderson examines the challenge of paradox for the rationality of Christian belief, developing a comprehensive argument to support his claim that there are central Christian doctrines that are inherently paradoxical, yet a rational person can still hold to paradoxical doctrine (2007, chap. 6). Orji focuses his account of the incarnation on LNC opening the chapter *The Incarnation and the Logical Principal of Non-Contradiction* (Orji, 2022, chap. 6) by asking:

[W]hether the theological language of the incarnation, i.e., the God-man, falls within the parameters of figure of speech that contradicts itself but which a further and deeper probing yields some true insights (Orji, 2022, p. 254)

A linked theory of the Law of Excluded Middle (LEM) ‘has equally long been acknowledged in theology: either *it is* or *it is not*; there is nothing in between’ (Orji, 2022, p. 32). LEM highlights a commitment to binary logic[[53]](#footnote-54) – there is no middle ground between truth and falsity therefore every statement must be either one or the other. LNC is generally considered uncontroversial. LEM, however, requires a commitment to discrete, fixed sets, and denial of “fuzzy” (or multivalent) logic. In other words, there is an assumption that everything can be described in exclusive terms. Multivalent logic arose in scientific discourse during the 1930’s in response to the Heisenberg inequality. As Basson and Koekemoer note ‘to be precise in an uncertain world means being flexible and adaptable. The principle of multivalued logic determines that indeterminacy defines a continuum, an infinite spectrum of options between falsehood and truth’ (Basson and Koekemoer, 1997, p. 280). Furthermore, in speaking of Zadeh’s fuzzy logic, they note ‘according to his fuzzy set theory almost all properties are fuzzy sets and elements belong to sets to different degrees’ (Basson and Koekemoer, 1997, p. 281). The fuzziness arises from any properties used to define a set that are not discrete or that are somehow ambiguous. For example, the set of “the tall people in canterbury” or “things that are greyer than the pebble on my desk” are both fuzzy sets. Used outside mathematics, fuzzy sets apply to things that can be true by degree.

The implicit dichotomy of LNC is reinforced when LNC and LEM are combined into the Principle of Exclusive Disjunction for Contradictories (PEDC). This is because for LNC at most one of the statement or its negation can be true; and for LEM at least one of the statement or its negation is true. Whereas in PEDC exactly one statement is true, and one is false *when taken together*. It is important to note that LEM and LNC are taken to refer to *logical* statements not *natural language* statements. Yet, some scholars (for example Paula Gottlieb, 2019) have identified that LNC moves beyond logical statements. Gottlieb identifies three accounts of LNC in Aristotle: the semantic account of LNC (applying to logical statements), the ontological account (applying to things that exist in the world) and the doxastic (applying to what we can rationally believe). There are valuable questions to be asked about whether our limited language causes paradox. However, the question of “verbal puzzles” does not tackle the metaphysical challenge that in Christ an immaterial God appears to have become *not*-immaterial.

### Defining Paradox

To progress the discussion beyond inconsistencies of theological definition noted in the literature survey. I will make use of two dictionary definitions that adequately sum two contrasting approaches to theological paradox:

1. Apparently inconsistent with itself or with reason, though in fact true or reasonable; strongly counter-intuitive. Also: really inconsistent with reason; absurd, irrational. (1b OED)
2. Of a phenomenon, circumstance, etc.: exhibiting some contradiction with itself or with known laws, esp. laws of nature; hard to reconcile with known or accepted scientific theory; deviating from the normal. (3a OED)

It is important to note that P1 combines two definitions – the *appearance* of inconsistency (P1) and the existence of *actual* inconsistency (P1’). P1 and P2 are the focus of this discussion.

Whilst P1’ refers to genuine contradiction (which Bruce Baugus calls “strong paradox”). P1 states a “paradoxical” claim may have the *appearance* of contradiction yet be ‘in fact true or reasonable’ (or “weak paradox”) (Baugus, 2013, p. 239). Michael Goulder (*Paradox and Mystification*, 1979a) argues that “paradoxes” which can be reconciled should not be called paradoxes but rather contradictions (despite prior commitment to a definition of paradox similar to the OED account). Goulder goes on to argue that many theological paradoxes can have the *appearance* of contradiction removed ‘even though its resolution may have to wait till Judgement Day’ (Goulder, 1979b, p. 52).

There is no question that “paradox” has a contested meaning. Orji goes as far as declining to offer a single definition ‘because defining paradox is itself a self-defeating exercise’ (Orji, 2022, p. 10). In *Paradox and Mystery* (2013) Baugus argues that claiming the *appearance* of contradiction causes paradox misrepresents the ‘central contradiction involved in these theological paradoxes’ (2013, p. 238). Paradox is better understood through the ‘constructive role paradox plays in human existence’ (Baugus, 2013, p. 238) – thinking that is echoed in McGaughey’s account of Aporia.

If paradox is simply the *appearance* of contradiction, one would be wise to give thought to Ronald Hepburn’s question ‘when is a contradiction not a *mere* contradiction, but a sublime Paradox, a Mystery?’ (1960, p. 17 original emphasis and capitalisation). For Hepburn paradoxes such as those found in science are to be ‘endured indefinitely’ (2013, p. 17) until a resolution can be found. This endurance is required because premature prioritisation of one side over the other can lead to the loss of important information (or explanatory power) in favour of “conceptual tidiness”. There is an important distinction to be made between an apparently contradictory ‘raid on the inarticulate’ (as mystery) and a ‘viciously muddled confusion of concepts’ (presumably contradiction) (1960, p. 17). Therefore, in understanding paradox as contradiction (real or apparent), and mystery as that which cannot be fully articulated, we appear be drawing close to Goulder’s distinction between paradox and mystery. Goulder pejoratively defines “mystification” as the attempt to make sense of claims that are ‘implausible or vacuous… *not an apparent contradiction but apparent non-sense’* (Goulder, 1979a, p. 54 original emphasis). However, the emphasis on the role of the ineffable in mystery is clear.

In contrast with the generalised account provided by P1 and P1’, P2 brings paradox into relationship with science. It gets to the heart of the role of scientific metaphysics in recontextualising the charge of theological paradox. P2 highlights the *appearance of* contradiction but focuses this between the claim and the scientific account of the matter in question. Thus, when considering P2 paradox two further questions are raised: (a’) what, if any, is the relationship between our scientific and theological accounts of the world? (b’) Is the tension based in a genuine conflict between metaphysical commitments or the appearance of conflict between metaphysical presuppositions. It is the second question that is of concern here.

The question raised by P2 hinges on whether the incarnation appears paradoxical because we are maintaining a pre-commitment to a “scientific ontology” that does not allow for immaterial entities. In other words, does the paradox of the incarnation arise from assumptions that scientific descriptions are (correctly) committed to strict materialism? Chakravartty argues that “scientific ontology” is ‘meta-scientific […] understanding what the sciences are telling us about what things and kinds of things exist […] go[es] beyond the strict execution of scientific practice’ (2020, p. 33). This view echoes Barbour’s much earlier claims that ‘*all data are theory-laden*. There is simply no theory-free observational language’ (1990, p. 33 original emphasis)

### Metaphysical Paradox at the Science-Religion Boundary

There is a clear disjoint between an assumed “materialist” scientific metaphysics and the theological claim that ‘God, who is pure Spirit, assumes (and not merely creates and conserves) matter’ (O’Collins, 2004, p. 6). However, there is a question as to whether/how the systematic, general truths associated with the ontological investigation into metaphysics relate to ‘the scientific project of determining the fundamental entities of the world’ (Paul, 2012, p. 4). L. A. Paul argues that the metaphysical account is ontologically prior to the scientific account (2012, p. 5). The ‘ontological account will take the properties postulated by the scientific theory, such as properties of charge, spin and mass, and ask’ what kinds of things they are (2012, p. 5). Thus, there is a clear link back to the question of the perceived contradiction between the theological account and “accepted scientific theory” and whether the tension rests with the *fundamental* nature of the properties described, or the scientific theory about those properties.

In examining the paradoxicality of the incarnation, the theologian must ask whether the incarnation is paradoxical because “spirit assuming matter” stands in opposition to a dominant scientific ontology; or whether the appearance of contradiction rests in *divine* becoming *human* (irrespective of one’s views on the nature of substances involved)[[54]](#footnote-55). At the heart of this thesis is a commitment to interrogating the spirit-matter “dichotomy” and whether contemporary science remains as committed to reductive physicalism as general perception assumes. ‘Metaphysics is concerned to identify the real natures of the world while science is concerned to discover the range of *instances* of those natures’ (Paul, 2012, p. 5 original emphasis). As Primas notes in *Endo- and Exo-Theories*, the incompatibility can also be removed by marking a distinction between the kinds of things that science can account for and the way the world is (as an ontological claim, not simply an epistemological one).

The bivalent (either/or) account of material versus not-material will be examined in more detail throughout this thesis, however it is noted here as a range of theologians[[55]](#footnote-56) argue that the “challenge” of incarnation is predicated on a distinction between material and “other”. In other words ‘most of the Christological controversies and subtleties [..] may be classified as ontological by nature’ (Webster, 1984, p. 9). For example: ‘the incarnation involves a divine being who is by definition eternal, without a body and unlimited […] personally taking up existence in that which is temporal, *partly material*, and thoroughly limited’ (O’Collins, 2004, p. 6 emphasis added); Schleiermacher notes that ‘one individual cannot share in two quite different natures’ (1928, sec. 96 [p. 393]) and this is echoed in Cupitt’s concern that ‘the eternal God and an historical man are two beings of quite different ontological status’ (1975, p. 625). However, the clearest example of the embedded assumption of dichotomy at an ontological level comes in O’Collins’ critique of a reduplicative approach to the problem: ‘I want to insist that you cannot predicate of the same object at the same time and *within the same frame of reference* mutually exclusive properties’ (O’Collins, 2004, p. 8 original emphasis). O’Collins argues that with the respect to the incarnation ‘the frames of reference, divinity and humanity, differ and that saves the situation at least from blatant incoherence’ (O’Collins, 2004, p. 8). The extent to which one can truly say that the “frames of reference” are distinct when during the incarnation they refer to the same being highlights the importance that our (scientific) metaphysics is playing on the assumptions about the ontological kinds of things involved in the incarnation.

### The Role of Two-Valued Logic in the Appearance of Contradiction

Both paradox and aporia rest on a *tension* or *dichotomy* between two aspects/accounts. The tension/dichotomy highlights an assumption of bivalent logic (also known as and/or, two-valued, or Boolean logic). Bivalent logic is a method of “sorting” or “categorizing” the nature of things, which works through definite values –something is either *A* or *not-A* (true/false; black/white; on/off) this logic enables us to neatly categorise entities. Although it may sacrifice accuracy for simplicity (Basson and Koekemoer, 1997), it has played a crucial role in the progression of modern science and can be understood as part of the Newtonian legacy of reductionism.

The bivalent categorisation of the world is unable to accurately capture the “vagueness” or “fuzziness” of our lived experience. Someone isn’t *Tall* or *not-Tall* but rather *Tall* to a greater or lesser degree. The fuzziness of reality, it is argued, is better captured by multivalent logic allows for ‘three or more values, perhaps an infinite spectrum of options instead of two extremes only’ (Basson and Koekemoer, 1997, p. 279)[[56]](#footnote-57). The “paradoxical” nature of the incarnation can be seen to rest in an implicit assumption of bivalence (or “dualism”)– i.e., human, and divine are understood as discrete mutually exclusive categories.

Despite the usefulness for scientific enquiry being clear, the reason for its (implicit) absorption into theological discussion is less so. If one adopts a multivalent metaphysics where the boundaries between object or individuals may be considered “fuzzy” then there is a “risk” potentially unacceptable to some, that the theologian may be required to adopt a pan(en)theistic model of God. Similar arguments can be made of the need for an epistemology that recognises that as our understanding of the nature of reality broadens we also need to ‘broaden the rationality’ (Basson and Koekemoer, 1997, p. 281) associated with theology to account for the “fuzziness” of our experience and common sense reasoning. The theologian must examine paradox at the junction of metaphysics, epistemology, and language, metaphysics and epistemology should be able to be “meshed” in such a way that ‘to achieve something like a good approximation to knowledge […] in spite of the spatial and temporal limitations of our experience and the flaws and distortions of our sensory and cognitive apparatus’ (Shimony, 1989, p. 25). This raises the question whether claiming paradox on grounds of our limited epistemology or metaphysics commits us to claim paradox in a far greater number of areas than the incarnation *because* we are not recognising that our finitude encompasses an innate aspect of unknowing.

## The relationship between Paradox and Mystery

In *Theology and Mystery* Wainwright (2009) notes our exploration of mystery in “important reference works”[[57]](#footnote-58) is missing. Its lack may be due to intellectual rather than theological matters: appeal ‘to mystery can be an excuse for avoiding hard thought and a justification for obscurantism and superstition’ (Wainwright, 2009, p. 80). Jonathan Edwards offers a less cynical concern that explication of mystery doesn’t remove its mysteriousness or ‘incomprehensibleness of it […] some difficulties are lessened, others that are new appear; and the number of those things that appear mysterious, wonderful and incomprehensible are increased by it’ (Jonathan Edwards cited in Wainwright, 2009, p. 79). Is mystery an “opt-out” for trying to reconcile paradox?

In *Two Cheers for Mystery* William Alston (2009) draws on metaphysics and epistemology at the borders of science and religion to argue that there is an increasing degree of confidence within philosophy of religion *‘*in our ability to determine exactly how things are with God’ (2009, p. 99). Wainwright questions whether this (over) confidence creates a distorted reflection that removes the apparent *need* for mystery. I question whether over confidence resides in concerns about the “privileged” access to truth held by modern science – that if theology speaks of mystery will it cement the divide between the “truth” of science and the “superstition” of theology?

This section will briefly examine Wainwright’s typology of theological mystery in relation to paradox. Wainwright identifies four accounts of theological mystery:

1. Mystery is understood in a similar sense to the biblical account of paradox – ‘wonder surprise or astonishment’ (2009, p. 81) at something humans did not expect and could not have anticipated.
2. Doctrines that are ‘incongruent or formally inconsistent’ (2009, p. 81) with a common sense understanding of the world (similar to P2 above). This diverges from P2 in that the inconsistency arises because we are applying terms outside their normal use.
3. Doctrines/truths seem mysterious because we do not have access to the full information required for them to be sensible. In this instance it is not that the truth is ‘*intrinsically* mysterious’ (Wainwright, 2009, p. 82 emphasis in original) but that we are ignorant of key facts that make sense of its “reasonableness”.
4. Whereas the mysteries in (M3) are, at least in theory, open to resolution through the acquisition of further information, the final category of mystery identified by Wainwright are those mysteries for which ‘the mystery is irreducible’ (Wainwright, 2009, p. 82) because it has *no solution*.

### Responding to Wainwright’s Classification of Mystery

Although M1 can arguably be seen to correlate to the original Biblical usage of “paradox”, as it does not contain a metaphysical component it won’t be discussed further here. M2 most strongly relates to Basinger’s definition of paradox as “verbal puzzles” and gives rise to divine mystery based on our finite language. M1 and M2 fall under what Wainwright calls epistemological mystery – the mystery arises due to the ‘limitations of created intellects’ (2009, p. 94). This echoes the ideas expressed in P1 and P1’ that whether one sees it as mysterious or paradoxical an incongruence arises because it cannot be *fully* *expressed*[[58]](#footnote-59)

M3 addresses the ontological mystery that stems from ‘an intrinsic aspect of God’s own being, rather than a feature of human or divine knowledge of it’ (Wainwright, 2009, p. 94). In many ways it straddles the epistemic-ontological boundary because it speaks to our knowledge of the divine, yet it raises questions about our ability to access the information – is it an (epistemic) inability to fully comprehend or an (ontological) inaccessibility of reality to our measurement? This blurring of an epistemic-ontic “boundary” is echoed in Basinger’s implicit distinction between a “conceptual paradox” (that he terms a verbal puzzle) and metaphysical paradox. He writes, that as humans ‘we may never be able to explain *how* God could have become human’ (1987, p. 205 emphasis added). This highlights a key boundary within this thesis – the aim here is not to show *how* God became human (the mechanism) rather that the “state of affairs” of God becoming human isn’t metaphysically impossible.

Wainwright’s distinction between M3 and M4 is based on the ability to access a solution. What is unclear is whether this distinction rests only on a human ability to access the information or the ability of *any* mind to i.e., God to be able to do so. There is a hint of this distinction when Basinger writes of Van Til and others: ‘perhaps they mean rather that such truths are only *apparently* contradictory from a human perspective but not from God’s’ (1987, p. 209 emphasis added). Resolution at the level of divinity points to the fact that this is not a contradiction *without* solution. Both Wainwright and Alston focus on the concept that ‘God is inevitably *mysterious* to us, to our rational capacities’ (Alston, 2009, p. 100 emphasis in original).

Mystery is distinguished from paradox because the object/entity being examined is not *logically* impossible given ‘normal definitions of the terms involved’ (Basinger, 1987, p. 205). This caveat regarding analogical language moves beyond the scope of this thesis. However, it is enough to note that the concepts themselves do not require excessive linguistic manoeuvring to arrive at an account that isn’t logically impossible. There is no attempt here to try and claim “square circles” are mysterious rather than paradoxical.

Despite Wainwright’s introduction of epistemological and ontological *mystery*, the distinction between paradox and mystery is one of ontology and epistemology, respectively. Paradox requires a tension between dichotomous concepts. Whether the tension is genuine or apparent depends on whether additional information can resolve the tension (apparent) or if the tension remains despite additional information (genuine). Mystery speaks to an epistemic limitation on our part – we are unable to explain the terms fully enough to know *if* they are in tension. This highlights the epistemic gap between us and God, through which we are unable to access the language and/or information to resolve the mystery. Therefore, Wainwright’s focus on M4 mistakes mystery for paradox: ‘a tension between components that are *irreconcilable and incommensurable* yet both *necessarily* indispensable’ (McGaughey, 1997, p. 39 emphasis added). To paraphrase Anderson – a recognition that our theorising about God may be grounded in mystery is not to claim that all of our theology *is* “mysterious” or *must be* mysterious, but rather a recognition that some aspects of our theology/theory may be “indissolubly” mysterious (2007, pp. 241–243).

Paradox, on the other hand, points to a tension, conflict, or contradiction between terms. This may be apparent and open to the potential of being resolved, or genuine and without “solution”. The incarnation appears to provide a paradox in unifying ‘two irreducibly different natures’ (Daley, 2004, p. 168), but a question at the heart of this thesis is whether the appearance of paradoxical natures can be resolved through ‘reshaping our categories and reconstructing our world’ (Kaufman, 1995, p. 49) to leave a mysterious “mode of union” at the heart of a non-paradoxical truth. I shall now turn to a traditional attempt at “reshaping” our understanding of the divine and human in Christ.

## A Traditional Resolution of Paradox: The Reduplicative Strategy

Numerous solutions have aimed at providing an account that can bring the dichotomous categories of divinity and humanity together in the single person of Christ. What remains constant is the assumption/understanding that we are necessarily dealing with a union that ‘must always bind together distinct realities’ (Daley, 2004, p. 172) this union is ‘not “natural” in that it is not automatically produced by those substances’ natural functioning’ (Daley, 2004, p. 169). Attempts to resolve paradox tend to rest in trying to reduce the richness of the semantic content of Chalcedon or the traditional properties of Christ[[59]](#footnote-60). The reduplicative strategy is one such solution. Ultimately attributing properties (such as immutability or changeability) to the divinity or humanity of Christ rests in metaphysical assumptions about the kinds of things they are and how seemingly dichotomous properties can be held within a single entity.

For Aquinas spatial extension is provided by the object’s substantial form, and no part of a substance can be understood as a “substance” in isolation whilst it is constituting a larger whole. In practice this means that: (a\*) if the constituents of a new whole existed as substances prior to becoming a composite, then (b\*) their substantial form also changes, such that (c\*) it no longer has the substantial form of x as x but rather it *shares in* the substantial form of y [new object]. In other words, ‘they cease to exist as things in their own right when they are conjoined into the whole, and a new thing is generated’ (Stump, 2004, p. 200).

Constitution is not identity, for Aquinas it is necessary to understand how the properties of the parts contribute to the identity of the whole. A key feature of the reduplicative strategy rests in the distinction between constitution and identity. This allows the appearance of paradox to be removed without the conflation of natures, or multiplication of persons. The reduplicative strategy allows the “whole” to borrow properties from the constituent parts[[60]](#footnote-61). Even though the whole (Christ) may have a particular set of properties, such as offering salvation to humanity, other properties such as mortality are due to the properties of one of its constituents (the substantial form of being human). Thus, Christ “borrows” the property of mortality qua humanity. Christ can therefore die on the cross by virtue of having a human body and soul, the death on the cross is attributed to Christ “as a whole”. The whole must borrow the property of being able to die from the human constituent of Christ. At first glance this appears to mitigate the problem of a divine being that can die, because the “ability to die” property is “held” by the substantial form of a human body. Christ can draw on (or borrow) the property which is then exemplified in Christ as a united being.

Both Stump and Leftow argue that this notion of properties being borrowed from the constituent parts (*qua* human, *qua* divine) is a coherent response that removes the appearance of paradox. However, despite agreeing that the whole being “more than” or exhibiting properties that “borrow” from the parts can be a useful tool to understanding, the method appears out of step with the aims. By adopting a reductionist account of apportioning properties to the correct (constituent), it raises the question of whether the strategy is conflating methodological and ontological reductionism.

I do not believe that the reduplicative strategy genuinely removes the “paradox”, it only limits the verbal puzzle. The defence of the strategy rests in the ability of complex physical objects to “borrow” properties from their parts, yet on this model the incarnate Son of God contains both physical and non-physical parts. The limitation of Stump’s analogies of borrowed properties with simple physical objects is that the borrowing (by the simple object) rests on non-ontological properties. The move suggested by the reduplicative strategy to interpret the non-physical properties of a person (whether divine/human) under similar criteria to a text (Stump, 2004, p. 216) appears to entirely miss the nature of what it is that creates the “paradox” within the person of Christ. At issue is not the question of whether Christ could “borrow” non-physical properties from his human or divine constituents and as such reveal different properties at different times, (or if he could be *understood* as having different properties); but whether this “borrowing” can be ontologically understood.

In *The Compositional Account of the Incarnation* Senor (2007) argues that the reduplicative strategy is unable to provide a defence against logical incoherence of the paradox, as the argument confuses properties and predicates – challenging the vagueness of our language rather than vagueness inherent in the objects themselves. The reduplicative strategy appears to either reduce the incarnational paradox to a verbal/logical puzzle or unsuccessfully attempt to remove the metaphysical challenge through reductionist reasoning. To adopt a reductionist account so that properties can be clearly attributed *qua* divine/human reduces the extent to which *both* sides of the paradox are continually *necessary*, instead opting to privilege each side when needed.

## Persons, Parts, and Paradox.

In any discussion of the incarnation, one must be aware of the sensitivities around theological and metaphysical concepts of personhood. The central focus of this thesis is to interrogate the notion that the root of paradoxicality rests in metaphysical assumptions regarding the kind of *substances* that make up a person (human and/or divine). Such concerns can be seen in Leftow’s metaphysical modelling discussed in §1.5.3C, or the fascinating interaction between Trenton Merricks[[61]](#footnote-62) and Luke van Horn[[62]](#footnote-63) on the role (or lack thereof) of embodiment in the creation of “personhood”.

This thesis is less concerned with the nature of what it is to *be* a person and more with the kinds of substances that may be involved in constituting something called a person. For a project focused on holism this may seem counter intuitive, however the holism is ontological whereas the reduction to substances is methodological. Discussion of the mereology of persons is situated within the framework of issues related to interaction and/or emergence of material/immaterial substance rather than focusing on the “parts” required. As Joel B Green notes in *Body, Soul, and Human Life* (2008) ‘whether the human creature is a singular whole, a bio-psycho-spiritual unity, as opposed to either a dichotomous (body-soul) or trichotomous (body-soul-spirit) being’ still carries weight in the discussion of theological anthropology ‘due in part to the elevated importance of dualism in the theological tradition’ (2008, p. 13). Regarding the incarnation the question of either the inclusion of the non-material divine “as soul/spirit” or the transformation of the non-material divine into a singular creaturely whole gives rise to the appearance of paradox.

This thesis poses the question of whether a metaphysical “shift” to holism removes the appearance of paradox within this space. Questions relating to human consciousness, the emergence (or not) of the human mind and/or the immaterial fall entirely outside the scope of this thesis, and the tightly constrained remit is intentional to avoid the wider concerns associated with anthropological discussions. Bearing this in mind I shall now identify different technical definitions of “person” and briefly note how their mereological commitments relate to the paradoxicality of the incarnation.

### Aquinas’ Relational Account

Aquinas’ discussion of personhood is associated with the notion of hypostasis, whereby an object is individuated by its form. The identity of an individual is bound up with its substantial form, as such ‘substantial forms […] [unlike natures] are individual rather than universal’ (Stump, 2004, p. 202). However, constitution should not be understood as identity. Rather the whole is formed of *more than* the sum of its parts, or the properties those parts exhibit prior to becoming constituents of the whole.

This can also be seen in Esfeld’s account of holism, discussed later. When this is regarding divine persons, Aquinas emphasises the relational nature of “person” – ‘the Persons [of the Trinity] are subsistent relations’ (Lamont, 2004, p. 260):

In creatures relations are accidental, whereas in God they are the divine essence itself. Thence it follows that in God essence is not really distinct from person […]For person, as above stated […] signifies relation as subsisting in the divine nature. (Aquinas, 1485 I, Q. 39, Art 1)

Thus, Aquinas’ understanding is based on a metaphysics of relations. Relation necessarily requires the involvement of two subjects: ‘a subject of which the relation is predicated (terminus a quo), and the thing towards which the subject is related.’ (Lamont, 2004, p. 261). When Aquinas describes the persons of God as subsistent relations, this means that it is possible to distinguish between the ‘the *supposita*, and yet the essence is not distinguished because the relations themselves are not distinguished from each other so far as they are identified with the essence’ (Aquinas, 1485 I, Q. 39, Art 1). With respect to the relation between the Father and Son it involves, different and opposed relations ‘the relation of paternity, and the relation of filiation’ (Lamont, 2004, p. 261). These relations are made real by the substantive being (essence) of Godself: ‘[T]he relations, in Aquinas's view, are identical with the Persons, and constitute the Persons’ (Lamont, 2004, p. 267).

Lamont argues that one reason this relational account fails is due to Aquinas’ incorrect metaphysics of relations. In contemporary metaphysics, attributes are divided into two categories: ‘the category of property (monadic property) and the category of relation’ (2004, p. 272). Lamont argues that as relations require more than one subject then they cannot be the differentiating properties that Aquinas requires.

### Baker’s Constitutional Account

In *Materialism with a Human Face* (2001), Lynne Baker sets out an account of identity (and personhood) within a materialist metaphysics. She argues that the first-person perspective and being constituted by a “human” body is what distinguishes human persons ‘from other kinds of persons’ (2001, p. 162). Furthermore, ‘a human person is a material object in the same way that a statue or a carburettor is a material object’ (2001, p. 159), there is no immaterial aspect to the human person. However, the incarnation requires a ‘slight modification of constitutionalism’ (2018, p. 348), to treat ‘Christ’s human nature as wholly material and Christ’s divine nature as wholly immaterial’ in what she argues is a ‘more straightforward and elegant’ solution (Baker, 2018, p. 349). Thus, the constitutionalist account she presents is more in line with Christian materialism.

Constitutionalism holds that human persons are *essentially* embodied, we have no immaterial parts, but we are not identical with our constituent body (Baker, 2018, pp. 341–342). Whilst constitution is not unique to human persons (Baker, 2001, p. 162), it has an *ontological* role in enabling new primary kinds of things to come into existence. Constitution is a relation of unity not identity, however regarding the incarnation this could prove problematic:

1. *x* constitutes *y* at t if and only if
2. *x* and *y* are spatially coincident at t […]
3. If *y* is immaterial, then *x* is also immaterial. (adapted from Baker, 2001, p. 163)

C3 ensures materiality is not lost in the act of constitution, thus exemplifying its coherence. However, whichever way one attributes humanity/divinity to *x*/*y* one either appears to end with the person (or body) of Christ being immaterial (if the divine Son is *x*) or the divine Son is (fully) material (if the human person of Jesus is *x*). If a human is necessarily embodied then to be fully human they cannot remain ‘wholly immaterial’ (2018, p. 349). Whilst substance dualism may lead to the risk that ‘Christ has two immaterial minds’ (2018, p. 349) it seems that the materialist constitution view results in Christ as two persons ‘[one] nonbodily or immaterial […] [and one] necessarily embodied’ (2001, p. 165).

### Cooper on Old Testament Holism

Over two chapters in *Body, Soul and Life Everlasting* (2000)John W. Cooper highlights the challenges faced by the theologian attempting to construct an anthropology that allows for some kind of immaterial existence. Cooper argues that whilst it can be tempting to view “platonic dualism” and “monism” as the only and polemic metaphysical options available, in fact:

The truth combines elements of the two extremes – that the Hebrew view of human nature strongly emphasizes living a full and integrated existence […] but that it unquestionably also believes in a continued existence after biological death. (Cooper, 2000, p. 37)

For Cooper “holism” means human nature is in a fundamental sense unified – ‘Soul and body, the mental, physical, and spiritual, are so essentially tied together that were they somehow separated a human being […] would actually cease to exist’ (Cooper, 2000, p. 35). This is not a form of materialism; Cooper argues we must emphasise living in *this* world but admit a life after death - anthropology must be dualistic and holistic. This is a functional rather than ontological holism due to the commitment to life after death. However, regarding post-mortem existence: ‘the dead are thought of as ethereal *bodily beings* whereas the living are *fleshly bodily beings*. The contrast is between fleshly and non-fleshly, not between bodily and nonbodily’ (2000, p. 67). He concludes by drawing on Thomistic thought to argue that the soul may be considered as something which is ‘organizing, energizing and directing the entirety of human life’.

### Parts and Paradox

Aquinas’ account of (divine) persons as relational does not create paradox, and indeed Lamont’s objection can be countered by Esfeld’s own account of relational ontology, or the move to a no-thing ontology. However, the greater challenge of Aquinas’ subsistence model, is how ‘a subsistent nature can be distinguished from a non-subsistent nature in terms of the addition of *esse*’ (Cross, 2002, p. 246). The need to distinguish between *suppositum* is still dependent upon ‘dividing the predicates between the two natures, such that some predicates apply to the person in virtue of the divine nature, and some in virtue of the human nature’ (Cross, 2002, p. 192). This in turn gives rise to the appearance of paradox through contradictory properties *qua* human/divine[[63]](#footnote-64). Whilst relational ontology may be reconsidered in light of the metaphysics discussed within this thesis, Leftow’s substantial challenge remains (cf. §3.5.4). The challenge is how to reconcile that it is ‘impossible that matter should exist in God’ (Aquinas, 1485 I, Q. 3, Art. 2) with the fact that in the incarnation the divine became meaningfully “a reasonable soul and human flesh subsisting” and thus a ‘composite creature, corporeal and spiritual, which is man’ (Aquinas, 1485 I, Q. 50).

Baker’s constitutional account faces the same problems discussed in relation to Christian materialism. By adopting a “traditional” materialist metaphysics regarding human persons she is faced with making a huge exception for the unified person of Christ. However, this metaphysical exceptionalism compounds claims of the paradoxicality of the incarnation. Whilst Aquinas’ relational metaphysics can be reshaped considering Esfeld’s ontology, the greatest promise for constitutionalism rests in arguing, with Primas, that we are mistaken in either the categories we are using or in assuming the discreteness of the boundaries between material and immaterial.

Whilst Cooper argues that the holism contained within the Old Testament anthropology is merely “functionally” holistic, parallels can be drawn to Esfeld’s holism and the way it adopts a model of “families of properties” that define the holistic system. For example, Cooper argues that the Hebrew usage of anthropological discrete parts doesn’t point to ‘dichotomies and dualisms’ because holism can allow for distinguishable parts – these identifiable parts within the holistic system *can* be understood, in Cooper’s terms as ‘phenomenological and existential unities’ that ‘would not necessarily continue to have all the same properties and functions if the whole were broken up’ (2000, p. 45).

As highlighted at the outset this is not an exhaustive account of how persons have been described within Christian anthropology, let alone responses to the positions articulated here. However, it highlights the variety of definitions and complexities in establishing accounts of personhood that work across both divine and human categories. It should also be clear that such accounting comes with its own metaphysical baggage in relation to distinctions between forms, natures, and essence. That is without acknowledging that ‘notions about what makes humans “human” – that is, distinctive vis-à-vis non-human creatures – are under almost continuous negotiation’ (Green, 2008, p. 36). It is for these reasons that this thesis is focused on how holistic metaphysics may reshape this conversation, rather than a particular notion of “person”. It is arguable that theses such as Baker’s have the most to gain from a holistic metaphysics, whereas the relationality and/or dualism seen in accounts such as Aquinas’ would require more reworking with a shift towards holistic metaphysics. As with Cooper’s “soft” or “holistic-dualism” there are spaces for nuanced metaphysics than can contribute to our understanding of Christian anthropology, that may be profitably brought into discussion with the varieties of holism discussed in this thesis. However, the anthropological implications can only be investigated once the metaphysical framework has been coherently articulated. It is this latter task that sits within the scope of this thesis.

## A Fourfold Account of Paradox (and Mystery)

“Paradox”, the sceptical philosopher protests, “is optimistic and too solemn a word for this. It would be more honest to call it a language of *contradiction*, one which can therefore delineate no possible being at all[”]. (Hepburn, 1960, p. 16 original emphasis)

In the following sections I build on Wainwright’s work to provide my own classification of paradox. The classification further demarks the bounds of this thesis identifying both broader and metaphysically related “causes” of theological paradox. Due to restricting the exploration to metaphysically related paradoxicality this discussion is by no means exhaustive; however, it does provide a framework in which to place Primas’ and Esfeld’s work later in the thesis.

First, it is necessary to note a few assumptions within its development. The uncertainty over the full definition of concepts such as divinity and humanity should not be taken as permission that ‘theology simply surrenders intellectual rigour and accountability *in the face of the inexplicable and incomprehensible’* (McGaughey, 1997, p. 39 emphasis added). Secondly, I side with McGaughey that paradox must recognise the tension between the “sides” even when they seem ‘incommensurable and contradictory’ (McGaughey, 1997, p. 197). Finally, I do not assume that paradox and mystery are mutually exclusive within the understanding of individual doctrines.

The relationship between the incarnation and paradox can be categorised in the following ways:

1. The incarnation is paradoxical because it appears to be contradictory, and further exploration of the contradictions involved reveal them to be genuinely contradictory (irrespective of God’s ability to hold the contradictions coherently).
2. The incarnation is paradoxical because it appears to be contradictory and further exploration of the contradictions involved reveal them to be apparently contradictory due to current knowledge/metaphysics/language use.
3. The incarnation is not paradoxical because although it appears to be contradictory, with greater knowledge the apparent contradiction can be resolved without leaving the appearance of contradiction.
4. The incarnation is not paradoxical because although it appears to be contradictory, we do not have the epistemic capacity to fully explain the objects/terms involved and so cannot know whether they are genuinely/apparently contradictory. Therefore, the incarnation is “mysterious”.

The categorisation can be applied in two ways. The first, in line with Basinger, asks if the doctrine of the incarnation is in contradiction with statements/claims made within scripture. The second, in line with Anderson, asks if the doctrine of the incarnation is *internally* coherent. The focus of this thesis is on the second. Is Anderson correct:

[T]he very idea that God – an eternal, infinite, immortal, transcendent spirit – could become a human being – a temporal finite, mortal, material creature – is one that seems *prima facie* impossible, if not altogether absurd (2007, p. 61).

This work radically departs from Anderson by examining the underpinning metaphysical assumptions rather than the question of (ir)rationality. The categorisation of incarnational paradox will be examined in turn and the *metaphysical* concerns associated with P4 and P5 will be examined in greater detail after the generalised discussion of P3-P5. As P6 focuses on mystery it will not be examined further here.

### Responses to Genuine Paradox in the Incarnation

*The incarnation is paradoxical because exploration of the contradictions involved reveal them to be genuinely contradictory.*

This category maintains that we have enough information about both “sides” of the tension to know that a genuine contradiction exists. It means that the incarnation affirms that Christ must possess, simultaneously, two sets of *inconsistent* properties (those characteristic of God[[64]](#footnote-65) and those characteristic of human beings[[65]](#footnote-66)), ‘and if (as it sure seems) it is logically impossible for any being simultaneously to have […] both sets of properties; then the orthodox doctrine of the incarnation is incoherent [paradoxical]’ (Davis, 2011, p. 120). I am responding to Anderson’s claim that the theologian trying to reconcile the paradox of the incarnation is left with two choices (a) surrender to paradox – and any potential “irrationality” of the faith (b) to “abandon” orthodoxy.

There are three main approaches to understanding the incarnation as genuinely paradoxical, although only the first two address metaphysical matters and will be addressed here:

1. God and therefore Christ contain within themselves all that is, and its negation.
2. The paradox arises due to the distance between creator and creature which cannot be resolved.
3. Paradox is a fundamental aspect of the personhood of Christ and therefore of Christianity.

#### Christ as and Beyond the Coincidence of Opposites

The claim that there is genuine contradiction in the incarnation might imply that we have an exhaustive enough account of both humanity and divinity. However, for medieval scholars such as Nicholas of Cusa (Cusanus), the paradox was contained within the idea of God as a maximal or supreme being. The following highlights how paradoxicality can be understood as inherent *within* an individual.

Cusanus is perhaps best known for coining the phrase “coincidence of opposites” in reference to the nature of God and, to a lesser extent, the person of Christ (Rohmann, 1999). Cusanus published *On Learned Ignorance* in 1440, where he established:

[T]he infinite must remain unknown. It cannot be reached by such finite steps […] from this it follows we cannot know the infinite […] but in order to say even that we must have some insight into the infinite. Reflection on the finitude of knowledge presupposes that there is something in us that allows us to transcend this limitation (Harries, 2015, p. 22).

This epistemological claim sits within an implied metaphysics that centres dichotomies between creature and creator[[66]](#footnote-67). Clyde Miller argues the key to Cusanus’ metaphysics lies in his ‘seeking out parallels between the infinite divine Original and limited created images and […] drawing out the implications of these parallels.’ (Miller, 2017, sec. 2.1)

Both Jasper Hopkins and Karsten Harries point to the ontological distance between the contracted maximum (the universe) and the absolute maximum (God) in Cusanus’ work. By allowing a distinction between infinite God and finite reality, Cusanus is holding that ‘the infinite and the finite are not two sides of the same reality. Instead, they are different realities[[67]](#footnote-68) […] The world is a contracted *reflection* of God’s being; but a reflection of God’s being is not God’s being’ (Hopkins, 1983, p. 98). Because of this God is *beyond* all opposites (Hopkins, 1983, p. 10). This leaves us with two assumptions about the relationship between God and reality that bear on the incarnation. Firstly, as noted in the *Apologia*, God contains *all* attributes *and their negation*. Even though this may seem relatively unproblematic for justice/goodness and their converse[[68]](#footnote-69), the paradoxicality arises when one examines the properties associated with divinity and humanity (e.g., temporality versus eternal being).

This in turn points to a metaphysical paradox, at the very least in relation to incarnation, because ‘though the universe is a reflection of God, it bears no resemblance to God’ (see preface in Hopkins, 1985, n. 4). Christ as the ‘contracted maximum is also equally the Absolute Maximum’ (Cusanus, 1440, bk. III, 190) and as such *must* participate in the coincidence of all opposites in God without being above it. To be both God and “creature”, Christ must be ‘in accord with the given contraction [of humankind’s finitude], actually all possible perfection […] and [embracing] the whole nature of the given contraction’ (Cusanus, 1440, bk. III, 190). It is here where Cusanus aims to explain how the “contracted maximum” (i.e., a maximally perfect created being) could exist in Christ that we clearly see the language of paradox:

[N]o such contracted thing could attain the fullness of perfection in the genus of its contraction. Nor would a contracted thing be God, which is most absolute, but the contracted maximum, that is God and creature would have to be both absolute and also contracted’ (Cusanus, 1440, bk. II, 192)

It is interesting to note that Hopkins’ translation makes use of reduplicative strategy language ‘for no such [purely contracted thing] could attain the fullness of perfection in the genus of contraction. Nor would such a thing *qua contracted be God*’’ (Hopkins, 1985). Thus, in Christ the fundamental (ontological) gap between Creator and created must coincide.

#### Paradox as an Inevitability of Creator-Creator Distance

Moving to the contemporary debate, a significant number of scholars argue paradox in the incarnation is an inevitable result of the ontological distance between us and God. In *The Incarnation* (1987) using an unreferenced citation from Don Cupitt, Brian Hebblethwaite highlights the paradoxical challenge: ‘The eternal God, and a historical man, are two beings of quite different ontological status. It is simply unintelligible to declare them identical’ (cited in Hebblethwaite, 1987, p. 3)[[69]](#footnote-70). Hebblethwaite is not declaring the incarnation illogical[[70]](#footnote-71), but responding to Cupitt’s comments in *Incarnation and Myth* (1979a)[[71]](#footnote-72). Hebblethwaite claims we cannot solve the paradox following the reduplicative strategy or through the ‘pressing the details of all-too-human analogies’ (Hebblethwaite, 1987, p. 45). Such attempts are bound to fail because they can only go as far as our anthropomorphic categories will allow.

Drawing on Ramsey, Hebblethwaite continues emphasising that ‘[i]t is not a matter of rejoicing in straight contradiction at the single mundane level […] The paradoxes are a sign that that we have to stop thinking anthropomorphically […] to explore the logic of irreducible religious paradox’ (1987, pp. 46–47). This is echoed by A. B. Torrance in *Kierkegaard’s Paradoxical Christology*. He argues that we shouldn’t try to ‘develop a human understanding of the relationship between God and creation’ (Torrance, 2019, p. 62) because the God-humanity union in Christ isn’t something that we can solve. A. B. Torrance’s discussion focuses on the “how” of the incarnation – ‘we cannot comprehend *how* God can unite Godself with humanity’ (Torrance, 2019, p. 62). The question at the heart of this thesis is not “how” but “whether” the incarnation is metaphysically possible.

Hebblethwaite’s recognition of paradox as a sign that we are too concerned with human categories provides a useful benchmark. It is true that essential attributes[[72]](#footnote-73) of divine and human stand in contradiction – yet this doesn’t mean that either (a’) the incarnation is impossible or (b’) the contradiction remains at the level of divine comprehension. If we maintain Cusanus’ definition of God and draw from Anselm, that God is “that beyond which there can be nothing greater”, there is a metaphysical contradiction God becoming incarnate. More precise definitions are not needed to see contradiction in the unbounded “Absolute Maximum” becoming bounded. The paradox is “irreconcilable” and thus we find ourselves acknowledging that the contradictions are genuine.

Although writing earlier[[73]](#footnote-74) than the *Myth* debate[[74]](#footnote-75) Hepburn’s discussion of paradox “picks up” where Hebblethwaite’s ends that ‘such paradoxical and near-paradoxical language is the *staple* of accounts of God’s nature and is not confined to rhetorical extravaganza’s’ (1960, p. 16 original emphasis). Hepburn approaches paradox as inherent and irreconcilable in the incarnation:

So the core of the problem would now seem to be in knowing in what circumstances we should regard some stubbornly paradoxical concept as a muddle, to be dissolved sometime in the future, and when to regard it as a mystery, to be lived with and perhaps held in reverence. (1960, p. 8)

Hepburn’s aim is to understand if we can reside with paradox ‘without abandoning belief’ (Hepburn, 1960, p. 186). Drawing on scientific metaphysics regarding light exhibiting both wave and particle like properties, Hepburn argues that what was once seen as paradoxical is now understood as valid. The same predicament is faced by the theologian – should we accept, or perhaps embrace, paradox even if we may never be able to consolidate the two sides? The advantage for the scientist is that they could “point towards” the object of the paradox. Herein lies the opportunity and the challenge of the incarnation – ‘For if the invisible, intangible God cannot be singled out for ostensive definition, God incarnate *may* be so singled out’ (1960, p. 19 original emphasis).

The centrality of paradox means the issues are not avoidable through clarification, they are what Ramsey terms “avoidable paradox” (Ramsey and Smart, 1959). The significance ‘arises from and is abound up with its permanence and unavoidability’ (Ramsey in Ramsey and Smart, 1959, p. 196).

### Responses to Apparent Contradiction in the Incarnation due to Current Understanding

*The incarnation is paradoxical because of limitations in our current knowledge/metaphysics/language use etc.*[[75]](#footnote-76)

It may be tempting to claim that given our finite capacities we should expect contradiction in theological doctrine. There is a narrow dividing line between P4 and P5 – for P4 it is not possible to remove the appearance of contradiction based on our *existing* knowledge, metaphysics, or language, however this does not mean that there is not the possibility for a resolution in the future. Basinger argues this claim of “paradox” is simply mystery by another name ‘we must not let the fact that we as humans do not have all the pieces of the puzzle lead us to believe that the concept of contradiction is inherently ambiguous’ (Basinger, 1987, p. 210). The focus here rests in the intersection of epistemology and metaphysics.

#### Paradox due to Epistemological Limitations

There are three ways to understand how our epistemological limitations may give rise to the appearance of contradiction, although only the second two touch on metaphysics and will be addressed here:

1. It is conceivable that there is information that could remove the appearance of contradiction, but we don’t currently have access to it.
2. The appearance of contradiction is not caused by our *knowledge* but by our assumptions about the nature of God/Christ.
3. We do not have the capacity due to our finite being to “contain” the (existent) information needed to remove the appearance of contradiction.

EP2 sits firmly on the boundary between epistemology and metaphysics and questions whether our metaphysical knowledge is insurmountably contradictory regarding our categories of humanity and divinity. To avoid undue overlap with §3.5.4, I focus on whether assumptions about our knowledge of God are leading to the appearance of paradoxicality. Our assumptions of the nature of God are closely tied to our metaphysics and use of language, as Catherine Keller notes ‘we bring so much baggage to the concept of “God” that we can hardly move, let alone undertake a journey’ (2007, p. 1). When establishing if our current knowledge “causes” the contradiction we must ask if this is based on knowledge or presupposition? This can be examined by asking if “minimal” definitions of God/human still give rise to the appearance of contradiction. This enables us to examine some of the “baggage” attached to the terms. In *The Word Made Flesh* (2007) Trenton Merricks questions whether embodiment is a *necessary* part of being human. This links to Hobbes and Menuge’s comments that our experience to date (of humans) may lead us to *assume* some attributes (such as embodiment) are necessary[[76]](#footnote-77).

To examine this further it is helpful to use of an example abstracted from the complexities of personhood and divinity. If we were to establish a minimal definition of “chairs” what would be required? Although one immediately pictures an example of a specific chair, probably with four legs, having four legs isn’t a necessary attribute of being a chair. Having a “seat plate” to sit on is, but how does this distinguish a chair from a stool? Furthermore, what does one do with objects that we traditionally term "stools" yet fulfil a minimal definition of chair (such as bar stools that have both a seat plate and a back rest)? The question of ambiguity (fuzzy sets) or complex chair-stool hybrids mirrors the questions about the contradiction (or otherwise) existing in the uniquely complex object of the incarnate Son of God. Does the apparent contradiction of a “chair-stool” or “God-human” still arise when using “minimally” defined versions of those terms?

Firstly, is the division that is being made one that is ontologically existent in the world *in binary terms* (there are stools and chairs only and there aren’t objects that fit into a space between)? The existence of “bar stools” seems sufficient to dispute this claim. Therefore, we have three other avenues: (a\*) it could be that due to their excessive leg length and common features these bar stools are *sui generis* (their own class) or (b\*) we have been incorrect in applying the class (name) “stools” to them, closer examination of the minimal definition will reveal that they are chairs; or (c\*) bar stools are stool-chairs and need to be described in non-binary terms to encompass the fact that although both descriptions are accurate, neither fully describes the object[[77]](#footnote-78). This thought puzzle highlights some of the issues associated with trying to construct sufficient definitions of complex objects. Both (a\*) and (b\*) have been posited as solutions to understanding how Christ can be fully human and fully divine. Because the incarnation was a one-time event, we are unable to make sense of His humanity because he was *uniquely* human in His also being divine.

The example of a “minimal” definition highlights how our current knowledge may lead to the appearance of paradox. The mechanism mystery remains - we don’t need to understand how chairs are constructed to be able to establish a minimal definition. However, the appearance of contradiction may remain if we try to reconcile specific definitions. Similarly, it may be the appearance of contradiction in the incarnation arises because we have been trying to reconcile specific definitions of “humanity” and “divinity”. If the apparent contradiction can be removed through changing our definitions the incarnation ceases to be P4 paradoxical[[78]](#footnote-79).

EP3 is closest to a "mystery” account. The difference between EP3 and mystery (P6), is that P6 focuses on our capacity for *explanation*. EP3 includes a metaphysical element by asking whether our “mental”[[79]](#footnote-80) faculties could contain the information. This is a different question to whether we could conceivably “discover” the knowledge to establish whether the contradiction is genuine.

An analogy can be made if the capacity of our metal faculty is likened to an SD card. The SD card contains two images (knowledge) one a red flower and the other a blue flower. If asked if there can be a flower that is both blueish and reddish (purple) we arrive at an “apparent contradiction”. Although there is conceivably an image of a purple flower that could correct the “contradiction” the file size of the purple flower image could not fit on the SD card (even if the other two images were removed). The knowledge (image) required to reconcile the apparent contradiction cannot be contained by the finite capacity of our mind (the SD card).

To fully examine this would require an understanding of the capacities of the human mind that we don’t currently possess. Despite this, an appeal to eschatological verification may overcome the paradox, as we would cease to be spatially and temporally circumscribed. This may allow our minds to hold the information that removes the appearance of paradox. However, the reliance on eschatological verification means that the apparent contradiction due to our “*current knowledge*” remains and therefore the incarnation is paradoxical.

### Responses to Removal of Paradox in the Incarnation Through new Knowledge

*The incarnation is not paradoxical because with greater knowledge the apparent contradiction can be resolved.*

P5 differs from P4 as it focuses on whether there is additional information (including eschatological verification) that could overcome the appearance of paradox. P5 includes the response of this thesis that knowledge about/from holistic ontology may remove the appearance of contradiction. It examines whether it is *in principle* possible to overcome the appearance of contradiction in the incarnation.

In general the discovery of a paradox is the result of an encounter with reality which our concepts are inadequate to deal with […] we find ourselves saying self-contradictory things, but this does not mean that the reality we have encountered is itself self-contradictory. It means that there is a problem with our conceptual equipment (Evans, 2006, p. 123)

Those that argue that we cannot understand the incarnation due to our finite capacity, are supporting P6 that the incarnation is mysterious not paradoxical. The body of this thesis will examine how changing the metaphysical starting point provides new knowledge for theologians to address paradox narrative. However, I will first examine how adapting one’s metaphysical knowledge may impact on whether and where the paradox is located.

### Responses to Metaphysical Paradox and its Removal

This section examines P4 and P5 together as they apply to questions of metaphysics. In §3.5.2 “current knowledge/metaphysics/language” was examined as *limitations*, yet regarding metaphysics it is more accurate to speak of *presuppositions*. If it is a limitation in reality that causes the apparent contradiction, then the incarnation is genuinely contradictory (P3). Due to the breadth of metaphysics, it would be impossible to provide a thorough survey of the matter here. Therefore, the focus is limited to the *apparent* contradiction between “scientific” materialism or physicalism on the one hand and “Christian” substance dualism on the other[[80]](#footnote-81).

In *The Significance of the Philosophy of Nature for Theology* Anna Lemanska provides a succinct account of the challenge of (scientific) metaphysics for theology when she argues changes in our (philosophical) understanding of the world have not always tracked with our theological reflections. ‘Thus various kinds of tension occurred between natural knowledge [and theology][…][and] this was particularly strengthened by the rise of modern natural science’ (2014, p. 134). A more positive conceptualisation of the interaction between our scientific and theological accounts of reality is found in McGrath’s *Scientific Theology* where he argues that a “scientific theology” should ‘treat the working assumptions and methods of the natural sciences as offering a supportive and illuminative role for the Christian theological enterprise’ (2001, p. 7).

The relationship between our concept of the nature of the world and theology[[81]](#footnote-82), is not simply a question of the relationship(s) between science and religion. ‘Theological discourse requires a relationship to metaphysical reflection if its claim to truth is to be valid. *For talk of God is dependent on a concept of the world*, which can be established only through metaphysical reflection’ (Pannenberg, 1990, p. 6 emphasis added). If we listen to Wolfhart Pannenberg’s call for theologians to take metaphysics “seriously” and understand theology as *inquiry* ‘into God and his revelation’ (Pannenberg, 1990, p. 12) then we must “clarify” and “reconstruct” our metaphysical reflection on the grounds of our developing experience of the world.

#### Paradox Due to Metaphysical Presuppositions

For differing reasons both the materialist and body-soul composite approaches to the incarnation give rise to the appearance of contradiction. The materialist account draws the theologian more closely in line with the perceived scientific account of the world and it avoids the challenges associated with dualistic interaction. A dualist approach recognises the immaterial nature of divinity and should be able to avoid the challenge of God changing from immaterial to material “substance”. With its proximity to the scientific metaphysics the materialist account will be examined first.

##### Appearance of Paradox in Materialist Approaches to the Incarnation

Prominent Christian thinkers who argue for a materialist position include Lynne Rudder Baker, Peter van Inwagen and Trenton Merricks. This discussion will focus on Baker’s *Persons and the Natural Order* (2007), and *Christian Materialism in a Scientific Age* (2011); and Merrick’s *The Word Made Flesh* (2007). Baker and Merricks are challenged by Charles Taliafero and Stewart Goetz’s work *The Prospect of Christian Materialism* (2008), and Merricks is further examined by Luke Van Horn’s *Soulless Saviour* (2007)and a later account of dualism for the incarnation (2018). The challenge with Christian materialism (and Merricks and Baker are no exception) is that they tend to focus on the issue of mundane personhood and not the implications for the incarnation itself (this is echoed in Van Horn’s (2018) assessment). In *Persons and the Natural Order* Baker identifies two kinds of materialism:

1. Animalism. Associated with thinkers such as van Inwagen, and Eric T. Olson. This holds that ‘persons are most fundamentally animals’ (2007, p. 264)
2. Constitutional account. Her own position. This holds that ‘human persons are wholly constituted by human bodies’ (2007, p. 266)

Although Baker distinguishes between the two, her position appears to be a variant of animalism. She argues that the ‘constituting animal’ of the human person ‘could exist without a first-person perspective’ (2007, p. 266). What distinguishes the human *person* from the human *animal* for Baker is self-consciousness. Therefore “persons” and “human bodies” are different kinds of things, but humans are only animals “derivatively”:

A particular statue is a piece of marble only derivatively, in virtue of being constituted by a piece of marble, and the constituting marble is a statue derivatively, in virtue of constituting a statue. Similarly, a human person is an animal only derivatively, in virtue of being constituted by an animal, and the constituting animal is a person only derivatively, in virtue of constituting a person. (Baker, 2007, p. 266)

It is difficult to see how this works in the incarnation – God the Son is human in virtue of being constituted by a human body, and the human body is divine in virtue of constituting a divine being? This may be an unfair interpretation as in *Christian Materialism* Baker implicitly retracts the above and argues that personhood is *non-derivative*. She is a person non-derivatively but her body has derivative personhood during the time that she is constituted by it (2011 fn. 9). She goes on to claim ‘since *human organism* and *person* are primary kinds, when a human organism develops to the point of having a rudimentary first-person perspective, a new entity – a person – comes into existence’ (2011, p. 49 original emphasis). It is unclear how this developmental relationship could work for the *person* of Christ – it would seem without first-person reflection no person can exist, but if the first-person reflection is grounded in the *human animal*/body then it is unclear how the incarnate God has *any* interaction/co-joining with humanity. Conversely if the first-person reflection is grounded in the divinity of Christ, then this implies Christ only appears human. Either version seems to lead to an extreme form of the two-minds view.

Unlike the deistic or atheistic materialist, ‘Christian materialists are not materialists tout court. They believe in a nonphysical God’ (Baker, 2011, p. 48). This God created the *material* world *ex nihilo*. When this is combined with Merricks’ account that ‘God the Son, in virtue of being incarnate, is related to his body just a you and I are related to our respective bodies’ (2007, p. 281). For the materialist “I” am my physical body – I do not have an immaterial soul or mind, and therefore it is not at all clear how there is anything at all about the joining of an immaterial divine being that can be anything like “you and I” are joined to our bodies. Taliaferro and Goetz also conclude that ‘it is unclear how materialism could allow that the Son of God can become incorporated into or become identical to a physical animal body’ (2008).

Alvin Plantinga voices similar concerns in *On Heresy, Mind, and Truth*: if ‘prior to the incarnation [God the Son][…] was not a material object, then the second person of the Trinity must have *become* a material object’ (Plantinga, 1999, p. 186 emphasis added). These are further echoed in Leftow’s comments that ‘materialist Christologies are non-staters’ going on to expound ‘my intuitions say that [God the Son becoming a human body] is flatly impossible […] how could something relevantly like a soul become something relevantly like a stone?’ (2011, p. 21). Even if one wishes to argue that God moving from being immaterial to, for a short time, being meaningfully attached to a physical body is not logically impossible and therefore could be achieved by an omnipotent divinity. This still needs to be reconciled with the Christian materialist’s claim that theism ‘with its non-physical miracle-working creator God – entails that the non-physical can causally influence the physical’ (Merricks, 2007, p. 284).

The corollary claim to this is that there must be non-physical entities or objects even if such objects/entities are limited to the divine. In reconciling this tension Merricks argues (his) materialism does not require that persons ‘divine or otherwise, [are] merely physical object[s]’ (2007, p. 295). Merricks allows for the existence of “mental properties” that are irreducible to physical properties (as he notes this brings his “materialism” more in line with property dualism). The challenge is that although the mental properties may not be *reducible* to physical properties they do emerge or arise *from* physical properties[[82]](#footnote-83). Without this initial relationship it is unclear how divine, and human can be integrated in the person of Christ.

This overview of the materialist position highlights that the Christian materialist is confronted with paradox on two fronts. The first is an internal contradiction between the insistence on local materialism (for human persons) while allowing a global dualism to account for immaterial divine beings. The second is that despite attempts to allow for the existence of “mental” properties in human persons, materialism does not provide an adequate account of how this translates into even an analogy for the interaction between divine and human in Christ.

##### Appearance of Paradox in Dualist Approaches to the Incarnation

The question is whether the dualist account can fare any better? Traditionally the paradoxicality of the incarnation resides in the fact that there is an immaterial divine being, which comes to reside meaningfully in a physical human body. The divine properties normally discussed as contradictory (with being a human person) in the incarnation are identified by Stephen Davis (2011) as: necessity, eternality, omnipotence, omniscience, and incorporeality. Here I will focus on the property incorporeality. In this sense, just as the materialist had to explain how something immaterial could become something material, the dualist must explain how something immaterial can meaningfully interact with something material. Fundamentally, if the soul is conceived as an immaterial substance ‘that has mental properties but no physical properties’ (Merricks, 2007, p. 282), and that the union between body and soul is (significantly) constituted by the souls’ ability to control bodily actions – how do the two “substances” interact?

This problem is commensurate for mortals and their souls, and for the union of the divine and human in Christ. However, it is compounded within a “scientific” metaphysics where our current understanding states that only physical objects can cause physical objects to move (or *the forces associated with the interaction of physical objects* can cause a physical object to move)[[83]](#footnote-84). Just as the Christian “materialist” must acknowledge the existence of immaterial beings, the theist (or deist) who allows divine interaction with the world must already accept that it is metaphysically possible for the immaterial to causally affect the material realm.

The difficulty in moving the dualist incarnation conversation beyond interaction is that accounts (e.g., Van Horn, 2018) focus on examining the role of *embodiment*: ‘we are neither essentially human nor human while disembodied’ (Van Horn, 2010, p. 336). There are two different points at which dualism gives rise to an apparent contradiction. The first is that unless it is possible to overcome the problem of how an immaterial soul (or something like a soul) can be causally effective then we arrive at Apollinarianism (or Monophysitism) whereby although Christ’s immaterial divine substance “acquires” a human body the Son of God does not have a “rational soul”. Yet, if as Van Horn (and other dualists state) ‘we are simply rational souls capable of being embodied in a variety of types of body’ (Van Horn, 2018, p. 336), it may be possible to argue that in becoming embodied the immaterial substance that is the Second Person of the Trinity became “relevantly like” a human soul (cf. Van Horn, 2018, p. 11). This shift from disembodied immaterial person of the Trinity to embodied immaterial “soul” ‘involved no fundamental transformation on [God’s] part, allowing [the second person of the trinity] to remain fully divine while simultaneously becoming fully human’ (Van Horn, 2018, p. 11). Van Horn avoids the claim of Apollinarianism by arguing that it is incorrect to understand Christ’s immaterial self “substituting” for a human soul. Instead, at the instant of incarnation the Second Person of the Trinity *became* a human soul. There is a potential correlation here to the instant at which a plank of wood becomes a shelf when it is brought into a certain relationship with brackets and a wall. The change from plank to shelf does not require a change in substance, but rather a change in relationship[[84]](#footnote-85).

The second potential point of paradox is the co-indwelling of contradictory attributes. This problem exists for both materialist and dualist however, the dualist has already got space for a substantive immaterial aspect of human personhood. There isn’t a clear account for how this space could support the co-presence of omniscience and non-omniscience for example (although it may be better equipped to engage in corporeality and non-corporeality). These attributes fall outside the scope of this thesis, yet it is worth noting that this *may* be something that can be encompassed within a Boolean atlas approach to describing reality. This returns to the importance of questioning the assumption that the attributes are dichotomous.

The dualist's contradiction is in a different aspect of the incarnation than the materialist’s – instead of the change of substance, it resides in how different substances can meaningfully interact. When this is combined with the shared challenge of contradictory attributes, it seems that dualism fairs no better in overcoming the appearance of contradiction. It is for this reason that the premise of this thesis is that to overcome the apparent paradox in the incarnation it is necessary to radically re-evaluate our metaphysics considering scientifically informed holistic ontologies (such as those suggested by Primas and Esfeld).

#### Removal of Metaphysical Paradox

Albeit that Jonathan Edwards sits outside the temporal boundary of this thesis, his work is worth examining here for several reasons. Firstly, along with Berkeley, Edwards is seen as one ‘of the greatest modern proponents of an idealistic metaphysics within the Christian tradition’ (Douglas Hedley’s cover endorsement of Farris, Hamilton and Spiegel, 2017). Secondly, as holistic quantum theory broadly posits a form of monistic realism, it provides a counter point to the metaphysical “solution” at the heart of this thesis. Finally, the recent publication of the two volumes of *Idealism and Christian Theology* highlights that there is still much contemporary engagement with Edwards’ thinking. This section will focus in particular on Oliver Crisp’s (2017)[[85]](#footnote-86) engagement with Edwards’ ideas rather than directly with Edwards’ work.

If paradox is caused by our metaphysical assumptions, the simplest “solution” is to reconsider whether the commitments that lead to paradox are necessary or “disposable”. Edwards’ idealism exemplifies how “greater knowledge” (or alternative knowledge) can remove paradox. Across Edwards’ writings there are three metaphysical commitments that are central to the possibly of achieving what Anderson would claim is impossible– removing paradox *and* maintaining an orthodox understanding of the incarnation (i.e., one compatible with Chalcedonian).

To achieve this aim requires a bold metaphysics, which includes commitment to: (a†) immaterialism, (b†) metaphysical antirealism, (c†) occasionalism, and (d†) (pure act) panentheism. For this discussion these will be understood as follows[[86]](#footnote-87):

1. Immaterialism: there is no material substance, the only things that exist are minds and their ideas. The divine mind sustains all things (thus avoiding radical subjectivism).
2. Metaphysical antirealism: Nothing exists that is not ‘radically dependent’ on God (Crisp, 2017, p. 153). All created minds and their ideas exist *only* in the mind of God. Their continued existence is dependent on God continuing to “think them”.
3. Occasionalism: God is the only genuine causal agent – ‘creatures are merely the “occasions” of God’s action’. There is no sustained existence of created “objects” or “persons” (thoughts) through time – only as successive “stages” that are continually created anew (Crisp, 2017, p. 155).
4. (Pure act) panentheism: God is both metaphysically wholly simple (pure act) and the universe exists wholly and only in God’s mind but God’s being is not exhausted by the universe.

This combination of metaphysical commitments appears to remove the paradox associated with the incarnation. Arguably the most radical commitment within Edwardsian[[87]](#footnote-88) Christology is immaterialism, this provides the theologian with both challenge and opportunity. The opportunity is that if ‘all reality is of the same essence or stuff as the divine spirit’ (Snowden, 1915, p. 155) then the challenge of interaction seen in substance dualism is removed. There is no challenge of how it is possible for second person of the Trinity to causally interact with a human body, as they are one substance, and Leftow’s charge that something “like a soul” must become something “like a rock” is removed. But this is also where the theological challenge arises.

In Athanasius’ writings in *Against the Arians*, he argues that ‘in nature the Word Himself is impassible, and yet *because of that flesh which He put on*, these things are ascribed to Him, since they are proper to the flesh, and the body itself is proper to the Saviour.’ (Athanasius, 1892, para. III.34)[[88]](#footnote-89). The language of “putting on flesh” or becoming *embodied* appears to stand in opposition to immaterialist metaphysics. Yet Edwards removes the appearance of contradiction by challenging the underpinning metaphysical assumptions. The claim that Christ did not adopt a *physical* human body is only heretical if that makes the “human” body inhabited substantially different to *our* human bodies. Edwards argues that ‘bodies have no substance of their own […] So that there is neither real substance nor property belonging to bodies; but all that is real, it is immediately in the first being [God]’ (Edwards cited in Crisp, 2017, pp. 147–8). Thus, if *our* bodies are not material bodies then Christ “putting on flesh” cannot refer to gaining a material body as this would not make Christ share in our humanity (Heb. 2:14).

Thus, idealism raises questions about the distinction between humanity and divine. For James Snowden this lies in a quantitative distinction:

God incarnates himself in successive degrees from the lowest point of the scale […] this scheme logically supplies a place for a further step up and higher manifestation [than humanity] […] reaching the summit and full splendor [sic] of the divine in the form of the human [Christ] (Snowden, 1915, p. 157).

This difference does not mean that the union is any less “real” than a materialist/dualist union in Christ, the union is both ontological and relational. It is ontological because it ‘consists of the uncreated Idea coming to exist as an idea *in time’* including a divine act of creation ‘giving being and identity’ (Tan, 2017, p. 185 emphasis added), and relational through the ‘relation of dependence or mutual communication between body and spirit’ (Tan, 2017, p. 185). This highlights that embodiment (or incarnation) requiring a material body is an often an unquestioned, metaphysical assumption, yet immaterial incarnation can be compatible with an orthodox interpretation of the doctrine.

The more problematic Edwardsian commitments are those of occasionalism and panentheism. Occasionalism requires a commitment to continuous creation. This means that there isn’t one act of incarnation, instead there is continual incarnation. The second person of the Trinity was repeatedly incarnated at each successive stage during Jesus’ earthly life – ‘the first creation being only the first exertion of this power […] So that the universe is *created out of nothing every moment’* (Edwards cited in Crisp, 2017, p. 149 emphasis added).

Furthermore Edwards’ commitment to occasionalism requires that ‘there is no causal agent besides God; creatures are merely the “occasions” of God’s action’ (Crisp, 2017, p. 155). Thus, no act *qua* human is the act of a human causal agent but instead an instance of divine action. Crisp argues that this is less problematic in Christ as it means that action occurs through ‘the immediate volition of God the Son’ (Crisp, 2017, p. 162), e.g., *qua* divinity. As with “embodiment” this means that Christ’s willing *qua* his humanity is the same as our willing – part of being fully human is to not be a causal agent. Instead, one is subject to theanthropic action. The challenges arise on wider theological issues (such as free will and the problem of evil) rather than specifically with the incarnation.

Finally, whilst ‘[t]here may be as many panentheisms as there are ways of qualifying the world’s being “in God”’ (Gregersen, 2004, p. 19), Joseph Bracken captures a clear definition of panentheistic incarnation that appears in-line with Edwards’ metaphysics. Incarnation is the ‘pivotal moment in an ongoing process of divine self-communication to the world of creation […] Indeed, in that primordial event, the immaterial reality of the triune God is already incarnated, made manifest’ (Bracken, 2016, p. 34). This ties back to Edwards’ occasionalism, although neither is a necessary *requirement* of immaterialism. Thus, although Edwards idealism can remove much of the apparent *metaphysical* paradox, it gives rise to other theological problems, which require further exploration to understand if the trade-off is worthwhile. On the above reading it appears possible to remove the contradiction by adopting an immaterial anti-realist metaphysics.

## Conclusion

This chapter has located the distinction between mystery and paradox in the contemporary debate. The key distinction between paradox and mystery rests in the implicit tension/dichotomy at the heart of paradox, whereas mystery speaks to something that is inherently unknowable. Within incarnational discussion there is a complex interaction between mystery and paradox. The purpose of this thesis is not to remove the epistemic gap between us and God, nor to claim that there may not be mystery in the mechanism of the incarnation. Instead, it is to understand how the appearance of contradiction may be rooted in our metaphysical commitments.

The greatest challenges of the paradoxicality of the incarnation rest in our inability to comprehend the point(s) of contention coherently and precisely, and to reconcile the metaphysical challenges. Of these two I argue the metaphysical challenges are the greater – the concern of the genuine impossibility and/or incomprehensibility of Christ as fully human and fully divine. This is not to say that in re-evaluating our metaphysics we can “comprehensively” understand God (incarnate). However, reviewing our metaphysics, should allow the discussion to progress in a meaningful way. For the remainder of this thesis, mystery will be put to one side. I will examine how holistic ontology can support the removal of the appearance of metaphysical paradox within the incarnation.

# Understanding the Shift to Holistic Ontology

It is […] widely believed that the aim of modern physics, and perhaps of all modern science, is to understand wholes in terms of their parts […] it is further often stated that contemporary physics, specifically quantum mechanics, surprisingly incorporates a form of holism absent from classical physics. (Maudlin, 1998, p. 46)

This chapter marks a shift within the thesis from an examination of the appearance of theological paradox to an explanation of the reductionist scientific metaphysics that has given rise to it, and the holistic metaphysics that may help overcome it. I will examine the shift across three interrelated sections. The first explains the key pillars of classical scientific metaphysics before touching on some of the theological issues these commitments raise. Next, I examine the relationship between supervenience and reductionism, explaining why supervenience may be able to account for the appearance of “new” properties at different levels of reality before examining why the “scientists’” solution is less helpful for the theologian. The penultimate section examines the relationship between holism, atomism, and how we understand the “parts” of the whole (mereology). Finally, I provide a brief account of why I think holistic ontology may be useful for the theologian, especially for examining the incarnation.

## The Challenge of Classical Scientific Metaphysics

Mario Beuregard’s claim that scientists are *unaware* science is ‘predicated on a number of metaphysical assumptions’ (2017, sec. 1) is somewhat presumptive. Yet his later statement that ‘most scientists *ignore* that their worldview is based on metaphysical assumptions that were first proposed by Ancient Greek philosophers’ (Beauregard, Trent and Schwartz, 2018, p. 21 emphasis added) is probably accurate of many scientists and theologians. The classical physics described by Newton offered an account of the world that appeared to leave very little space for the existence and action of God: ‘the universe once unknown and capricious, became a huge clock ticking along inexorably. Every event was easily explained as a combination of known forces […] with the machine functioning so well, God was no longer necessary’ (Brown, 1990, p. 477). It is into this challenging worldview devoid of transcendence, where there is little or no room for the immaterial, and where God is arguably dependant on space for existence (Connolly, 2015) that theology has been trying to reconcile itself to scientific metaphysics. Yet this mechanistic and reductionist metaphysics is most harmful to the theological enterprise and creates an environment where consonance with “science” is prioritised over compatibility with transcendence.

### Understanding the role of Metaphysics for Scientific Explanation

For the classical scientist, the metaphysical pillars of realism, reductionism, and determinism were ingrained into their understanding of the world. However all three were challenged by the “postmodern” (Simmons, 2014) or “postmaterialist” (Beauregard, 2017) paradigm shift brought about by quantum theory (Barbour, 1990). As Henry Stapp noted in *Quantum Nonlocality and the Description of Nature* (1989) ‘[p]hysicists have, however, been proclaiming for more than fifty years that the empirical evidence provided by quantum phenomena demands a radical revision of our ideas about physical reality’ (1989, p. 154). This section examines what realism, reductionism, and determinism mean for our understanding of the world broadly speaking. The theological implications of these metaphysical assumptions are examined in the following section.

#### Realism

A scientific account of the world includes a commitment to ontological realism. As the place of critical realism in the science-theology dialogue was addressed in chapter 2 I will on briefly recap some pertinent points here. In *Scientific Explanation* Denis Bonnay describes scientific realism as:

[T]he hypothesis that science provides, or at least aims to provide, an exact description of the world […] the theoretical entities posited by science […] must be interpreted as being entities that really exist (2018, p. 34)

However, one must be careful not to assume that there is *direct correlation* between scientific truths and the world. As Christopher Southgate explains in *God, Humanity, and the Cosmos*, to do so is to assume a *naive realism*. Instead, we must recognise that ‘scientific views always depend on particular preconceptions about the world and particular ways of measuring it’ (2005, p. 14). Southgate goes on to highlight that:

[W]e hold our views of reality *provisionally*, that we cannot simply read off the nature of the world from scientific data. The theories and presuppositions […] affect our selection of what data we count as important to collect, as well as the ways in which we interpret these data (2005, p. 14)

The emphasis of our selection of a relevant interpretation is highlighted by Primas in *Non-Boolean Descriptions* when he argues that ‘*there are no unprejudiced classifications*’ (Primas, 2007, p. 13 original emphasis) – we determine what should be included as “relevant” to our descriptions of reality. The provisional nature of the scientific description of the world is repeatedly noted by McGrath in *Scientific Theology* (e.g. Volume 1 2001, pp. 45–50). In the same volume he goes on to highlight three forms of realism that frame his study, and implicitly underpin both this thesis and the scientific enterprise.

1. Ontological Realism – there is a reality (or multiple realities) that is independent ‘and external to the inquiring human mind’ (2001, p. 75).
2. Epistemological Realism – We can gain knowledge of the external reality (R1), and our statements concerning it are not simply subjective. There is ‘at least some degree of epistemic access’ to the external reality (2001, p. 75).
3. Semantic Realism – No matter how provisional or inadequate they may be, it is possible to make statements about reality (R1) ‘which may be described at least as approximations to the truth’ (2001, p. 75).

Realism, especially in this “critical” form is the least problematic scientific commitment. Therefore, it won’t be examined further here.

#### Determinism

Newtonian physics moved scientific thinking away from a “mysterious” world of natural forces to a world in which ‘every event is governed by the laws of nature without exception’ (Koperski, 2015, p. 159). Determinism states that even when events appear “random” from a human perspective they could have in fact been accurately predicted given full knowledge of the state(s) of the system just prior to the event concerned. As Stapp notes ‘[w]ithin that framework the most complete prediction […] is simply the complete description of the state of the universe at that time. This complete description is *in principle* predictable’ (Stapp, 2014, pp. 135–6 emphasis added). Even an event that appears random such as the toss of a die is, given enough information, predictable and the “randomness” is simply epistemic uncertainty on our part[[89]](#footnote-90).

Taede Smedes in *Is Our Universe Deterministic?* (2003) identifies five key features of scientific determinism:

* 1. Every event has a sufficient cause.
	2. At any one time exactly one future is possible.
	3. Given *full* knowledge of the universe at *t* it is possible to establish its history.
	4. The state of the universe at any given time determines its unique future.
	5. The totality of being determines all possible future states of that being[[90]](#footnote-91).

The criteria of D1-D3 entail scientific determinism whereas D4-D5 include additional commitments to metaphysical determinism with D5 being a stricter, and more controversial, statement of D4. The metaphysical determinism can be understood as deducible from generalising D1-D3. Scientific determinism is a separate commitment to theological determinism, although the problems for human freedom are similar for Newtonian metaphysics.

Scientific determinism is a metaphysical rather than epistemological claim. However, the progression and/or predictive power of (classical/macro) science, can be understood to be based in the ‘possibility to compute the state of a system at any instant [which] seems to presuppose that the succession of states of the investigated system is knowable in advance, *in other terms that they are pre-determined*’’ (Barberousse, 2018, p. 414). Indeed, Smedes argues that ‘we as finite beings are incapable of determining whether or not the universe is completely deterministic’ (2003, p. 972). The only kind of being able to do so *must* be both infinite and transcendent. However, it is unclear whether Smedes’ commitment is framed by a pre-existent theological commitment, as a philosopher of religion, or an implicit broader ontological commitment.

#### Reductionism

The problems that arise from ontological reductionism lie at the heart of this thesis, and reductionism is often placed in a dichotomous relationship with holism. I will focus on Maudlin’s exploration of reductionism considering the “challenge of holism”. It is important to note that Maudlin examines this issue from a purely philosophical standpoint, and therefore the theological implications discussed in the following sections are my conclusions based on his work, rather than something for which he has argued.

In *Part and Whole in Quantum Mechanics* (1998) Maudlin begins by raising up the status of reductionism. Without revising our understanding of the reductionist claim, its collapse in the face of holism is ‘too easy […] [and] no scientific enterprise ever has been, or could be, reductionist’ (1998, p. 47). What then is the reductionist claim? In *Religion in an Age of Science* Barbour describes reductionism as the view that ‘the behavior [*sic*] of the smallest parts, the constituent particles, *determines* the behavior of the whole. Change consists of the rearrangement of the parts, which themselves remain unchanged’ (Barbour, 1990, p. 96 emphasis added). To understand why this reductionist claim is “too easy” to defeat I will paraphrase Maudlin’s argument (1998, pp. 46–49), which makes use of the archetypal example of a complex system – the pocket watch.

A simple account of holism is that “the sum is more than the parts”. If this is true in a way that is radically different to the reductionist claim, then it means that for the reductionist “the sum is *no more* than the parts”. All the while I have the parts of the pocket watch I have the same whole. This cannot be a correct account of what is meant by reductionism for very few would claim that the working pocket watch, and the same disassembled on my desk are the same “whole”. Certainly not in terms of behaviour, even if one wishes to claim that mereologically they are the same “whole” via addition.

The first reductionist “solution” explaining the distinction between my working pocket watch and the pile of watch pieces on my desk, examined by Maudlin is that part of the “whole” includes the relationship between the parts. In disassembling the watch, the relationships between the parts have changed and therefore I don’t have the same whole. The challenge with the addition of “relations” to the whole, is establishing where these relations should end. If we are referring to *all* the (spatial) relational properties of the parts of the watch, then these don’t simply include the relationship between the winding stem and the hands. Instead, their spatial relationship to the ‘Eiffel Tower (and ultimately [to] the entire universe)’ (Maudlin, 1998, p. 47) are also included. This would seem to go too far in claiming the relational states of the entire universe were bound up in the *relational states of watch parts* or vice versa, neither seems to be what the reductionist really has in mind.

The second “solution” provided by Maudlin is:

[T]he watch is the sum of its parts iff all of the facts about the watch are determined by the intrinsic (nonrelational) state of the parts together with the relations between those parts (Maudlin, 1998, p. 47)

This places a boundary on the relationships included within the “whole”. The question is whether it is also able to account for the fact that taken as a “whole” the parts and their relationships create something that “tells the time”. The problem now is that both the holist and the reductionist can respond and claim that their position is correct. For the holist, “telling the time” cannot be predicated on the state of the watch parts and the relationships between them. When one examines the whole one finds *new properties* of the whole that cannot be explained by this account. The reductionist’s reply is that ‘these supposed holistic properties of the watch are nothing more than *further relations of the parts*’ (Maudlin, 1998, p. 47 emphasis added) the “new” property claimed by the holist, the reductionist can argue is no more than an unexpected relationship between the parts.

The relationship between the properties of the whole and those of the parts will be examined further in §4.2. Before examining the implications of these metaphysical commitments for our theological discussion, it is worth noting that McGrath’s distinction between different “realisms” is echoed in a distinction between different understandings of reductionism. In *Biological Reductionism the Problem and Some Answers* (1987), Francisco Ayala identifies three kinds of reductionism which he categorises as follows. Ontological reductionism focuses on questions regarding the constitution of organic entities (‘do organisms consist of other entities besides molecules and atoms’ (Ayala, 1987, p. 316)); methodological reductionism focuses on questions regarding the approach to acquiring knowledge about biological entities (‘whether a particular biological problem should always be investigated by studying the underlying (ultimately, physical) processes, or whether it should also be studied at higher levels of organization’ (1987, p. 316)); finally epistemological reductionism focuses on the level of explanation available (‘whether biology may be ignored as a separate science because it represents simply a special case of physics and chemistry’ (1987, p. 316)). This chapter focuses on the implications of ontological reductionism in science – are complex entities *fully* describable in terms of their constituent parts?

#### Materialism and Locality

In addition to the three commitments noted above. There are two further metaphysical commitments within classical physics that despite not being explicitly addressed are often at least tacitly assumed: locality and materialism. Locality (or local realism) states that an object can only be *directly* influenced by its immediate surroundings, and that no signal can travel faster than the speed of light. When combined these two features of the classical world rule out the possibility of any form of “action-at-a-distance”. The shift to a metaphysics (such as that proposed in some interpretations of quantum theory) that allows for nonlocality, either global or “local” provides space in which “action-at a distance” is conceivable in certain instances.

Materialism is, at its most basic level a commitment to a particular understanding of the “stuff” that makes up the world. Whilst the concept of some kind of “matter” as a foundation for change or being can be traced back to the ancient Greeks, it is in the seventeenth century shift towards the world as bodies in motion that matter comes in to its own. As Ernan McMullin, a philosopher of science, highlights, the move to a reductionist and mechanical understanding of the nature of reality led to the growth and development of “materialism” (McMullin, 2014). Materialism varied in the detail but ‘would always involve a denial of the existence of spirit, understood as something that lay outside the scope of the mechanical philosophy, and it would emphasize the reductionist claims of that philosophy’ (McMullin, 2014, p. 24). This is echoed in its contemporary ‘comparatively precise’ use within philosophy of mind (Koons and Bealer, 2010, p. x) where it stands in contrast to idealism and addresses ‘the ontological status of, and fundamental metaphysical relationship between, the mental and the physical’ where the mental is reducible to physical ‘internal bodily properties’ (Koons and Bealer, 2010, p. x). Before moving on to examine the “shift” brough about by quantum theory, I will briefly set out some of the theological problems associated with adopting a “classical” scientific ontology.

### The Challenges of Classical Metaphysics for Theological Explanation

In line with this thesis, this section will address a selection of examples of the interaction between the scientific metaphysical commitments and the incarnation. Realism is perhaps the least problematic “scientific” commitment for orthodox Christianity. As Le Poidevin notes not only has there been a resurgence in theological realism in recent decades but, particularly around in the incarnation there is a commitment to realism about theological language – Chalcedon, for example, isn’t simply a statement that expresses the ideals of Christian life, but a statement that is ‘descriptive of a transcendent reality’ (Le Poidevin, 2009b, p. 705). Le Poidevin’s move to discuss (metaphysical) realism in terms of language highlights the similar complexities of a commitment to realism for scientists or theologians, whereby the question “what is entailed by a realist commitment to *x*?” is deeply ingrained with the question “what can one say about *x*?”. This can also be seen in Alexander Bird’s discussion of *Scientific and Theological Realism* (2007, sec. 2). Here I have joined them to their analogous theological commitments:

1. The world investigated by science, and the God examined in theology, exists independent of the human mind.
2. Scientific (and theological) language genuinely refers to the entities they mention (and not just the observable “effects” of their action).
3. Theoretical (or religious) statements are “truth-apt” - the function of theoretical statements is to *describe* the world and not simply to provide accurate *predictions*.

In *Theological Realism* (2016)Andrew Moore identifies these claims as being about ontological, epistemological, and semantic realism[[91]](#footnote-92). He argues that the theologian faces a greater challenge than the scientist in identifying which kind of realism the statement refers to. For theological claims ‘it is difficult to tease out for separate analysis the ontological, epistemological and semantic aspects of the statement “God exists” or to decide which [kind of relation] should have priority’ (Moore, 2016).

If realism is the least problematic assumption for theology, determinism is doubly tricky for theology within a scientific world. It is committed to the belief ‘that there is a fundamental and unchanging order in nature, that this order is all-pervasive, and that we can understand it’ (Smedes, 2003, p. 959). Further it is fundamentally *required* (at some level) within *any* scientific metaphysics in a manner that leaves no place for God to work. As Michael Dodds notes ‘[c]ausality ceased to be an ontological feature of nature at all and became merely a quirk of human psychology’ (Dodds, 2014, p. 15). The mathematisation of nature compounded the issue as it led to an implicit assumption that ‘the glue that connected causes and effects [determinism] must be as strong as that which connected premises and conclusions in a mathematical argument. Determinism thus became a precondition for the mathematical description of nature’ (Gigerenzer cited in Dodds, 2014, p. 16). It is this twofold challenge to God’s action that makes determinism difficult to reconcile with a theological account in which there is both free will and free (divine) action.

Despite the explicit concern within this thesis of the implications of ontological reductionism. It is possible to see the influence of all three kinds of reductionism within the Christological literature. For example constitutional accounts of the incarnation such as those proposed by Leftow (*A Timeless God Incarnate*, 2004) and Stump (*Aquinas’ Metaphysics of the Incarnation*, 2004), and discussed by Senor *(The Compositional Account of the Incarnation*, 2007) appear to sit across ontological and methodological reductionism. Constitutional accounts clearly adopt a methodological reductionism, seeking to understand the nature of the whole through comprehending the parts. Yet within this is an adherence, as seen in the reduplicative strategy, that there is an ontological distinction. The “whole” of the incarnate Son of God can be divided between the human and divine “parts” with nothing novel arising. There is an implicit ontological divide between what is possible *qua* humanity and that which is only possible *qua* divinity. This includes an adherence to a bivalent approach in which Christ’s attributes can be divided *discretely* and *exclusively* into either category.

Some of the clearest examples of methodological reductionism can be seen in discussions of how one may know God through knowledge of Christ. Once one makes comment, as Paul Molnar does in his introduction to T. F. Torrance’s *The Christian Doctrine of God, One Being Three Persons* (2016), that ‘the incarnation therefore is the place within history where we may know God in himself because, if our thinking begins with Jesus Christ as the revelation of God the Son […] then we are in fact thinking from a centre in God’ (2016, l. 139) then one is tacitly accepting that our knowledge of God is best arrived at through an investigation into the underlying and discrete (physical) processes/parts. Unsurprisingly this echoes Torrance’s thinking that ‘God actively reveals himself through himself, through the incarnation of his Son among us as our Saviour and by the power of his Spirit’ (Torrance, 2016, p. 13). Methodologically, in and of itself, this form of reductionism is not problematic, however it *does* become problematic if one mistakes method for ontology.

## Supervenience, Holism, and the Quantum Paradigm Shift

The previous section started to touch on how it is possible to understand the appearance of new or unexpected properties associated with the whole that cannot be explained by the properties of the parts taken in isolation. This section discusses these relationships further. I will examine the relationships between reductionism, supervenience, and holism within science first, before providing an overview of how some of these concepts have carried over into theological discussions relating to the incarnation.

As highlighted earlier, for there to be a non-trivial account of reductionism[[92]](#footnote-93), there must be boundaries placed around the kinds of relationships that can be included in the description of the “whole”. Otherwise, it may be necessary to bring the universe in its entirety to bear on the description of a pocket watch. To avoid this Maudlin presents the following solution to providing appropriate constraints:

[T]he only fundamental external relations between parts of an object are their spatial (or spatiotemporal) relations […] any whole can be divided into parts, each of which may be characterised by an intrinsic nonrelational physical state, and further *all* physical properties of the whole supervene on the nonrelational physical states of the parts together with the spatial relations between the parts. (Maudlin, 1998, p. 48)

This means that one ends up analysing the properties of the whole (in this case the “time-telling-ness” of the watch) in terms of progressively smaller and smaller parts. The properties of the watch can be explained in terms of the properties of the springs and gears (and their spatial relationship); the properties of the springs can be explained in terms of the “parts” of the spring (whether those parts are mechanical or in terms of atoms doesn’t matter at this point). This particularisation continues until one arrives at parts that can no longer be divided into smaller spatiotemporal parts – ‘these partless parts must be spatially unextended: they must be points’ (Maudlin, 1998, p. 48).

Consequently, this approach means the reductionist arrives at a form of field theory in which ‘a classical field is specified by the attribution of a physical quantity to every point in a region of space’ (Maudlin, 1998, p. 48). The concern of taking reductionism to this “extreme” is that it seems to border perilously close to a form of ‘truly radical holism’ (Maudlin, 1998, p. 49) in which a small section of space-time cannot be adequately explained without taking in to account the state of every other portion of space time.

Even if one is willing to argue that this reductionist account isn’t in fact a holist field theory, we have arrived at a description of the world where the properties of the whole appear to “supervene” or depend *entirely* on the properties of the parts. This is echoed by Jaegwon Kim’s work on the mind-body problem ‘if you have already made your commitment to a version of physicalism worthy of the name, you must accept the reducibility of the psychological to the physical, or failing that, you must consider the psychological as falling outside your physicalistically respectable ontology’ (1989, p. 134). Even though Kim is concerned with the mind-body problem in particular the comment holds for this broader discussion (as seen in McLaughlin and Bennett’s entry on *Supervenience*):

Everyone agrees that reduction requires supervenience. This is particularly obvious for those who think that reduction requires property identity […] But on any reasonable view of reduction, if some set of A-properties reduces to a set of B-properties, there cannot be an A-difference without a B-difference. This is true both of ontological reductions and what might be called “conceptual reductions” (McLaughlin and Bennett, 2021, sec. 3.3)

Thus, it is arguable that the case against reductionism is in fact a case against supervenience that the properties of the whole are nothing “over and above” the properties of the parts. It is in relation to this claim that quantum theory marks a radical departure from classical mechanics:

as applied to physical theories, quantum mechanics is then taken to be a paradigmatic example of holistic theory, since certain composite states (i.e., entangled states) do not supervene on subsystem states, a feature not found in classical physical theories (Seevinck, 2004, p. 694)

Murphy’s (1999) paper provides further nuance to the ontological reductionist’s claims and argues that the “more than” requires further description due to its ambiguity. The ambiguity arises because it isn’t clear what *isn’t* introduced at new levels within an explanatory or causal hierarchy. The first form of ontological reductionism (which retains this name) is the claim that ‘as one goes up the hierarchy of levels, no new kinds of metaphysical “ingredients” need be added to produce higher-level entities from lower-level ones’ (Murphy, 1999, p. 554). The second form, that Murphy re-categorises as *reductive materialism*, maintains that ‘higher-level entities are nothing but the sum of their parts but adds that only the entities at the lowest level are really real; higher-level entities — molecules, cells, organisms — are only composites of atoms’ (1999, p. 554). Murphy goes on to claim that there are a number of scholars (including Barbour and Peacocke) who allow for ontological reductionism in the first sense but ‘vehemently reject reductive materialism’ (1999, p. 555).

In *Physicalism without Reductionism* (1999) Murphy argues that without supervenience there are only two relations that can entail between higher order (supervenient) properties and the constituent (base) properties – identity and causation. An identity relation leads to reductive materialism, causal relation leads, unsurprisingly, to causal reductionism. With supervenience there is opportunity to understand the relationship of base-supervenient (constituent-whole) properties through a wider relational lens. Using the example of ethical behaviour Murphy shows how supervenience can either support or refute a claim for ontological reductionism. The two accounts of supervenience are[[93]](#footnote-94):

* 1. Supervenient properties (S-properties) supervene on base properties (B-properties) iff two entities cannot exhibit different S-properties without also being constituted by differing B-properties.
	2. Supervenient properties (S-properties) supervene on base properties (B-properties) iff the B-properties are (non-causally) instantiated in the S-properties.

S1 is a reductionist account of supervenience that implies some form of identity relation, I shall refer to this as *strong supervenience*. S2 exhibits only *weak supervenience*. S2is not implied by S1 and S2also allows for the inclusion of *circumstances or relations* as defining criteria for when something has S-properties, even if in both instances B-properties are present. For example, if we understand “goodness” as an S-Property, it is possible to conceive of the kinds of attributes (B-properties) that goodness would supervene on. In the case of strong supervenience these B-properties would produce “goodness” irrespective of the wider relationships at play (i.e., in every instance in which someone had that set of B-properties we would say that they were a good person). However, on a weak supervenience approach it is conceivable that ‘identical behavior [sic] in different circumstances would not constitute goodness’ (Murphy, 1999, p. 558) i.e., when part of an alternative relationship. This solution allows for multiple realisability and in doing so avoids the property identity issues associated with a strong supervenience approach to consciousness and can, in the correct circumstances, avoid supervenience implying reduction[[94]](#footnote-95).

### Explaining the Appearance of “Novel Properties”

The “reductionist” field theory posited by Maudlin raises again the question of the role of supervenience in asking ‘whether the totality of all facts about the universe [S-properties?] is determined by a salient subset of those facts [B-properties?]’ (Maudlin, 1998, p. 49). Indeed, it is to Hume’s supervenience account that Maudlin turns to conclude the discussion of reductionism. Hume held that all global facts supervened on local facts, as David Lewis explains:

[A]ll there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another. […] We have geometry: a system of external relations of spatiotemporaldistance between points. Maybe points of spacetime itself […] And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that. (Lewis, 1987, pp. ix–x)

Thus, for Hume, and others who adopt this kind of supervenience materialism, the natural laws and all causation is automatically fixed through the spatial relation and temporal order of events. Supervenience contains an implicit ontological reductionism that allows for everything to be explained in terms of ‘the collection of local facts, together, of course, with the spatiotemporal relations between the local regions’ (Maudlin, 1998, p. 49). Whatever terminology one wishes to use for this ontology: Humeanism, reductionism etc. what it means is that if quantum theory genuinely refutes our attempts to explain the world through reduction into parts, then the metaphysical implications of this are far greater than a denial of determinism. This is because the “wholeness” required by quantum theory isn’t an epistemic claim to complete knowledge (and the removal of unexpected relations) but ‘the issue before us […] is *not subjective uncertainty but physical states*’ (Maudlin, 1998, p. 51 emphasis added).

In order for quantum theory to provide a non-reductive account of ontology it must be shown that according to the theory it is not possible for ‘the physical state of a system [to] be completely specified by the attribution of physical states to the spatial parts of the system, together with facts about how those parts are spatiotemporally located’ (Maudlin, 1998, p. 50), in other words it at least needs to allow for a weak supervenience as described in S2 above. Thus if quantum theory is non-reductive it must be understood as in some sense requiring that complex wholes/systems/entities require some form of ‘ontological commitment additional to that entailed by their parts’ (Calosi and Morganti, 2016).

As already shown classical physics required a commitment, at the very least, to realism, determinism, and reductionism. It is the shift away from, or at least recognition of the ontological limitations of reductionism that lies at the heart of understanding why quantum theory was so revolutionary. Healey argues for a supervenience approach to holism, that at its most fundamental level states ‘the metaphysical holist believes that the nature of some wholes is not determined by that of their parts’ (Healey and Gomes, 2022, sec. 3). However, this definition does not seem to provide a clear account of what distinguishes holism from, say, emergentism. Whilst some, such as Nils Baas and Claus Emmeche (1997), have argued that ‘*emergence* is just the same as *holism*. An *emergent* structure is a *holistic* structure’ (1997, p. 71 original emphasis) this appears to have a limited use focusing on the properties of complex entities rather than the *nature* or substance of those entities – for example Baas and Emmeche go on to argue that on this notion of holism there is *no* commitment that the properties of the whole are not deducible from the properties of the constituents (see 1997, p. 72) and their example of “emergent phenomena” seems to allow or even suggest one should actively work towards a theory reductionism – ‘a deeper level of explanation […] would be to see the *laws* of thermodynamics derived from the laws of Hamiltonian mechanics’ (1997, p. 74 original emphasis).

Claudio Calosi and Matteo Morganti draw on Mauldin’s later (2009) monologue *The Metaphysics within Physics* in their defence of the (non-reductionist) metaphysics proposed by quantum theory. They develop an argument that it is the act of composition that appears to provide for the divergent S properties from the same B property set. They make this argument on the basis that for entangled quantum states there is no difference in the component parts but there can be substantive differences in the whole. The reductionist may argue that one simply needs to include supervenient relation within the base properties, but this is unsatisfactory both in terms of its ad-hocness and its lack of explanatory power – we must *just* accept these as base properties even though it’s these base properties that have called into question the reductionist relation itself? Calosi and Morganti do not seek to answer the question of “when” composition occurs but rather toidentify that composition seems to have a “creative” power that moves beyond those exhibited by the constituents. ‘[W]hilst the reductionist position is not internallyinconsistent it sacrifices the possibility of explaining certain fundamental physical facts and differences only with a view of defending a very general metaphysical thesis’ (Calosi and Morganti, 2016, p. 1184).

Calosi and Morganti are seeking an account of quantum wholes that does not lead to a reductionist metaphysics. They argue that to adopt reductionism fails to recognise important scientific data that shows initially indistinguishable quantum systems (such as those in an entangled state) can evolve into two qualitatively distinct systems. Thus, it would seem to speak directly to the focus of this thesis in attempting to reconcile a potentially holistic quantum ontology with macroscopic world of discernible individuals. The work is interesting not because they challenge the supervenience narrative but due to their reluctance to follow it through to its ultimate consequences. For example, they argue that any metaphysics that disallows composite objects runs against current best theory due to the implication that the only “system” that exists is that of the entire universe. Likewise, although they reject Esfeld’s appeal to “primitive ontology” (discussed later) they do so because an overhaul of our ontology that leads to ‘a radical form of global interdependence of the fundamental blocks of the [universal] mosaic […] appears to betray the spirit, if not the letter, of the Humean reductionism’ (Calosi and Morganti, 2016, p. 1192). Thus, prioritising their own “primitive” (or preconceived) ontology.

### Relationship to Theology

Maudlin has presented the scientific theologian with a challenge of how one is to understand an object that exists in total isolation – if we place a quantum object into an “empty” world do we have an object that can be fully described or does its *total isolation leave it indescribable*? For Maudlin the quantum world provides good reason to question reductionist metaphysics:

The world is not just a set of separately existing localized objects, externally related by space and time. Something deeper, and more mysterious, knits together the fabric of the world. We have only just come to the moment in the development of physics that we can begin to contemplate what this might be (1998, p. 60).

Whilst it is true that any serious physicalist must adopt at least ontological[[95]](#footnote-96) reductionism (if not reductive materialism), it is not clear how such a position can do anything other than to reinforce the paradoxicality of the incarnation. Although not discussed here, Murphy’s work takes great pains to provide an account of our mental life that allows for the reality of religious and emotional experience. However, the continued commitment to disavow the introduction of any “new” metaphysical ingredients at any level of our ontology[[96]](#footnote-97), I argue, is deeply problematic for an account of reality that allows for the existence of an immaterial theistic God. Supervenience and/or emergentist approaches to consciousness/the immaterial and novel properties, may work to account for how consciousness arises from the physical brain. However even if one accepts it for mundane accounts it fails to provide appropriate description of how God can be accounted for in terms of either ontological non-reduction (at some levels new “ingredients” are added to produce higher level entities) nor how this account can be reconciled with the consciousness present in Christ without arriving at the two wills problem.

The potential exception (despite the fact there is no evidence of this in Murphy’s writings) is for one to adopt a pan(en)theistic account in which descriptions of the “lowest” level would also be a description of the “highest” level – and consequently a pan(en)theistic approach would not require any “new” metaphysical ingredients[[97]](#footnote-98). If quantum theory is to be truly understood as a paradigm shift the reductionism it challenges must be robust, and, arguably requires joint commitment to ontological reductionism *and* reductive materialism. However, whilst reductionism in this form potentially gives rise (at a metaphysical level) to paradox within the incarnation, the holistic “solution” provided by quantum theory isn’t without its own challenges. Not least of these, is that despite reductionism appearing to remove the possibility of the immaterial, holism appears to remove the possibility of the individual (this will be examined later in this chapter, and in chapters 6 and 7).

The theological problems associated with Murphy’s supervenience approach are raised by Dennis Bielfeldt. In Bielfeldt’s (1999) response to Murphy’s nonreductive physicalism he argues that a supervenient downward-causation approach requires God’s action to *supervene upon the physical process* within the world. This appears to stand against classical theism’s claim that God is distinct from and sustains the world, rather than God’s action being emergent from it:

Classically, God certainly has not been considered to be dependent upon creatures as they are dependent upon God. But how could God not be dependent upon creation if divine action is determined by subvenient natural and historical processes? (Bielfeldt, 1999, p. 626)

Supervenience in this case doesn’t seem to overcome the problems of ontological reductionism but instead relocates them elsewhere within the theological discussion. Furthermore, it seems that both ontological reductionism and reductive materialism fall afoul of the same issues faced by the Christian materialist - they may be able to overcome some of the problems for human persons, yet they cannot address concerns at the heart of the incarnation regarding the “novelty” of immaterial divinity.

## Atomism, Monism, and Holism: Are There any Individuals?

Metaphysical[[98]](#footnote-99) holism states that ‘in the last analysis, there is only one independent thing. Everything that exists is a way of being the one thing’ (Esfeld, 2009, p. 120). Based on first appearances it may be tempting to assume that holism requires a necessary commitment to substance monism and pan(en)theism. However, there is (at this stage) no *necessary*, commitment to either of these positions, what is required is an openness to the fact further examination *may* lead to a theological metaphysics that requires one or both. Perhaps the most pertinent issue in developing an understanding of quantum wholes (whether local or global) is the distinction between atomism and holism, in their commitment to the kinds of relations that exist at a fundamental level. Before examining this, it is worth briefly drawing out what is meant by “primitive ontology” and how this relates to the upcoming discussion.

### Primitive Ontologies

“Primitive ontology” has come to the forefront due to the multiple (potential) ontologies that that attempt to reconcile the findings of quantum theory with our experience of the macro world. In *Primitive Ontology* (2013) Valia Allori asks whether a realist interpretation of quantum mechanics requires us to re-interpret the wavefunction as *referring* to physical bodies or if the theory isn’t “really” about the wavefunction[[99]](#footnote-100). Calosi and Morganti raise the issue of primitive ontology both in relation to supervenience, and to (re-)address the understanding that equations are used to describe the evolution of *physical objects in time*. In classical physics equations are used to describe the *behaviour* of (realistically existent) particles in three-dimensional space. Therefore, if they are used in the same way in quantum theory Schrödinger’s equation must describe the temporal evolution of its object the wave function. As the equation is describing the evolution of the wave function, through analogy to the classical picture, we should be able to assume that the wave function *exists* as does the “space” in which it is described as evolving. The challenge arises that the space of the wavefunction is not three-dimensional but the multi-dimensional “configuration space”. Our experience however tells us that we don’t live in configuration space, but three-dimensional space – ‘therefore, a proponent of this view has to provide an account of why is seems *as if* we live in three-dimensional space even though we do not’ (Allori, 2013, p. 59 original emphasis). This requires finding a way to reconcile what Wilfrid Seller’s called the *scientific* and *manifest* images – the scientific image is that provided by our best scientific explanations, whereas the manifest image is the image of the world based in our everyday experience[[100]](#footnote-101).

Any account of the world from science needs to provide an account of the *manifest image* and to do so they start with a “primitive” ontology, based in three-dimensional space (or space-time), and describe the evolution (through time) of entities that exist in that space. This description is used to match the experience of the world with the scientific theory or *scientific image*. The formal (mathematical) description uses “primitive variables” to describe the ontology (space/space-time) or the kind of matter that exists and then makes use of “nonprimitive variables” to describe the evolution of “primitive variables” through time or temporal development of the theory. Once this work is undertaken any event within the manifest image (macroscopic world) should be explicable in terms of the primitive ontology.

Thus, if the primitive ontology is being used to regulate the relationship between scientific and manifest images, how is it arrived at? The primitive ontology is perhaps best understood as a set of metaphysical presuppositions that start aligned to the manifest image and are then adapted in response to scientific experimentation. Thus, the initial scientific theory is based in a search for an *explanation* of something observed in the manifest image. Continual adaption and change of the scientific image over time means that now, for example in the case of quantum theory, the scientific image can be a long way from the manifest image, however the key distinction between the primitive ontology and the wave function ontology described above is that the primitive ontology is still grounded within three-dimensional space. Importantly for the discussion of the relationship between scientific and/or primitive ontology and theology is that the primitive ontology is not designed to be exhaustive – it only accounts for *physical* entities:

The primitive ontology is the most fundamental ingredient of the [scientific] theory. It grounds the “architecture” of the theory: first we describe matter through the primitive variables, then we describe its dynamics, implemented by some nonprimitive variables […] all the macroscopic properties are recoverable. (Allori, 2013, p. 66 original emphasis)

Therefore, primitive ontology undertakes an *explanatory* role in linking scientific and manifest images ‘[b]ecause the primitive ontology describes matter *in the theory* (the scientific image), we can directly compare its macroscopic behaviour to the behaviour of matter *in the world of our everyday experience* (the manifest image)’ (Allori, 2013, p. 66 original emphasis)[[101]](#footnote-102). However, the nonprimitive variables can only be examined in terms of their impact on the *behaviour* of the primitive ontology.

Allori argues that a wavefunction ontology requires a radical recreation of our ontology and an appropriate alternative is yet to be found. However, if we maintain a primitive (three-dimensional) ontology for quantum theory ‘the quantum world is less crazy and paradoxical than one would have thought’ (Allori, 2013, p. 69). This is exemplified by Bohmian mechanics. Under a “traditional” interpretation this provides an account of the quantum world in terms of both the wave function and *other variables* such as the position of particles. Calosi and Morganti reject this because, they argue, it is inevitably committed to monism. Allori, on the other hand argues that it can be understood along the lines of the primitive formula described above – Bohmian mechanics includes particles in three-dimensional space (primitive ontology), the *evolution* (dynamics) of the primitive variables are then described by the nonprimitive variable of the Schrödinger equation.

Calosi and Morganti argue that Bohmian primitive ontology is a Humean reductionist account in which ontology is reduced to a mosaic of “points” and the relationships between them. Yet, in his most recent work Esfeld (2022) argues that “primitive” ontology does not imply a reductionist ontology, in the sense that the primitive or foundational properties (for Esfeld this is location) are not a ”fundamental” level of ontology – ‘[t]here are no levels. There is only one layer of reality that is described in terms of the primitive notions. It is then shown how *everything that exists is located in this layer’* (2022, p. 1 emphasis added).

### Mereology

Holism is often understood in contrast to atomism. The distinction between holistic and atomistic systems can be broadly conceived as a distinction based on the relationship between the parts and the whole. In philosophical terms atomism is the theory advanced by Democritus that ‘there are smallest indivisible bodies from which everything else is composed, and that these move about in an infinite void space' (Esfeld, 2013b, p. 10 Sec. 4). Thus, atomism allows for discrete, clearly defined parts that have an existence independent of the wholes they compose. At this level of description neither atomism nor holism (when understood as a holistic system being “more than the sum of its parts”) are committed to a particular account of the kinds of *substances* in existence (e.g., it is possible to be either be monist or pluralist about substance and hold to either ontological claim). The distinction lies in what and how the fundamental “parts” of reality are being counted. The statement that holism entails “the sum is more than the parts”, as Esfeld notes, actually entails two key beliefs: ‘(a) that a whole in the sense of a holistic system has parts and that (b) what turns a whole into a holistic system is that it is more than the sum of its parts’ (Esfeld, 2013b, p. 10 Sec. 5.1). Before examining how holism relates to monism, it is worth drawing on Esfeld’s example of a distinction between holistic and atomistic systems.

In *Philosophical Holism,* Esfeld challenges the assumption that holism is defined in *its entirety* by the idea that a system is more than its parts. Even a heap of sand he says is more than the sum of its parts, but it is not a holistic system. ‘If one lays out one thousand grains of sand in a row on the floor, one has not created a heap of sand’ (2013b, p. 10 Sec. 5.1) the heap of sand requires not only the parts (grains of sand) but also that those grains are arranged in a particular way, so that the grains have particular spatial and causal relationships to one another. This “more than” is not enough to claim that a heap of sand is a holistic system, the heap of sand is still an *atomistic* system. This distinction is important because it means that relationality is not enough for a system to be holistic, it requires a more meaningful “more than”. A system’s holism is based on the *nature* of its parts. Thus ‘the “more than the sum of its parts” means that‘*being part of the system touches on the nature* of the thing in question’ (Esfeld, 2013b, p. 11 Sec. 5.1 emphasis added). For the atomist, the parts that make up the whole can exist in isolation – a grain of sand, for example can be the only existent object within the universe. However, what makes the “part” of a holistic system distinctive is that being *part of* that system is an intrinsic aspect of what it is to be that entity/object. This means that belonging to a holistic system is not a transitive property. If it was this would mean that if Shayne was “part” of a social community (complex system) then we would be saying that the constituent parts of Shayne (such as their limbs, bones organs etc.) are also “part” of the social community. When we say that Shayne is part of the social community we are saying Shayne is part of the community because they have ‘the capacities to think and to act’ (Esfeld, 2013b, p. 11 Sec. 5.2) whereas the *parts* of Shayne do not have these capacities. Esfeld argues we should speak of *constituent parts* of a system which would mean that human beings like Shayne would be *constituent parts* of the social community because they possess the properties needed to be a “part” of the system[[102]](#footnote-103). In *Conservative Reductionism* (2017) Esfeld and Christian Sachse examine the different accounts of fundamental physical properties. This division is important for the development of the incarnational account in chapter 6 therefore it is worth establishing here. An atomistic account holds that the fundamental physical properties of the universe are *intrinsic*. They are held by an entity/object ‘whether or not they [the object] are alone or accompanied by other objects’ (Esfeld and Sachse, 2017, p. 47). On the other hand, if one adopts a holistic ontology then there is a fundamental relationality. ‘[I]f the fundamental properties are relations, the objects are tied together by these relations instead of existing independently of each other’ (2017, p. 47). Something that is part of a holistic system in this sense cannot be the solely existent object in the universe.

Whilst it may be tempting to attribute atomism to Newtonian physics and posit that holism is only appropriate for quantum physics this isn’t the full account. Despite quantum physics often being seen as exhibiting ‘holistic features […] in many of the hard problems concerning the ontological foundations of modern physics’ (Bartels, Lyre and Esfeld, 2004, p. 597), there is also evidence associated with quantum physics that relates to data from discrete particles – ‘Entities that are not particles–such as waves or fields–come in as figuring in the *explanation of the behaviour of the particles*, but they are not themselves part of the experimental evidence’ (Esfeld and Deckert, 2020, p. 5 emphasis added). Thus, it appears that the challenge of holism does not, necessarily, arrive from a classical quantum split but rather draws on other ontological commitments, indeed it is possible to hold a holistically-informed atomistic ontology (Cf Esfeld and Deckert, 2020, p. 5).

### Counting Things

The final relationship to be discussed is between holism and monism – how can “the sum is more than the parts” and “at the last analysis there is only one *independent* thing” both be true? The most well-known form of monism states that there is only one *thing* that exists and the multitude of objects in the world is only an appearance. Even though this form (substance monism) is best known (and perhaps most strongly challenged) there are a variety of forms of monism that exhibit a shared commitment to a fundamental oneness. As Jonathan Schaffer notes ‘where they differ is in *what they target* and *how they count’* (2018 original emphasis).

The contemporary atomist is committed to the existence of many objects (particles) that make up the existence of the cosmos and everything in it. This commitment does not require that there are many *substances* however, only that there are many instances of the same fundamental substance (existence pluralism). One could be an atomist and still adopt a form of monism. Although there are many concrete objects (pluralism), they are all the same substance (monism). In Schaffer’s terminology, there is a pluralism of targets, but they are all the same “highest type” (substance monism), whether that type is material, mental or something else is not important at this point.

If holism, atomism, and monism aren’t mutually exclusive ontologies how are we to understand the relationship between them? Existence monism is the position, espoused by Spinoza, that exactly one thing (concrete particular) exists, and whilst there appear to be distinct kinds of things in the cosmos, these simply reflect variability of the nature of the “One” at different points. This form of holism does not admit the existence of genuine parts, indeed it goes further to claim that ‘the complete causal story of the world can be told in terms of the physical aspect of the world’ (Schaffer, 2018, sec. 2.2.2). For the existence monist, the existence pluralist who supports the existence of many objects, runs the risk of not being able to adequately define the *boundaries* of those objects[[103]](#footnote-104). In the choice between many precise objects (i.e., particles – atomism), or a monist account of only one single object, they argue that existence monism should be preferred as it provides the simplest solution. It is conceivable that this is the kind of ontology Primas has in mind for non-Boolean holism when he speaks of the elementary particles being patterns not building blocks of reality (2007, p. 8) and that ‘for a holistic universe there is no a priori given partition into parts’ (2007, p. 37). The challenge of individuation is the biggest problem presented by existence monism.

Esfeld’s (2001) monograph sets out a relational model of ontological holism, however he raises concerns about the suitability of the model to work at the macro level because it isn’t compatible with ‘social holism and holism about beliefs’ (2001, p. 273). This supposed incompatibility does not affect how it is applied in this thesis. I will now examine the potential parallels between Esfeld’s holism and *priority monism*. As with existence monism, priority monism “targets” concrete objects as what is being counted and agrees that there is only one (basic) object, i.e., the world. The distinction arises in that where substance monism counts concrete objects via (one) token – there is only one concrete object; priority monism counts concrete objects via (one) *basic tokens* – there may be many concrete objects but only one concrete object is *fundamental* (or basic) all other concrete objects subsist on/are derived from the single basic object. Thus, the priority monist allows that the world has proper parts. Such a view would appear to allow space for the potentiality of a panentheistic theology in contrast with existence monism that only allow pantheism. This model seems to align with Esfeld’s discussion of potential relational priority and holism at a quantum level i.e., the notions that there are genuine proper parts but a form of unity between them. The priority monist holds that the “sum” is prior to the parts, unlike the priority pluralist who holds that the parts are prior to the whole. The whole being prior would seem to align with Esfeld’s account that the “more than” of the parts must touch on the very nature of the thing[[104]](#footnote-105).

At this point it is enough to note that holism does not necessarily entail monism (in existence terms). Yet, it may be argued that existence monism *does* entail a form of holism, and if one is to take Esfeld’s statement that ‘although we propose an ontology of atomism, we draw on *holism* to work the ontology out: the atoms are holistically individuated in terms of the distances among them’ (Esfeld and Deckert, 2020, p. 7 original emphasis) at face value it seems that atomism and holism are not always exclusive categories. However, it is important to ensure when examining the relationship(s) between holism, atomism, and monism, that the terms are being examined at the same, ontological level.

## Conclusion

This chapter has provided an overview of some of key concepts associated with holism and their theological relevance. It is by no means exhaustive however it sets out the philosophical landscape that Primas and Esfeld are writing in to and the metaphysical opportunities that are raised by our developing understanding of the nature of the quantum world. This chapter intentionally remains slightly abstract in these discussions as the implications and ontological commitments of Boolean and non-Boolean holism diverge so starkly that to examine both at this stage would muddy the waters of the broad picture. Thus, it is in the following chapters that ideas contained here will be fully examined in relation to Primas (non-Boolean holism) and Esfeld (Boolean holism) and then later (in chapters 6 and 7) applied to the development of holistic models of the incarnation.

# Distinguishing Two Models of Quantum Holism: Boolean and Non-Boolean

Holism is regarded as the counter-concept to atomism or particularism. […] A special place is held by quantum theoretical holism. It is the only one not to work on the assumption that a whole is made up of given parts which then stand in relation – however problematic – to that whole (Atmanspacher, Amann and Muller-Herold, 1999, p. 231)

After some preliminary remarks regarding shared ontological commitments between the two positions, this chapter will set out, as far as possible, the ontological commitments of Esfeld and Primas. Both accounts challenge ontological reductionism as an appropriate approach to understanding the nature of reality considering quantum theory. Both accounts also advocate a form of holism, although how they understand that term and the metaphysical commitments it requires differ. The purpose of this chapter is not to explain *why* holism is implied by quantum theory, but to examine the general *implications* of both accounts.

Perhaps one of the biggest challenges to either model is the potential for an ontological and/or causal gap between the nature of the quantum world and the nature of the macro (everyday) world. Current experimental results suggest that although there may still be some form of “gap” - for example ‘no matter how big these [quantum] […] systems get and no matter how strong the quantum effects the human eye will never actually see an object in two places at once’ (Ornes, 2019, p. 22416). In the same article Simon Gröblacher is cited as saying that ‘there is no hard boundary where everything all of a sudden changes and quantum mechanics becomes incorrect’ (Ornes, 2019, p. 22413). Ornes goes on to explain that isolating and observing quantum systems ‘is less a matter of size than of complexity’ (2019, p. 22414). With the increasing size of quantum systems involved in experimentation:

Large quantum systems have helped build confidence in the strangeness of quantum rules. They indicate that the divide between quantum and classical worlds is less a boundary […] and more of a disguise (Ornes, 2019, p. 22415).

This increasing understanding of the potential scale of quantum effects highlights that ontologies built on the findings of quantum theory are not simply relevant to the very small. Even if this were not the case, the focus of this thesis is not to examine the implication(s) of specific quantum effects for incarnational theology but the implication(s) of the holistic ontology that is implied by these findings.

## An Ontological Prelude

This section briefly examines the relationship between Boolean and non-Boolean accounts of reality. Although more pertinent to Primas’ ontology, the discussion is included at this point to provide useful background to both accounts. It is important to note that Boolean in this section refers to a bivalent (two-value) account of categorising the world. In the broader discussions of Esfeld and Primas’ ontologies it is understood, in line with Primas’ distinction, to refer to the possibility of discretely partitioning reality into ontological parts (i.e., in contrast to “fuzzy” sets).

### Boolean Descriptions of Reality

As noted earlier Boolean logic has played a significant role in the progression of the scientific enterprise. Boolean or bivalent logic, and its accompanying algebraic formulation, is based in three laws (a) the law of contradiction (b) the law of excluded middle (c) the law of identity. These laws state that (a’) nothing can be both *A* and *not-A*, (b’) *anything* must be either *A* or *not-A,* and (c’) that if anything is *A* then it is *A*.

However, there is a crucial caveat, it is only possible to make unambiguous statements or to find regularities within sets of data if one has already suppressed and/or ignored the irrelevant features. This caveat may seem trivial after all it doesn’t matter about the colours of the test tubes that are used in an experiment or which lab in a particular building was used so it is no surprise that this information is not conveyed within the description of an experiment. However it is making a more robust claim that *‘every empirical statement is conditioned by what is ignored’*’ (Primas, 2007, p. 11 original emphasis). As Primas argues, scientists make a choice to ‘proceed by particularization’ (Primas, 2007, p. 11) and in doing so intentionally ignore the natural interconnection of all things as the ‘inevitable price for unambiguous empirical statements’ (Primas, 2007, p. 11). This methodology has become so ingrained that it is taken to be a fundamental ontological fact, we have lost from our collective consciousness the acknowledgement that:

What is relevant and what is irrelevant *is not determined by some natural law but by some convention*, or by our own interest, or by our cognitive apparatus, or by the evolutionary history, or by pattern recognition devices. (Primas, 2007, p. 11 emphasis added)

Even the fact the measuring instruments give definitive numbers on the display doesn’t say that that which is being measured has a definite size. All it points to is the fact that the measuring instrument contains a threshold device that ensures the instrument produces a defined number, the number is therefore produced by the device and *‘cannot be attributed to a property of the object system’* (Primas, 2007, p. 12 emphasis added). The primacy of binary categories within the natural world is even intrinsic to our classification process, to classify objects into separates classes (or as part of the same class due to shared characteristics). The classes are not classes of identity but of *equivalence*, which enables similar objects to be merged into the same class by ignoring *some* of the distinguishing characteristics. However, even though it is possible to classify (or filter) objects into different classifications, Primas cautions that there is no universal Boolean system that can encompass *all* classifications, even within classical science.

### Duality and Complementarity

This classification (or not) into discrete sets returns to the issues noted around the laws of non-contradiction, fuzzy sets, and the nature of paradox. It ties into the language we use to describe the world, and how atomism (and a metaphysics of individuals) can be problematic. The clearest example of the problem of Boolean language resides in one of the most well-known “paradoxes” of quantum science, that of wave-particle *duality*. The concept of wave-particle duality is the theory that ‘electrons, and presumably other matter as well as light, could be demonstrated to be *either* compact lumps *or* widely spread-out waves. It depended on the experiment you chose to perform’ (Rosenblum and Kuttner, 2010, p. 73). However, this belief that particles are either/or rests in an assumption of the correctness of two-value logic and it is *this* assumption that it is either/or that ensures it is a “paradox”. The problem with this fairly ingrained assumption about the behaviour of particles is that we now know that electrons are neither waves nor particles[[105]](#footnote-106), but rather something far more nuanced, they can appear in wave-like and particle-like states and ‘they can also be in *infinitely many* *other states* which are neither particle-like nor wave-like’ (Primas, 2007, p. 15 emphasis added). However these “infinitely other” states cannot be expressed in terms of Boolean logic or to put the problem in the language of metaphysics the “paradox” uses dualistic language whereas the reality is a picture of ‘*complementarity’* (Primas, 2007, p. 15 original emphasis). To tie this back to our descriptions of Boolean logic, the term “wave-particle duality” places “wave” and “particle” in different incompatible sets whereas “wave-particle complementarity” speaks of ‘holistic situations where Boolean *fragmentation into parts is not possible’* (Primas, 2007, p. 15 emphasis added).

If, therefore, it does not make sense to talk of wave-like and particle-like properties as distinct sets how are we to understand the fact that particles exhibit these seemingly incompatible properties depending on the experiment one undertakes, what does complementarity mean in practice? Primas and Bohr have slightly different definitions of complementarity; however, if these are taken together, we are offered a very full explanation of the term. Primas states that complementarity is referring to ‘the empirical fact that what is in principle knowable is not necessarily knowable simultaneously’ (Primas, 2007, p. 16) thus, as Bohr explains, ‘evidence obtained under different experimental conditions cannot be comprehended within a single picture [...]only the totality of the phenomena exhausts the possible information of the objects’ (Bohr cited in Primas, 2007, p. 16). This means that we must expand the scope of our discourse so that it is able to contain these *complementary* descriptions that cannot be combined into a single Boolean description. This is because the states of wave-like and particle-like cannot be contained within the same two-value logic description. For example, the question “is the object located at a discrete point in space(-time)?” this would be true of the particle-like state but not of the wave-like state. If we were to try and answer this question when the particle was exhibiting one of the infinitely many “other” states it wouldn’t even be that our values were in binary opposition, but that we simply couldn’t answer the question in true/false terms. As Primas explains, ‘*a complementary description refers always to a* ***contextually chosen*** *decomposition of the universe of discourse’* (Primas, 2007, p. 16 italic original emphasis; bold added). What this means is that these pairs of properties that refer to the states of quantum systems cannot be held together in a single Boolean description or set but rather they are *complementary* properties that can be known, but not simultaneously.

Thus, Boolean logic does not work at the quantum level, Primas goes on to say that it isn’t simply a semantic or logical issue but refers to ontology. For example, we shouldn’t speak of wave-particle *duality* as this implies that “wave” and “particle” are in different sets (analogous to metaphysical natural kinds perhaps – ‘dualistic statements refer to elements in different categories’ (Primas, 2007, p. 15)), however “complementarity” recognises that these statements/states of affairs are not part of an either/or dichotomy but are ‘situations where Boolean fragmentation into parts is not possible’ (Primas, 2007, p. 15). Section §6.3 will examine Primas’ alternative to a (wholly) Boolean account of reality.

### The Measurement Problem and Primas and Esfeld on Entanglement

The “measurement problem” arises because the evolution of quantum systems according to the Schrödinger equation results in the end state of a system being in a superposition. The system is in state $σ=\pm 1$. As noted in §2.1 whilst the results of repeatedly preparing a system along one axis and then measuring along another would appear to provide a random series of $σ=+1$ and $σ=-1$, when the statistical results are examined the *average* result for measurement of $σ\_{y}=+1$ along the $x$ axis ($σ\_{x}$) is found to be 0. It is the combination of these measurement statistics, the information provided by the Schrödinger equation about how the system (in isolation) should evolve, and the way in which states are represented that give rise to the measurement problem. In her introduction to *The Wave Function* (Ney and Albert, 2013) Alyssa Ney describes the problem as follows. If we are using a measuring device (*m*) to establish whether a particle (*e*) with $σ\_{z}=+1$ will be in a state of $σ\_{x}=\pm 1$, the Schrödinger equation tells us that the entire system (measuring device and electron) will, following measurement, be in a state of $(σ=+1)\_{m}$ $(σ=+1)\_{e}$ $and$$(σ=-1)\_{m}$ $(σ=-1)\_{e}$. In other words, quantum mechanics predicts that the system will be in a ‘superposition state of [the measuring device] pointing to “x-spin up” and “x-spin down”’ (Ney, 2013, p. 24). Despite this our *observations* always shows the device displaying *either* $σ=+1$ *or* $σ=-1$. Because of this discrepancy ‘anyone who wants to understand quantum mechanics as a theory of our world […] therefore must do something to reconcile what the theory predicts with what we observe’ (2013, p. 24). In the following discussions I make use of Alyssa Ney’s comprehensive overview in *The Wave Function* to quickly sketch the wider landscape of some key responses to the measurement problem before looking at the available evidence for how Primas and Esfeld have responded to the “problem”.

The first “textbook” solution to the problem is proposed by von Neumann. On this interpretation there are several key distinctions that need to be noted. Firstly, the Schrödinger equation isn’t a complete description of a quantum system when it is being measured. This means that the discrepancy between the predictions of quantum mechanics and the observation can be explained by the fact that two different processes take place depending on whether the system is being observed. In an unobserved system the evolution of the system follows process A and as in the Schrödinger equation arrives at a superposition state of both spin up *and* spin down. However, when the system it observed it follows process B and ‘once a measurement of *x*-spin takes place […] the wave function (i.e., quantum state) is no longer spread out […] but collapses into one or the other’ *either* $σ=+1$ *or* $σ=-1$ (Ney, 2013, p. 26).

The major challenge to von Neumann, raised by Bell, is that the question of when process B kicks in seems to be incredibly unclear – is it when the measuring apparatus is set up? When the measurement takes place? Or when the measurement is observed? If it is the point of observation is this at the image being received on the retina or when the brain interprets the signal? Etc., etc. It is in trying to reconcile this incredibly blurred line that Eugene Wigner argues measurement occurs when there is an ‘interaction of a physical system with an irreducible consciousness’ (Ney, 2013, p. 28). Even if one resolves the instant of observation, the further challenge is that if the evolution of quantum physical systems refers to *fundamental* physical laws, then the fundamental law, arguably, cannot require the interaction of an observer.

Bohm argues that von Neumann’s mistake was to assume the completeness of the description provided by the wavefunction. Instead, he argues that the measurement probabilities are epistemic not ontological – the probability relates to our knowledge of e.g., where an electron is, but the “state” does not describe all there is to know about the electron. For Bohm (and de Broglie) there are two fundamental kinds of things in the universe – waves and particles. Particles (and objects such as our measuring system) have a definite location that is not described by the wave function. The role of the wave is ‘to guide the particle into various states’ (Ney, 2013, p. 31). although the wavefunction (which describes the entire universe) and the “guidance equation” are both deterministic we arrive at the appearance of indeterminism (i.e., our observation “resolving” the superposition) because the uncertainties are associated with our incomplete knowledge of particles which always have definite positions. This approach (against “textbook” quantum mechanics) assumes that quantum mechanics is an incomplete theory – it requires the addition of “hidden variables”.

An approach that doesn’t require hidden variables, was proposed by Hugh Everett. Everett’s Many Worlds interpretation states that there is not a collapse of the system into *either* $σ=+1$ *or* $σ=-1$. Instead, the “total” wavefunction (i.e., the superposition of both $(σ=+1)\_{m}$ $(σ=+1)\_{e}$ $and$$(σ=-1)\_{m}$ $(σ=-1)\_{e}$) does accurately describe the state of the system. On an Everettian interpretation, at observation there is a “branching” of the universe whereby in one “strand” $(σ=+1)\_{m}$ $(σ=+1)\_{e}$ is read and in the other $(σ=-1)\_{m}$ $(σ=-1)\_{e}$ is read. Wallace argues that despite the naïve reading of Everett that takes the entire universe ontologically splitting as literal, one should instead interpret this as these branches existing as ‘patterns in the one universal quantum state’ (Ney, 2013, p. 34). Thus, it can be considered that the universe as a whole is in superposition state. Whilst Primas explicitly rejects the formalism of many worlds (arguing that it requires the use of hidden variables/ad hoc assumptions) there is the potential for at least a superficial correlation between the vision of the universe in a unified superposition state and the many overlapping, contextually dependent Boolean atlases proposed by Primas.

The final account discussed by Ney, aligns with Bohmian mechanics in assuming a wavefunction collapse, but like Everett assumes that quantum mechanics provides a complete description of reality (with the addition of new constants). The Ghirardi, Rimini, Weber (GRW) account maintains that (Ney’s) process A (explained on p. 221 of this thesis) is the usual state of affairs for the evolution of a quantum system. However, in certain circumstances there is a (non-observer) process by which the wavefunction will spontaneously “jump” or collapse. This requires the introduction of a new constant which identifies ‘how often there is a jump in the quantum state’ (Ney, 2013, p. 35). The likelihood of a jump occurring rises with the complexity of the wavefunction. Thus, the interaction between a “simple” electron and an incredibly “complex” measuring device (in terms of quantum composition), means that ‘it will be much more likely for a jump to occur’ (2013, p. 36) when the electron is being “observed” (i.e., interacting with the complex system) than in an unobserved state.

In *Holism in Philosophy of Mind and Philosophy of Physics* (2001) Esfeld discusses a range of solutions to the measurement problem, however he is more concerned with whether quantum holism is universal or limited to the microphysical realm. In his discussion of von Neumann’s response to the measurement problem he does note a preference for the use of “state reduction” over “collapse” of the wavefunction in relation to what occurs during process B (above). In *Conservative Reductionism* (Esfeld and Sachse, 2017) he sides with Bell’s challenge of von Neumann arguing that the measurement problem (in terms of locating the point of collapse) is a ‘placeholder for the general problem of how to understand the transition from quantum systems in entangled states to systems that possess classical properties’ (2017, p. 57). They go on to support a GRW approach as the only interpretation that allows for ‘the transition from entanglement to classical properties’ (2017, p. 57).

In *A Minimalist Ontology* (Esfeld and Deckert, 2020) Esfeld argues that it is Bohmian mechanics that provides the “most convincing” solution to the measurement problem and is best suited to their minimalist ontology. This argument stems from the fact Bohmian mechanics allows for particles, which do not have any intrinsic features, to have a definite position, which given their commitment (noted in §4.3.3) that ‘the atoms are holistically individuated in terms of the distances among them’ (Esfeld and Deckert, 2020, p. 7), means that in order for there to be any individuation “persistent particles” (or particles with a definite location) are a required aspect of their ontology. They go on to argue that it is the simplest “adequate” ontology: ‘less simply will not do; bringing in more leads to drawbacks instead of providing additional explanatory value’ (2020, p. 100) the strength of the Bohmian approach for their ontology is further emphasised in the fact that it can be equally applied to both quantum mechanics and quantum field theory. However it is important to note Esfeld’s comment from *Holism*, that the question of the problem of movement from entangled state to classical properties cannot be currently solved by any ‘convincing *physical* solution […] it is still an issue of *philosophical* argument’ (2001, p. 274 original emphasis). This is not to say that a GRW ontology isn’t “correct” for Esfeld’s wider philosophical commitments, but that this is a philosophically motivated option based on *meta*physical considerations.

For Primas, the question of the measurement problem sits within the important distinction between endo- and exo-physics (discussed in detail in §5.3.2). What is the relationship between “subject-independent” reality (endophysics) and our empirically “adequate” descriptions (exophysics)? Primas argues that the measurement problem is an “interface” problem regarding the ‘derivation of a statistical interpretation of quantum exophysics from ontologically phrased quantum endophysics’ (Primas, 1994a, p. 175). As noted elsewhere Primas’ work is less “complete” than Esfeld’s as he doesn’t make any unequivocal statements about the measurement problem. However, in his discussions of realism (1994c) and the interactions of observers/experiments (1993) we are able to piece together a potential approach. Esfeld argues:

In any experiment in which we put quantum theory to the test, we assume that the experimenter is not entangled with the experimental arrangement and that there is no entanglement between the measuring instruments and the measured systems prior to measurement (2001, p. 274)

However, in *Realism and Quantum Mechanics* (1994c) Primas argues that the problem with current approaches to the measurement problem (including distinctions such as those in the quote above) is that they try to solve issues using a version of quantum mechanics (Hilbert-space mechanics) which is ‘*valid only for finite closed systems*’ (Primas, 1994c, p. 610 original emphasis). Such systems, Primas argues, do not exist ‘since all material systems are inextricably coupled […] even “reasonably isolated” finite systems do not exist’ (1994c, p. 610). This is also seen in *The Cartesian Cut* (1993) where he argues both that the quantum world casts radical doubt on a Cartesian *res extensa*–*res cogitans* divide but also we are wrong to assume that a “more sophisticated” version of the divide is not called for. Primas is deeply influenced by Pauli’s work and argues that the “cut” between mind and reality/observer and experiment ‘can be *participatory* so that external reality is not something give a priori, not ready-made objective truth but something affected by the subject’s action’ (1993, p. 248 original emphasis).

Primas argues against von Neumann’s response to the measurement problem in *Epistemic and Ontic Realities* (Atmanspacher and Primas, 2003) and in greater depth in *Chemistry, Quantum Mechanics and Reductionism* (1983). However, whilst it is clear he maintains statistical interpretations only illuminate ‘epistemic states and does not allow a reconstruction of an individual description in terms of individual ontic states’ (Atmanspacher and Primas, 2003, p. 9). There is no clear positive statement akin to the one found in Esfeld’s work. The closest one gets is in *Reductionism* where he states that ‘modern quantum mechanics compellingly demands a *multitude* of context-dependent descriptions [...] the material world is certainly not constructed out of independently existing elementary systems’ (1991, p. 165). The challenge to understanding Primas’ response is that he is clear that he rejects Bohmian, GRW, and Many-Worlds interpretations. A detailed examination of Primas’ work to establish which response(s) to the measurement problem may most closely fit his wider philosophical and scientific commitments goes beyond the scope of this thesis. Nevertheless, I posit that it may be conceivable to argue that a “Consistent Histories” interpretation, such as that proposed by Roland Omnès in *Quantum Philosophy* (2002) *may* be appropriate given the commitment to ‘the existence of a thousand possible ways of speaking of the same object, all mutually exclusive’ (Omnès, 2002, p. 182). This does not lead to paradox in quantum mechanics because ‘every description of a physical system must consist in propositions belonging to a unique and consistent quantum logic […] such a principle […] does not rely on the presence of any observer’ (Omnès, 2002, p. 183).

Both Primas and Esfeld propose metaphysically holistic pictures of the world which are interpretation neutral, in the sense that they potentially work across multiple interpretations of the ontic implications of quantum mechanics. In his discussion of the measurement problem Esfeld is explicit that an account which allows definite location for particle position has led to his adoption of Bohmian mechanics. However, given that one does not have to adopt his minimalist ontology to accept a version of his holism it would seem that a rejection of Bohmian mechanics isn’t a rejection *per se* of Boolean holism. Primas is much harder to pin down, but this is perhaps a strength in his account. I would argue that whilst Primas rejects both GRW and Many Worlds there isn’t an ontological reason for doing so. Rather, he has a preference for avoiding additional variables. In this sense I would argue that it is possible to reject a particular response to the measurement problem without having to fully reject either account of holism. As Esfeld noted – the decision comes down to philosophical preference and/or wider metaphysical commitments.

## Esfeld’s Boolean Holism

### Esfeld on Why Holism is a Revision of Cartesian Dualism

It has already been discussed how the paradoxicality of the incarnation can be tied back, at least in part, to a commitment to some form of dualist or even locally physicalist account of the nature of reality. However, Esfeld argues that rather than standing in opposition, it is more correct to understand holism as a revision of the Cartesian position. Descartes equated matter with space and thus a move to holism can be seen as a return to or revision of Cartesian metaphysics. Holism in this sense is less accurately placed in opposition to reductionism *per se* and more in opposition to the Newtonian conception of absolute time and space. By making Cartesianism (both in terms of Descartes writings and the philosophy of physics that follows) the basis for his examination of holism Esfeld highlights that the potential for a holistic worldview compatible with scientific metaphysics does not stand or fall based on one’s interpretation of quantum theory. For Esfeld this shows the *philosophical* relevance of holism for physics.

According to Esfeld’s interpretation of Descartes, in denying Aristotelian essentialism and a hierarchy of forms, Descartes defines the physicality of all things on their spatial extension (with the totality of humans, for example, also including a “cogitating substance”). Thus, there are not a multitude of entities in existence (existence pluralism) instead it appears that Descartes’ position is more closely aligned with Esfeld’s own monism as a form of priority monism (over “traditional” dualism). The reason Cartesian philosophy can be understood as a form of monism goes back to what is being counted and how. There is only one *basic token* (extension in three-dimensions) and all else is derived from this. This is what allows there to be “substance” without a particular form and avoids the over complication of ontology by requiring independently existing matter *in addition* to absolute space and time. This substance (matterspace) cannot cease to exist, only individual “corporeal shapes” (objects) can cease to exist. For both Descartes and Spinoza despite the fact this single substance can be “divided” it does not reveal individual, independently existing parts that compose the whole. Thus the “whole” is prior to any constructed parts and for Spinoza, but not Descartes, these apparent parts are in fact only *modes of being* of the whole – they can be differentiated based on their qualities, but such demarcations are “only” modal. Whilst Esfeld notes an ambiguity in Descartes position ‘on the one hand […] admitting only one substance, namely the whole corporeal realm. On the other hand […] Descartes assumes that the parts of the corporeal substance are themselves substances’ (Esfeld, 2001, p. 170), the pertinent point for this discussion is that both the monism of Spinoza and the “dualism” of Descartes point to there being only one existent substance/entity in the physical realm – matterspace.

On this metaphysical account the matter that is/extends throughout three-dimensional space can be divided into arbitrarily small parts. Because of this and irrespective of one’s views on the plausibility of points ‘as parts of space’ (Esfeld, 2001, p. 176), space must be understood as a continuum. This means that the divisions one makes into regions is a division into either proper parts or nothing more than demarcations[[106]](#footnote-107). This leads to a fundamental relationality regarding regions/points in space (i.e., that they cannot exist in isolation), when combined with the identification of matter with space it means that the metaphysics is inherently *holistic*. Matter and space cannot be distinguished into discrete entities this ‘means that all matter is one holistic system’ (Esfeld, 2001, p. 178) – there is an ontological interdependence between all “things” that have physical properties – this is not a *causal* link but a *relational* one.

Esfeld argues that this form of Cartesian holism falls into the category of metaphysical systems where the holistic system derives its properties from the parts (a bottom-up account), opposed to the parts acquiring their properties on the grounds of being in the holistic system (a top-down account). Yet it is also possible, by arguing for intrinsic but localised properties of space regions, to claim that holism about matterspace falls in to the second category whereby the internal properties of the whole such as the mossy-ness of this rock or the wetness of that puddle ‘manifest an internal structure within the whole’ (Esfeld, 2001, p. 180). These are not properties of that region of space but descriptions of the fact that space is mossy over here and wet over there. As Esfeld discusses in *Holism in Philosophy of Mind and Philosophy of Physics* (2001, chap. 6.4 & 6.5) this account can easily be adapted to include space-time instead of just space. Matter and the space-time continuum become one holistic unit – physical properties are instantiated in regions or points in space-time and this gives rise to ‘an internal structure [of space-time] […] which are distinguished from each other by the difference in the physical properties which they instantiate’ (Esfeld, 2001, p. 185). In a manner that isn’t important for this discussion, it is possible to modify the Cartesian framework so that it could be appropriate within a quantum metaphysics.

Esfeld is committed to a particular form of holism that aims at a ‘reduction of all physical properties to properties of points or regions of space-time […] without being committed to physical systems *in addition to space-time*’ (2001, p. 192 emphasis added). Whilst such an ontology isn’t possible within current or predicted future physics the requirement to have physical systems and space-time does not seem to necessarily void a holistic account but rather challenge certain accounts of monism[[107]](#footnote-108). Esfeld moves to examine how a holistic account can be understood at a quantum level. In doing so he moves away from the kind of global holism that is posited within the cartesian position, and interestingly adopts the reverse position of Primas who argues for the possibility of a holism with parts (of a kind) at the local but not global level. To understand Esfeld’s position more fully it is necessary to examine his account of “Ontic Structural Realism”. It is to this that I shall now turn.

### Esfeld on an “Atomistic” Account of Holism

Atomism acknowledges particles as indivisible fundamental building blocks of matter, yet quantum mechanics presents us with an ontology in which ‘quantum systems have some of their basic properties *not in separation from each other*, but only in the form of *correlations of entanglement* among them’ (Weber and Esfeld, 2013 emphasis added). Thus, the question that arises is, if as is commonly agreed, quantum mechanics isn’t positing particles only existing in discrete isolation from one another, what are the grounds to argue for a form of atomism as part of a fundamental or primitive ontology?

In *A Minimalist Ontology of the Natural World* Esfeld and Deckert state the volume will ‘propose an ontology of atomism […] [they will] draw on *holism* to work that ontology out: the atoms are holistically individuated in terms of the distances among them’ (2020, p. 7 original emphasis). The question is how an atomistic ontology can also be holistic given the accounts examined earlier where the “holism” or being part of a holistic system is an intrinsic part of the constituents. The clue is to be found in Esfeld’s earlier discussion of a general conception of holism where he writes ‘one and the same system can be holistic with respect to some of the properties of the mentioned family [of properties] but atomistic with respect to others of them’ (Esfeld, 2001, p. 16). His holism is not based on an ‘ontology of substance’ (Esfeld and Deckert, 2020, p. 7) but rather is concerned with the ‘the commitment to simple, discrete objects standing in distance relations’ (2020, p. 8). They argue that this commitment to “matter points” distinguished by their spatiotemporal relations provides a much simpler “primitive ontology” than the alternative of a unified ‘continuous stuff, known as gunk, that fills all of space’ (Esfeld and Deckert, 2020, p. 31). The continuous “gunk” model of primitive ontology is viewed as the alternative to a Newtonian (or contemporary) account of matter as existing in discrete particles, as Esfeld explains in *Physics and Intrinsic Properties* (2014a):

If one considered matter to be a continuous stuff distributed all over space (that is, gunk), then one would have to maintain that there is more stuff at some points of space and less stuff at others in order to be able to accommodate variation. But it could not be a primitive matter of fact that there is more stuff at some points of space and less at others; a property of the stuff would be needed to account for that difference (2014a, p. 1)

In *A Minimalist Ontology* Esfeld and Deckert argue that Allori, and others committed to the Ghirardi–Rimini–Weber interpretation of quantum physics, are adding an (unnecessary) additional layer within their ontology. If space is filled with matter, there must be something that is able to account for why matter is denser in some places than others. This explanation requires that matter is primitive ‘stuff-essence with different degrees of density’ (Esfeld and Deckert, 2020, p. 32). Whereas on a particle-based ontology the “density variation” exists because in some places there is matter and in others matter is absent. It is a commitment to the existence of ‘matter points [atomism] standing in distance *relations* [holism]’ that allows for Esfeld’s atomistic-holism (2020, p. 32).

Primitive ontology is designed to provide a description of the world through which we can make metaphysical claims from the description provided by physics. An appropriate (realist) theory in physics ‘contains a metaphysical hypothesis about what constitutes physical objects’ (Allori, 2015, p. 107) and this primitive ontology provides an explanation grounded in three dimensional space (or four dimensional space-time). Esfeld develops his primitive ontology, in his more recent works (see Esfeld *et al.*, 2012; Esfeld, 2014b; Esfeld *et al.*, 2017; Esfeld and Deckert, 2020 for explicit discussions, and implicitly in Esfeld, 2022). The clearest account of how one might propose an ontology of atomism that is committed to a substantive account of holism is in *‘Thing’ and ‘Non-Thing’ Ontologies* (Esfeld, 2021). The challenge laid before the physicist or philosopher seeking to maintain some form of atomistic ontology that allows for entities (or “bodies”) as *individuals* with physical properties is that ‘quantum systems are not distinct individuals […] therefore we have to give up the assumption that the ultimate physical systems are individuals’ (Esfeld, 1999a, p. 32), It is this commitment to a plurality of "things" in the universe that lies at the heart of atomism, but also within some “non-thing” ontologies (cf. Esfeld, 2021, sec. 1). In many respects the position posited by Esfeld could be termed “holistic-atomism” – the question at stake is whether it is possible to describe the fundamental nature of the universe such that a single thing could exist ontologically independent of any other “thing” existing.

Esfeld argues ‘if they [atoms] exist independently of each other, each atom has some *intrinsic features that characterize it as the atom that it is* […] independently of whether or not there are other atoms’ (Esfeld, 2021, p. 1 emphasis added) this kind of “permanent” or Aristotelian atomism however is not what Esfeld (and Deckert) are arguing for. It may be tempting to think that with the arrival of modern science and now the deepening knowledge provided by quantum theory that we find ourselves better placed to identify what makes some*thing* a thing of *x* or *y* kind over the other. Yet we find ourselves in the situation that the more we know of the fundamental ontology the less we can identify distinguishing properties – within a reductionist metaphysics everything is composed of the same “building blocks” of atoms, electrons, and other fundamental particles. These particles cannot be individuated within the same “kind” there are no properties that distinguish one electron from another. As Esfeld notes in an earlier paper – in some models ‘there is a numerical plurality of quantum objects, but […] these objects neither have an identity at a time that distinguishes each of them from all the other ones, nor do they have an intertemporal identity’ (2013a, p. 1).

The absence of intrinsic “thisness” or separability arrives at the distinction between atomism and holism even if, as is the case with Esfeld, both are committed to the existence of objects. In atomism the objects ‘are characterized by intrinsic properties (that is, properties that each object can have independently of whether there are other objects in the world)’ (Lam and Esfeld, 2012, p. 246). In contrast in holism ‘only the state of the whole fixes the relations among the parts’ (Lam and Esfeld, 2012, p. 246). For Esfeld those properties normally taken to be intrinsic (including mass, charge etc) are in fact primarily *relations*. Even though one may argue that it is particular (re)combination of atoms or molecules that distinguish one tiger from another – this in fact must be understood at a more basic level – it is not the particular atoms that individuate, but their *relative combination* and *position*. Esfeld argues that position is not only the fundamental property that individuates objects (of the same kind), but is also the only proper property that can be understood as “world making”: ‘if there is a plurality of things, there has to be something that relates these things so that they make up a world […] At least as far as the actual world is concerned, *position in the sense of spatial relation (distance)* is what unites the world’ (Esfeld, 2021, p. 2 emphasis added).

### Esfeld’s Ontic Structural Realism

Ontic Structural Realism (OSR) was introduced to the philosophy of science by James Ladyman and developed by Ladyman and Don Ross in *Everything Must Go* (2007). Ladyman’s *ontic* structural realism has been developed to extend the *epistemic* structural realism (ESR) of John Worrall. Structural realism, broadly construed, holds that the fact mathematical and structural accounts of the nature of reality have been retained across changes in theories about the *kinds* of things that exist (Ladyman, 2020, sec. 1) means these are what must be held as fundamental. This original proposal speaks, along Kantian lines, to an epistemological claim that allows for either[[108]](#footnote-109):

1. We cannot know *what* makes up the fundamental structure, but we can know *how* they are related and their properties.
2. We can’t know the individuals (or intrinsic properties), but we can know their relational properties.

Ladyman argues that this knowledge claim does not go far enough, and that it isn’t simply that we cannot gain access to the nature of reality beyond comprehending its structures, but that ‘individual objects are constructs’ (Ladyman, 2020, sec. 4). Whereas “standard” metaphysics[[109]](#footnote-110) assumes the ‘structure is fundamentally composed of individuals and their intrinsic properties, on which relational structure supervenes’ (Ladyman and Ross, 2007, p. 148), ontic structural realism, as proposed by Ladyman and Ross, holds that ‘all the properties of fundamental physics […] [are] extrinsic to individual objects’ (2007, p. 151). On this account it is the objective *structure* that is ‘ontologically fundamental, in the sense of not supervening on the intrinsic properties of a set of individuals’ Ladyman and Ross go on to argue that even the *individuality* of objects is *dependent* on underpinning relational structure – ‘[t]here are no things. Structure is all there is’ (Ladyman and Ross, 2007, p. 130). Esfeld argues that this (Ladyman’s) version of OSR, that I shall term *Strong Ontic Structural Realism* (SOSR), goes too far. The concept of relationality being ontologically prior to everything including the objects themselves can seem paradoxical requiring the acceptance that:

(a) relations require relata, that is, things which stand in the relations, and that (b) these things have to be something in themselves, that is, must have intrinsic properties *over and above* the relations in which they stand (Esfeld, 2004, p. 602 emphasis added)

Esfeld argues that the paradox only arises if you are committed to both claims, whereas relational metaphysics only requires the acceptance of (a). Esfeld (along with Lam and Deckert) are rejecting the SOSR claim that all that exists in the “physical domain”[[110]](#footnote-111) are structures, understood as ‘networks of concrete physical relations that do not presuppose relata with an intrinsic identity’ (Lam and Esfeld, 2012, p. 246). The reason that their OSR is moderate (MOSR) rather than the SOSR of Ladyman and Ross is because they are committed to the existence of independent objects. They position MOSR as rejecting “property-orientated” metaphysics[[111]](#footnote-112), whereas SOSR rejects object-orientated metaphysics.

MOSR allows that objects do exist (it is a “thing ontology”) but are only individuated by their relations. Thus the matter points from Esfeld’s atomism do not have any intrinsic properties or identity ‘but one provided by distance relations that make them absolutely discernible entities’ (Esfeld and Deckert, 2020, p. 25, Cf. p. 12). It is these relations that create the fundamental structure of reality, but the relations are not *prior* to the objects or relata that stand in those relations. Instead relations and the objects that stand in them are ‘are on the same ontological footing, being given “at once” in the sense that they are mutually ontologically dependent on each other’ (Esfeld and Lam, 2011, p. 4). This view presents a challenging ontology by maintaining that:

[T]he distinction between object and properties, including relations and thus structures is *only a conceptual one*, by contrast to an ontological one: properties, including relations, are modes, that is, the ways in which objects exist (Esfeld and Lam, 2011, p. 13 emphasis added)

This leads to a commitment to substance monism ‘with a plurality of things, albeit considered as ontological monism of only one substance’ (Esfeld, 2021, p. 4) and viewing relations and the objects that stand in them as two parts of an *ontologically* mutually dependent relationship: ‘there cannot be relations without objects that stand in the relations , so there cannot be objects without the relations in which they stand’ (Esfeld and Deckert, 2020, p. 25). Thus, removal of the relations (conceived of as “distance” relations between matter points), leads to no-thing being left in existence as “objects” do not have existence or identity ‘independently of the structure they are part of’ (Esfeld and Lam, 2011, p. 1).

The final aspect of the holism described by Esfeld, and colleagues is the commitment to a “dynamic” account of ontology i.e., that calculating motion/change within the context of a system individuated by relations requires consideration for the system *as a whole.* In a classical system this means that ‘one would have to take into account its [the matter point’s] relation to all the other mater points’ (Esfeld and Deckert, 2020, p. 85) to correctly establish its velocity. Thus, both quantum, and classical mechanics depend on “dynamical holism” but at the quantum level this isn’t dependent on the distance between individual points but ‘is defined only for the configuration of matter as a whole’ (irrespective of the distance between individual matter points) (Esfeld and Deckert, 2020, p. 85) .

### Parts, Yet No Parts: Concluding remarks on Esfeld’s Boolean Holism

Despite an attachment to a purely epistemic account of holism in his philosophy of mind (Esfeld, 2001, chaps 5 & 9), within his philosophy of physics (or metaphysics), he is clear that structural realism is an ontological commitment. This is held alongside:

Quantum holism […] [including] an ontological interpretation of quantum theory, i.e., a realistic interpretation […] which takes quantum theory to tell us something about nature independently of experimental arrangements and measurements. (Esfeld, 2001, p. 231)[[112]](#footnote-113)

On Esfeld’s model, we are committed to view that, as a *whole*, the two entangled systems have a ‘relative distance, total momentum, or total spin’ (2001, p. 240) but that neither system has these properties when taken in isolation. Furthermore in what he terms “wide-ranging holism” (2001, p. 243) he argues, if we take entanglement seriously, we must allow, that even though not all quantum states will be *maximally entangled* (exhibiting a direct correlation), we should consider entanglement as touching on *all* quantum systems – *‘entanglement is ubiquitous among the states of quantum systems; if anything, only the whole of all quantum systems taken together’* (Esfeld, 2001, p. 243 original emphasis). Once states have interacted in the past, they remain entangled, therefore, we should consider that *all* quantum systems have previously interacted and so remain entangled[[113]](#footnote-114).

There is currently no way to empirically determine whether a metaphysics of individuals or relations is more accurate. The argument against adopting a metaphysics of individuals rests in the fact that it leaves us ignorant as to the intrinsic nature of things (ESR). Thus, there is a gap between our metaphysical theory and the apparent limitation that our fundamental physical theories provide only information regarding the relationships that physical things stand in. Faced with this gap between epistemology and metaphysics we have two options (a\*) maintain a belief in a metaphysics of individuals but accept this means we are unable to gain knowledge about the intrinsic properties of the individuals as far as they are intrinsic (b\*) discard a metaphysics of individuals in favour of a metaphysics of relations according to which at the fundamental level only relations exist. ‘There is no a priori argument that excludes a metaphysics of relations’ (Esfeld, 2004, p. 615).

In the concluding sections of his chapter on the *“Meaning of Quantum Holism”* Esfeld (2001, chap. 8) sets out to characterise the key aspects of his relational account of holism. It is worth noting that whilst this is developed further in *A Minimalist Ontology* with Deckert, the later volume aims to create a more parsimonious account, rather than redefining the fundamental metaphysics. Thus, his conclusion can also be seen to reflect the earlier work when he asks:

[W]hat is an ontology of the natural world that is minimally sufficient for empirical adequacy [?] Leibnizian relationalism combined with Super-Humeanism – that is, an ontology of distance relations individuating matter points and the change of these relations (Esfeld and Deckert, 2020, p. 166).

This Leibnizian relationalism can be seen as having four key ontological commitments:

1. There are no separate/independently existing properties over and above relations. This correlates to the fact that the properties of the whole identify how the parts relate to one another in exhibiting the properties that make something part of the system under discussion, in a manner that touches on the nature of the thing itself.
2. All matter at the quantum level is a *single* holistic system, where this is understood as an ontological commitment without any expectation of the possibility of arriving at an (epistemological) complete description of the combined state(s) of all (local) quantum systems. This conception is limited to relationships between all physically possible worlds. Thus, separability fails at the quantum level.
3. The individuality (or not) of quantum systems is not decided by the requirements of quantum holism, but rather one’s wider metaphysical commitments to the necessary and sufficient conditions of individuality. Whatever one’s view on individuality quantum holism should be understood as a substantive (or ontological) commitment. Esfeld argues for quantum systems as physical systems that cannot be individuated.
4. Quantum holism can be compatible with accounts of quantum field theory, so long as one acknowledges that a space-time event is ontologically dependent on the existence of other space-time events. This is acceptable if one is willing to revoke a commitment to physical holistic systems being constituted by individuals.

Thus, Esfeld provides us with a picture of holism that can be described as “Boolean” because it allows for a partition into parts (of sorts) that have ontological status provided they stand in relation to other parts i.e., it is not possible for there to be an isolated “part” of a holistic system as the foundational properties of the objects are relations. Esfeld’s concern in critically examining our ontology is to develop a more accurate account of the kinds and number of things that exist in the universe. In this sense Esfeld is undertaking a project in monistic metaphysics as described by Schaffer – critically examining what is being counted (in this case that there are physical “objects” that exist) and how they are being counted (systems that cannot be individuated except in terms of their relations). It would appear that Esfeld’s account falls somewhere between, or a combination of priority and property monism (see Schaffer, 2018, sec. 1.2)[[114]](#footnote-115). The move towards a form of property monism provides a feasible ontology for the theologian, as noted in §3.5.4 whilst the Christian materialist may not be genuinely committed to materialism, they are committed to a form of property dualism. Therefore, it may be that some form of property pluralism alongside a development of Esfeld’s relationalism has the potential to offer some of the advantages of substance dualism without the inherent metaphysical paradox. Furthermore, Esfeld’s requirement for interdependence between the “parts” of the holistic system provides an interesting framework within which to examine the sustaining relationship between creator and creation. Whilst it is not possible to examine all the implications of Esfeld’s metaphysics for our understanding of the incarnation some of these avenues will be examined in chapter 6. For now, I shall turn to Hans Primas’ part-less or non-Boolean account of quantum holism.

## Primas’ Non-Boolean Holism

As noted in the introduction, Primas’ ontology is far more fragmented than Esfeld’s. This is further compounded by the availability of relevant works in English. This means that it is necessary to draw together the various aspects of his thinking into a more systematic account. Thus, this section is arranged into key themes that can be found in Primas’ metaphysical and philosophical writings. The final difference between these sections and the discussion of Esfeld work, is that having already set out the alternative account, there will be an aspect of engagement between Primas’ ontology and Esfeld’s.

### Primas, the “Cartesian Cut”, and Scientific Enquiry

Primas repeatedly highlights the “Cartesian” distinction required by contemporary science. He is not advocating that science should a adopt a materialist stance, but rather that ‘Cartesian dualism is still the basis of the contemporary physical and engineering sciences’ (1993, p. 246). By which he means that *all* scientific experimentation requires the experimenter to have the freedom to establish the initial conditions. However ‘there is a clash between [our] […] freedom to act and the presupposed determinism of a purely material world’ (1993, p. 250). This requires that ‘nature is intrinsically divided into two parts: mind (*res cogitans*) and matter (*res extensa*)’ (1994c, p. 610 original emphasis). In *Realism and Quantum* Mechanics he adds the further explanation that the progress and success of science is based in ‘a tacit assumption […] that nature can be manipulated and that proper initial conditions can be brought about by interventions of the world external to the object under investigation’ (1994a, p. 164).

Despite the commitment to the Cartesian cut (the distinction between the subject “observing” and the object “under observation”), Primas is *not* advocating that substance dualism is implied by contemporary science. In *Complementarity of Mind and Matter* (2009) he explicitly states that he adopts ‘an *ontological monism*, combined with an *epistemic dual-aspect approach’* (2009, p. 171 original emphasis), based on the implicit positioning in his earlier works, it seems fair to assume that this commitment runs throughout his work. He goes on to argue that:

[O]ur distinctions between an atemporal material, an atemporal mental, and a temporal domain do not imply an *ontological* partition of the world – it is *chosen as a partition of the universe of discourse to facilitate the discussion* (2009, p. 24 emphasis added)

This mirrors earlier comments in *Endo- and Exo- Theories of Matter* (1994a) that he adopts cartesian dualism (for the discussion) as ‘in spite of its incoherence […] it is a *temporarily useful fiction* which ensures that matter does not contain spiritual elements in an essential way’ (1994a, p. 165). Just as his commitment to the cartesian split didn’t make him a dualist, the insistence that matter exclude “spiritual elements” is not due to a physicalist commitment, but a commitment to ensuring that matters discussed through scientific enquiry are within its remit, even if this means recognising an incompleteness in our scientific account of the world:

The experimentally well-confirmed holistic character of the material world casts severe doubts upon the consistency of the Cartesian separation of the *material* reality from the *spiritual* one […] [despite this] *present day experimental science* still requires an *epistemological* dualism (Primas, 1994c, p. 611 original emphasis)

This is re-emphasised at the end of the same paragraph when he states ‘since there is no sound theory which includes consciousness in the realm of physics I prefer to acknowledge that there is a *gap in the reasonings of present day science’* (1994c, p. 611 emphasis added). The challenge of incompleteness is also found in *The Cartesian Cut* (1993): ‘all physical theories at our disposal are essential incomplete […] *they are incapable to deal with the complementarity of matter and spirit’* (1993, p. 251 original emphasis).

The incompleteness of contemporary accounts stems not just from the fact that ‘science, as at present conceived, forces us to leave out crucial parts of reality’ (1993, p. 250), but also from Primas’ commitment to ontological holism. Primas’ holism diverges starkly from Esfeld’s. For Primas holism *must* stand in rejection of atomism, and (to use Esfeld’s terminology) reject a “thing” ontology that allows for a plurality of objects (Cf. Primas, 1991, p. 165, 1994c, pp. 611–613). Primas’ holism therefore comes with both an ontological commitment that denies the existence of ‘context-independent objects’ (Primas, 1994c, p. 629), and an understanding of the limits of our epistemology that ‘our ability to describe the world cannot go further than our ability to isolate objects’ (1994c, p. 626). The following section will examine the implications of Primas’ “non-thing” ontology and how this is understood within a non-Boolean account of reality.

### Primas’ Foundational Ontology

Primas’ discussions of reductionism (1977, 1991, 1998) focus on “theory reductionism” despite his commitment to a non-reductionist ontology. In *Reductionism in Biology* Ingo Brigandt and Alan Love provide a concise description of theory reductionism as the claim that ‘a higher level theory can be logically deduced from a lower level theory’ (theory A logically entails and explains theory B) (Brigandt and Love, 2017, sec. 3). However, within *Emergence in Exact Natural Sciences* (1998) and, to a lesser extent in *Realism and Quantum Mechanics,* Primas provides further detail about his anti-atomism position.

In *Emergence* he argues that science is mistaken in its continued attempts to analyse ‘the material reality in terms of some *elementary* building blocks’ (1998, p. 67) and what he terms the ‘dated belief’ that our description of reality can be explained in reference to ‘independently existing atoms’ (1998, p. 87). This realist approach to discrete ‘objects existing [independently] in the world’ (1994c, p. 613) is mistaken because it assumes a particular account of the structure of the world that is out of step with the findings of quantum theory. Quantum theory, according to Primas’ interpretation, not only shows that the world is a whole without independent parts (1998, p. 88) but that the ’*unbroken wholeness* of the material world […] cannot be observed directly by our five senses’ (1994b, p. 335 emphasis added).

Primas argues for, what he terms, “contextual ontologies” because of his dismissal of the existence of independent objects. Although neither Primas, nor the authors within Atmanspacher’s edited volumes use the terminology of ontic structural realism, it appears that his position could be interpreted as a form of SOSR. In Ladyman’s description SOSR was the claim that ‘individual objects are constructs […] individuals have only a heuristic role’ (2020, sec. 4). This ontology would seem to resonate with Primas’ claims that ‘objects do not yet exist, we have to create them’ (1993, p. 254) and that ‘the world is *not made out of* some building blocks [..] these [electrons, atoms molecules] are just *manifestations* of the material reality’ (1994c, p. 619). Furthermore, there seem to be correlations to the claim that what exists at the fundamental level is “structure” not “objects”. In *The Cartesian Cut* Primas speaks of the “First Principles” as ‘in the main independent of the contextual meaning, that are associated to “ordering factors”’ (1993, p. 255). In *Realism and Quantum Mechanics* he explains the concept of “contextual objects”, arguing that they ‘represent *patterns of reality* […] Elementary or composed “particles” […] are not primary but rather secondary and derived’ (1994c, p. 628). This concept of access to the formalism or “structure” over reality as it is, is found in one of his final articles on the matter, *Epistemic and Ontic Quantum Realities* (Atmanspacher and Primas, 2003) where they argue that the success of science to describe the “structure” does not mean that the theoretical entities or elementary systems actually compose matter (2003, sec. 1.2).

This is not to definitively say that Primas held to SOSR, but there are strong parallels that when understood as a form of SOSR provide greater clarity on the distinction between Primas and Esfeld’s accounts. For example, Primas does not maintain a role for *ontological* parts within our metaphysics, and would argue that the holistic systems described by Esfeld are still reductionist “objects” ‘[which] presupposed that the decomposition of the universe into subsystems is given *a priori* ’ (Primas, 2007, p. 8). Instead, as ‘quantum mechanics put an end to atomism’ such “foundational” building blocks are actually ‘not primary but arise as secondary manifestations’ (2007, p. 8). Furthermore, in a line of thinking that will be examined further later, Primas asserts that ‘the holistic structure of the quantum world enforces a Platonic view for the universally valid laws governing matter’ (1994a, p. 163). This is echoed across a number of his works, but one of the clearest developments is found in *Realism and Quantum Mechanics* where he states ‘[t]o be sure, an ontic interpretation of quantum mechanics does refer only to a fictitious *theoretically immanent reality*, and not to the *ultimate reality’* (1994c, p. 622) where the “ultimate reality” is potentially understood as ‘much nearer to Plato’s ideas, according to which the attempt to divide matter again and again results in mathematical *forms’* (1994a, p. 174).

It is this commitment to the distinction between the world as it is and the world accessible to experimentation that leads to his division of physics into endo- and exo- physics/systems. He sets out the following definitions that become implicit in his later work in *Endo- and Exo- Theories* (1994a, p. 164):

* 1. **Endosystem:** ‘A system without accessible external observers’ (1994a, p. 164). This is linked to the notion of endophysical/endophysics in which ultimate reality is accessible at best through introspection – endophysics refers to a (form of) Platonic universe.
	2. **Universe of Discourse: ‘**A part of the world which is split into an observed system and an observing system’ (1994a, p. 164). In later writing this seems to be used synonymously with “contextual ontology” – ‘hidden structures become manifest only by choosing a topology capable to distinguish the relevant and irrelevant features’ (1998, p. 97).
	3. **Exosystem: ‘**The tools of observation and communication (which may or may not include human observers)’ (1994a, p. 164). This is linked to the notion of exophysical/exophysics in which ultimate reality is accessible to a (hypothetical) external observer – exophysics refers to empirical facts (as seen by the external observer). It is always contextually framed – no ‘particular ontologization is “more true” or “more real” than another’ (1998, p. 97).
	4. **Object:** The system observed is called *object*. This object is an ‘open quantum system interacting [..] with the environment’ (1994c, p. 626). This should be understood as a “mode of being” independent of observation. The existence of discrete independent objects is denied by Primas.
	5. **The “Cut”: ‘**A metatheoretical distinction generating an object and an exosystem’ (1994a, p. 164). This could be between the experiment and the experimenter (“Cartesian cut”). Or it could be a “Heisenberg cut”, which presupposes the cartesian cut and adds a requirement that the observed must engage with but remain “disentangled” from the object (Cf. Primas, 1993, pp. 251–252).

Primas’ commitment to endophysics, in a highly Kantian turn, makes a key distinction between the world as it is and our access to it, noting that:

All phenomenological theories are context-dependent, they cannot be deduced from universally valid first principles […] such context-dependent abstractions do not falsify our description of the material reality but *they create the exophysical patterns* by means of which we interpret the world. (1994a, p. 167 original emphasis)

In this manner the new concepts or content invoked at “higher” levels of our description of reality do not speak to new emergent properties or properties that can be deduced *a priori* but rather are the result of a new “context topology” that ‘depends in a crucial way on the abstractions made by the cognitive apparatus or pattern recognition devices used by the experimentalist’ (Primas, 1994a, p. 167). As noted above, Primas’ commitment to the unitary holism of the universe means that there are no *a priori* discrete objects or independently existing ‘postulated entities’ (1998, p. 96). This means that every description is contextually bound and whilst appropriate for that situation/context it does not disclose a *‘context- and mind- independent reality’* (1998, p. 96 original emphasis). Thus, we are only able to make “abstractions” about the nature of reality (1991, p. 167). Because of the context dependence of our empirical knowledge of the world, we are unable to make a straight one-to-one correlation between a universal law/fundamental theory and the empirical truths. Endophysics offers a “hypothetical” subject/observer independent account of reality, but this ‘precludes its direct application to concrete problems’ (1998, p. 96). Instead it should be understood as containing the universal laws in the same way these are found in the Platonic forms (Cf. 1994a, p. 160). Exophysics in contrast provides us with *descriptions* of what one can expect to “observe” it offers a “functional” or “instrumental” account rather than access to reality. This requires a clear definition of the context, and our recognition of its limitations as ‘[n]o part of the world can be faithfully represented by an isolated physical system’ (2007, p. 35).

In this manner there are links with later work by scholars such as Allori (2013, 2015) and indeed Esfeld (Esfeld *et al.*, 2012; Esfeld and Deckert, 2020; and implicitly in Esfeld, 2004) on primitive ontology where a distinction is made between the scientific and manifest image. Whilst it would be fair to acknowledge Primas’ transcendental independent endophysical realm as a “primitive ontology”, his distinction goes further than the scientific-manifest divide. In classical physics there is a distinction between the scientific theory or formalism (scientific image) and the behaviour we can observe in the macroscopic world (manifest image) (Allori, 2013, p. 66). Primas includes a further distinction, between the context dependent “world” of our scientific theories and the world as it is. This is because our “fundamental laws” refer to ‘strictly closed systems [..] Of course, strictly closed systems are by definition not observable so that truly first principles *necessarily refer to some kind of Platonic reality’* (1994b, p. 335 emphasis added). Thus, we cannot “read off” the ontology from the formalism (scientific image) because ‘none of the objects […] can be straightforwardly taken to represent stuff existing in time and space’ (Esfeld *et al.*, 2012, p. 15).

### Primas on the Role of Contextual Ontologies

In the material world, patterns like molecules, atoms, electrons, or photons arise by an *appropriate decomposition* of the fundamentally holistic universe of discourse […] quantum mechanics is the paradigmatic example of a theory which allows the description of the whole *which does not consist of parts*. (2007, p. 8)

Primas argues that all attempts to divide the world into “pre-existent” or ontologically independent kinds of “stuff” is incorrect. Because of his commitment to endophysics we must recognise that partition into discrete *ontological* categories isn’t possible. This means that whilst classical science has had great success in proceeding using Boolean (or bivalent) categories where something is either *A* or *not-A* this is not a primitive feature of the world. Instead of being the fundamental building blocks, “elementary particles” should be understood as secondary manifestations or ‘*patterns*’ (2007, p. 8 original emphasis) in reality. ‘[W]e cannot attribute real being to such theoretical entities since they do not have even an approximately independent existence’ (1993, p. 256). These entities arise when we ‘isolate a phenomenon and assign individuality to it’ (Primas, 2007, pp. 11–12) within a particular context.

This does not mean we arrive at an “anything goes” ontology. Our theories refer to ‘our knowledge of observable patterns or modes of reactions of systems’ (1998, p. 96). Therefore, it is possible to develop stable “contextual ontologies” that enable us to discuss the entities involved *as if* they were independently existent. We must not assume that this consistency stems from privileged access or a single “correct” ontological level or account. When taken in isolation it is still possible to explain experimental or theoretical accounts in terms of Boolean logic. They are *locally Boolean*. What it is not possible to do is to ‘combine the family of all feasible experiments’ (Primas, 2007, p. 16) (i.e. “all that is in principle knowable”) into a single Boolean context, they are *globally non-Boolean*. What this means therefore is that there are many incompatible Boolean contexts, there are many ways to classify (or filter) the information that we deem to be relevant. As he notes in the conclusion to *Emergence*:

Only if we maintain multiple sets of contextual ontologies, can we tolerate the coexistence of complementary views in our experience of reality […] the numerous inequivalent contextual descriptions allow us to get deeper insight into the structure of independent reality (1998, p. 97)

There are no *a priori* sub-systems or elements to decompose the world into; the division is accidental and not ontological. Thus, if a universe of discourse is able to admit one set of complementary descriptions then ‘usually there exists a whole family of different mutually incompatible pairs of complementary Boolean Descriptions’ (Primas, 2007, p. 20). If we combine all these different descriptions, then we can arrive at a non-Boolean description by way of partial Boolean sets[[115]](#footnote-116). This is because ‘No single operational description is uniquely legitimate, *and none is sufficient; all of them together are necessary’* (1998, p. 97 emphasis added). Primas likens this “atlas” of contextual descriptions to our attempts to portray a spherical world on a two-dimensional map. It is possible to “combine” different cartographic projections, however taken individually each projection is only valid at the *local* level with the validity being based in purpose for which the map has been chosen in other words, to return to an earlier quote from Primas the validity ‘*refers to a contextually chosen decomposition of the universe of discourse*’ (Primas, 2007, p. 16 original emphasis). For example: the Mercator projection preserves angles and circles and is used in aeronautical charts; the stereographic projection preserves shapes and directions at the polar regions, however area becomes more distorted the further from the centre of the circle one moves; and the Lambert azimuthal projection preserves areas but the further one moves from the centre of the map the greater the distortion of shape.

To allow for an overlapping global picture of the nature of the world Primas argues that we need to create what is called a *Boolean atlas*. A Boolean atlas is formed of families of Boolean descriptions called Boolean charts. These charts then overlap in such a way that ‘overlapping Boolean charts are compatible’ (Primas, 2007, p. 22). The combined information contained within a Boolean atlas can provide all the information required for a non-Boolean description. Where the Boolean charts overlap, they will appear to *locally Boolean* even though taken together they are *globally non-Boolean*. These locally compatible areas of the Boolean atlas can be defined through partial Boolean descriptions in which the overlapping elements can be said to have a common Boolean sub-description. However not every pair of elements within the overlapping collection will belong to the same sub-description. Even when there is a local “overlapping” the overlap cannot be quantified in a single Boolean description rather there is complementarity involved at the local level. Not all the descriptions will apply to all the pairs.

Within *Non-Boolean Descriptions for Mind-Matter Problems* (2007)Primas distinguishes between Boolean and non-Boolean holism. In describing Boolean holism Primas cites Bertalanffy’s description which states ‘General system theory is a general science of “wholeness”, [in which] the whole is more than the sum of its parts’ (Bertalanffy cited in Primas, 2007, p. 26) – this is Esfeld’s holism. Primas argues this ‘cannot describe holistic situations as we know them’ (2007, p. 26) because of the presumption that the systems can be broken down into discrete objects. In contrast ‘*non-Boolean holism refers to a whole which has no parts*’ (2007, p. 27). The main difficulty is the ‘choice of an appropriate partition of the universe of discourse’ (Primas, 2007, p. 27).

No single exophysical description reveals the whole independent reality with its non-Boolean event structure but projects *some aspects* of this reality onto a *Boolean context* […] There is only one reality, yet there are many legitimate viewpoints, hence many equally legitimate but complementary descriptions of nature’ (1994c, p. 628)

Primas goes on to argue that “entanglement” is not the ontological problem it is often identified as. Instead, it is an ‘inevitable and generic consequence of partitioning a non-Boolean whole which has no parts’ (Primas, 2007, p. 28). Because there is no *a priori* way to divide the world, entanglement appears as a ‘*contextual concept’*. It is possible to change the level of entanglement through changing the way in which one partitions the world, and because of this ‘entanglement is not *The Greatest Mystery in Physics*, but one of the most often misunderstood and misrepresented concepts’ (Primas, 2007, p. 28 original emphasis). The fact that entanglement is not a “paradox” of a quantum world, but resultant from our attempts to understand a holistic world, highlights the importance of re-examining the way conceive the immaterial-material distinction in a world that has no parts.

### Primas’ Account of the Immaterial

Primas is committed to ontological holism. Alongside this he maintains endophysics (which studies the ‘realm of non-spatial, non-mental, timeless, but nevertheless real entities’ (1994a, p. 166)) is deterministic, but exophysics (the ‘means of which we interpret the world’ (1994a, p. 167) is dependent upon the abstractions raised in endophysics) is not (cf. Hosle, 1999). I have also identified that Primas places a divide between the ontological world as it is and the world that we can observe[[116]](#footnote-117). Whether this divide is a form of SOSR, Platonism, or Kantian phenomenal-noumenal split, is not important. What is striking is his commitment to the existence of the immaterial. Because of his focus, even within his philosophical writings, on the natural sciences, the nature of this claim is never fully unpacked. Even in *Complementarity of Mind and Matter* and *Non-Boolean Descriptions* the focus is on the temporal/tensed divide between the two realms. What is clear is that the “commitment” to a dualist split is a pragmatic device for scientific enquiry and he views the *Ultimate Reality* to be a monistic/dual-aspect matter-spirit unity. This is echoed in *Endo- and Exo-Theories* where he writes ‘for a scientific description of the material reality *it is inevitable* to distinguish between spirit and matter’ (1994a, p. 165 emphasis added) and carried forward into his later writings where he argues ‘Neither nowness nor consciousness can be identified with any property know to physics *so we relate these phenomena to the nonmaterial domain’* (2003, p. 95 emphasis added). Yet the “nonmaterial” aspect of reality is *not* *a priori* distinguished from the material:

[O]ur point of departure [from Leibniz] is the hypothesis that there is a *timeless* holistic reality […] Neither time, nor mind, nor matter and energy are taken to be *a priori* concepts […] these concepts emerge by a contextual breaking of the holistic symmetry of the unus mundus (2003, p. 93 original emphasis)

In *Time Entanglement Between Mind and Matter* (2003) we find the most explicit description of how Primas conceives the mind/spirit. He draws heavily on Wolfgang Pauli’s work:

[T]o ponder upon a holistic conception concerning mind and matter. Pauli [...] suggested that the mental and material domain are governed by common ordering principles and should be understood as “*complementary aspects of the same reality”’* (2003, p. 90).

He goes on to describe the immaterial:

However, we do not restrict the [nonmaterial] tensed domain to the inner world of private thoughts […] *We relate the tensed domain to a mental world which we consider as fundamental to the nature of existence and being*. According to this view, “mind” operates as a principle beyond individual consciousness and is not restricted to the “human mind” (Primas, 2003, p. 92 original emphasis)

Holding both accounts means that we must move away from Cartesianism to a ‘primordial unity, not yet divided into two’ (Primas, 1993, p. 249). ‘To comprehend physis and psyche “as complementary aspects of the same reality” we have to use a structure which supports locally Boolean descriptions but which is globally non-Boolean’ (2009, p. 178). The division occurs because of our (scientific) need to partition the observer from what is being observed. Even though Primas goes on to argue that the *unus mundus* can be divided into three parts, these are ‘for convenience […][and] mutually compatible’ (2009, p. 179)[[117]](#footnote-118). Contextual distinction (or ‘decomposition of the world’ (Primas, 2007, p. 28)) means that both entanglement and individuation (separability) occur because of our choices about how to divide the world – *‘decompositions of the world are neither given a priori nor determined by first principles’* (Primas, 2007, p. 27 original emphasis), thus the degree of entanglement or separability can be changed by changing the place where the cut is made (i.e., changing the “universe of discourse”).

### The Holistic World: Concluding Remarks on Primas’ Non-Boolean Holism

There is no doubt that Primas’ ontology is the more “radical” holistic option of the two accounts. Whereas Esfeld’s account committed us to understanding entanglement only in terms of the whole system, Primas argues instead that “entanglement” arises because of our failure to recognise that we are artificially dividing a unified whole. It is possible to argue that Primas adopts a form of SOSR however this label would seem to take away from his argument that the “pattern” (or possible structure) only arises when we “break” the fundamental symmetry. Primas’ non-Boolean holism points back to the views of those like Plato, Leibniz, and Spinoza. The question is whether his account can support our contemporary theological discussion.

Primas’ work holds hope for the theologian for two key reasons. Firstly there is a deep commitment to the “nonmaterial” in some format, and whilst he recognises that we are not currently in the time of “post-Cartesian science” where nature is dealt with as a whole and ‘the knowing subject can be actively engaged with the outer reality’ (1993, p. 249), he *is* committed to this idea of a “primordial” or primary matter in which the distinction between matter and nonmatter is made by us based on our own abstractions. This commitment to a world in which “material” and “immaterial” are not dichotomous picks up on one of the potential causes of paradox examined in chapter 3.

The second reason to spend time with Primas’ work is his commitment to a kind of Platonic realm/heaven. Whilst commitment to (a form of) Platonism may seem an unusual boon for the theologian: Primas’ work could be seen to advocate a theism-friendly form of Platonism. This is particularly evident in *The Cartesian Cut* (1993) and *Mesoscopic Quantum Mechanics* (1994b), where his language points towards a fundamentally “open” system/structure that underpins all our contextual divisions of reality (analogical to a sustaining God perhaps). There is not only an epistemic (and/or perhaps ontic) gap between ourselves and this “bare” reality, but it fundamentally interacts with its surroundings even though ‘its properties remain unchanged whatever changes may happen in its environment’ (Primas, 1994b, p. 235). Further this endophysical “system” should be understood as the root of ‘universally valid first principles’ (Primas, 1994a, p. 169). I am clear that Primas is not attempting to advocate any theological “first principles”, however he spends a great deal of time examining the kind of “fundamental” centre/core to the universe that science is seeking to explain. This fundamental core is provided with a range of ontological properties and what Esfeld would term “world-making” properties. If one understands God to be a (philosophical) “object” or creative “substance” that sustains and recognises the metaphysical paradox that arises from a Cartesian distinction, Primas’ *unus mundus* provides food for thought.

## Conclusion

Both Primas and Esfeld’s accounts of holism nominally address questions of the mind-matter interaction, which should, in principle be informative for the theologian. But Esfeld’s “philosophy of mind” is more accurately a discussion of epistemology rather than an account of how we may understand the nature of reality itself. Thus, the question becomes what are the implications of his “primitive ontology” of relational “objects” for of the nature and distinctions of human persons?

Primas comes closer to something that is a richer conversation particularly if one emphasises his use of Platonic accounts in *Endo- and Exo-Theories of Matter*. His emphasis on the distinction between the world as *it is* and the world as *described* by science allows him to acknowledge that whilst a mind-matter distinction is *inevitable* within physics, ‘the traditional characterization of the mental and physical domains does not allows us to construct a workable theory for the mind-matter problem’ (Primas, 2007, p. 29). Yet just as Esfeld’s account concludes with the importance of/incompatibility with a “holism of beliefs” so Primas concludes by arguing the (or perhaps one of many) appropriate division is that between tensed and tenseless accounts of time. This account allows us to recognise that the appearance or “necessity” of a deterministic world describable by bivalent logic ‘is no longer suitable for the investigation of a non-deterministic world view’ (Primas, 2007, p. 35).

Yet even though neither provides a full account of the immaterial/mental in a holistic world, they both provide the theologian with much to consider due to their commitments to a form of substantive monism. Esfeld’s challenge of the nature of the parts and the deeply “entangled” association between objects and their relations provides rich food for thought for an account of a triune God as well as an incarnate one. Likewise, Primas’ call for a guiding Platonic “heaven”, distinction between the hypothetically material world of the physical sciences and the dual-aspect nature of the Ultimate reality raises questions about the boundaries between transcendence and immanence, creator, and creature.

Both accounts provide an alternative metaphysics to the material-immaterial dichotomy that set up the (meta)physical paradox. They also point us to a world that is more unified and thus that seems to provide greater scope for understanding divine transcendence in a substantive and coherent way. Yet the closer one moves to a metaphysical holism, particularly one that incorporates a form of substance or priority monism the theist is posed with the challenge of whether they should, more correctly adopt a form of pan(en)theism. Esfeld’s theory with its intrinsic relationality offers the “safer” option – there are still parts to wholes, and objective distinctions. Even if these “individuals” may have to be understood as intrinsically relational, it offers a model that would seem to speak easily to a metaphysics that makes room for a transcendental and trinitarian God. However, Primas’ model with its intrinsic wholeness, ungraspable nature of the foundations of reality, and commitment to the immaterial that I believe offers the more radical opportunity to deconstruct the notion of the metaphysical paradox of the incarnation.

In what follows I will examine the implications of Esfeld and Primas in turn, to see which is able to provide the most coherent account for the incarnation. Cross highlights that ‘the union of the divine and human in Jesus cannot be satisfactorily told without considerable philosophical analysis’ and that ‘a clear understanding of the metaphysics underlying the incarnation is an important element in understanding the doctrine as a whole’ (2002, p. vii). In the next two chapters I will examine the metaphysical implications of both forms of holism for our understanding of the incarnation and seek to show that a holistic ontology over and above a reductionistic one provides the better grounding for our incarnational dialogue.

# Developing a Holistic Account of the Incarnation from an application of the works of Michael Esfeld

If a thing that is part of a holistic system is ontologically dependent on there being certain other things insofar as it has certain properties, what are these properties? […] properties that are characteristic parts of a whole […]the parts have these properties only within the whole, then the whole is a holistic system. (Esfeld, 2001, p. 12)

As seen in chapter 5 Esfeld’s ontology provides a challenging account in which it stops short of Strong Ontic Structural Realism (SOSR) despite his argument in *Quantum Mechanics* that there is no empirical way to establish between a metaphysics of relations versus one of individuals. He argues only that a metaphysics of relations would leave one ignorant of the nature of the world “as it is” as follows[[118]](#footnote-119):

1. The world fundamentally consists of individuals.
2. We only understand the nature of these individuals through their interactions with our senses and measuring devices. We gain knowledge about what they *do*.
3. This knowledge may or may not refer to the intrinsic properties of the individuals.
4. We can only identify physical properties via their relations. Our explanations of fundamental physical properties are relational.
5. Identity of relations doesn’t imply identity of intrinsic properties.
6. Because of the epistemic gap between our “observation” of the fundamental properties and the intrinsic properties of the individual ‘we are ignorant of the intrinsic nature of things’ (Esfeld, 2004, p. 614).

Thus, there is a gap between our metaphysical theory (of individual things with intrinsic properties) and the apparent limitation that our physical theories only provide information regarding the relationships that things stand in. Within a theological account this argument holds less sway than within a scientific account because the epistemic gap between us and full comprehension of God is already established. Despite only adopting a moderate form of OSR the mutual ontological dependence between relations and the things that stand in them provides a theologically interesting ontology. One can argue that the Logos as an “organising principle” and the human nature of Christ are mutually dependent, rather than a situation where one side must be placed ontologically prior. The insistence on priority for one side causes difficulty in understanding the unity and interaction between the natures in Christ. In *A Minimalist Ontology* (2020) Esfeld and Deckert argue for a holistic atomism founded on ‘two axioms of there being matter points individuated by distance relations and change of these relations’ (2020, p. 57). Although Esfeld and Deckert don’t explain how they understand the nature of these “matter points”, Gregersen’s framing of “matter” as energy/information (examined in the following section) is at the very least a helpful conceptual framework and potentially compatible ontological commitment. Although Esfeld’s holism is, technically, still reductionist, the ontology and underlying metaphysics stands in contrast to current atomistic theological ontology, which has a robust commitment to individuals, and at a minimum requires the believer to adopt a global dualism. Because of this Esfeld’s OSR provides some valuable insights for the discussion of the incarnation.

## An Ontological Prelude

Having rest mass or charge is tied to being spatio-temporal. If there are things which are not spatio-temporal such as abstract objects, it does not make sense to attribute rest mass or charge to them. Nothing which does not have position, momentum, and spin in any direction *in some sense* therefore is a quantum physical system. (Esfeld, 2001, p. 257 emphasis added)

There are two key points raised by this comment that are worth examining before moving forward. The first is that having position etc. *“in some sense”* would be compatible with incarnational theology. Even if one was considering the Triune Godhead in its entirety, it seems that there is “some sense” in which God can be understood as being partially “physical” if only for a time that is negligible when placed against eternity. The second point is that although Esfeld makes a distinction between physical and abstract objects there is no distinction made between existing non abstract immaterial objects and physical objects. This is not unexpected due to the nature of scientific enquiry but given his explicit exclusion of the immaterial (but not denial of it) there remains a query over how he understands his metaphysics to apply to existent immaterial entities.

Gregersen’s work[[119]](#footnote-120) on the nature of reality and information is helpful in establishing the parameters of a science informed theology and navigating the challenge of the scientific concept of “matter”. Gregersen opens his discussion by stating that ‘the idea of a Triune God – Father, Son and Holy Spirit – offers unique resources for developing an ontology which is congenial to current scientific concepts of physical matter as constituting a world of *mass, energy and information’* (2011, p. 103). He goes on to argue that this concept is dependent upon “information” having an ontological status and a causal role in our metaphysics. His framing for the relationship between this scientifically influenced metaphysic and a theological discussion helps frame how Esfeld’s (and Primas’) work may be constructive for theology:

Needless to say, however, the proposed Trinitarian view of the material world does not in itself have any status as a scientific theory […] rather it is a metaphysical proposal developed under the specific constraints that the theological proposal must be congenial with recent developments in scientific understandings of matter. (Gregersen, 2011, pp. 103–104)

On this basis he maintains that his work is not natural theology (arguing “from below”) but rather a “theology of nature”. He moves *from* theology *to* physics and biology. In both the *Triune God* and *God, Matter, and Information* he highlights that radical shifts that have occurred in our scientific conception of “matter”. Whereas classical physics moved us away from a duality of the material and spiritual to a ‘seamless unity […] with a narrow interpretation of the nature of the material’ (Gregersen, 2014, p. 405), the shift to relativistic physics saw the ‘visibility, indivisibility and locality of old-style materialism’ disappear (Gregersen, 2011, p. 105). This is further complicated by Einstein’s claim that due to the (quantitative) equivalence of matter and energy, matter can be understood as “concentrated” energy, whereas “fields” are spaces where energy is less concentrated (Cf. Einstein cited in 2011, pp. 105–6). Whether one wants to take Gregersen’s precise route to argue that information is a foundation to the nature of “physical” matter is not crucial, what is important is that what is meant by “matter” has changed radically. Energy is now understood as being just as foundational (or perhaps more so) than mass and our concept of nature has become more nuanced so that talk of matter is actually talk of three independent but fundamentally “entangled” aspects: (a) the substance or mass (the “physical stuff” it is constituted by); (b) the energy (both the potential for and actual ability for it to change); and (c) the organisation or information (pattern formation, whether this refers to the instructional “pattern” of DNA or the “pattern” that creates a table rather than a chair). On this model matter is far more *dynamic* than traditionally perceived.

If one extends this analogy (as Gregersen does), it is possible to see resonance between matter as mass, energy, and information, and the Triune God. The Spirit can be understood as “energising” creation, the Logos as the organisational/or informational driver, and with Father as the ever present and foundational “mass” or substance. I agree with Gregersen that a robust theological ontology needs to account for the connectivity between God and matter, but avoid either matter being prior to God, or an extreme pantheism where God is without will and simply identical with the laws of nature. Instead there is a deep interconnection (and incarnation) in which God is “radically” present in creation such that if ‘all-that-exists within the world of creation is materially constituted […] then God, by implication, is present in matter itself’ (Gregersen, 2011, p. 113). This is further developed in Gregersen’s later writings where he argues:

[There is] a deep congeniality between a logos Christology explicated in its cosmic framework and contemporary concepts of matter and information. The “flesh” of the material world is […] seen as saturated by the presence of the divine (2014, p. 439).

I will return to this aspect of Gregersen’s work in chapter 7 in relation to the implications for Primas’ work.

## Moving Towards a Boolean account of the Incarnation

There are three parts to this investigation which mirror the approaches set out by Esfeld in his 2001 and 2004 works on holism and are developed and augmented in his more recent work. The bottom-up and top-down approaches that I shall examine first, can be understood in terms of a “standard” metaphysics of individuals and therefore the changes to our account of the incarnation stem from moving from an atomistic to a holistic ontology. This shift rests in a change of how the relationships between the properties of the whole and parts are understood. The move to a metaphysics of relations (SOSR[[120]](#footnote-121)) provides a different set of challenges for the theologian and in many senses, these are more similar to those raised by Primas’ unified “Ultimate Reality”. SOSR means that more than only being able to *discuss* relations, but that *only* relations exist. This does not preclude the development of a metaphysics of the relations between God and creation (in Christ). However, the development becomes more speculative because we don’t have the pre-existent conceptual frameworks to discuss this in the same way we do for a metaphysics of individuals. This is briefly touched on in the concluding section to this chapter and again in chapter 8 but due to being less developed in Esfeld’s writing it doesn’t receive the same level of attention in this thesis.

As examined in chapter 3 the key to Esfeld’s conception of holism rests in the nature of parts and their relational properties. Before examining how this ontological model can influence our theological discussion it is necessary to first re-cap his definition of a holistic system:

Consider a system of the kind *S* and its constituent parts […] An *S* is holistic if and only if the following condition is satisfied by all the things which are its constituents: with respect to the instantiation of some of the properties that belong to such a family of properties, a thing is ontologically dependent in a generic way on there actually being other things together with which it is arranged in such a way that there is an *S*. (Esfeld, 2001, pp. 15–16)

This marks Esfeld’s relational holism out as a form of Boolean holism (according to Primas’ distinction), as it is a holism that allows for the existence of parts within a holistic system. It is possible to see an immediate comparability with our conception of both the Trinity and the hypostatic union, both are to be understood as complex wholes in unity that contain parts. The possibility of defining discrete parts is also seen on Gregersen’s conceptualisation of the Trinity in informational terms. However, the key to this discussion is that “parts” are not to be understood as having prior independent existence outside of the whole[[121]](#footnote-122), unlike for example the cogs and springs before they are brought into relationship in the watch. Even though Esfeld’s (2001) conceptualisation of the relationship between metaphysics and the philosophy of mind is more accurately interpreted as a discussion of epistemology, it provides a robust conceptualisation of the nature of a (substantive) holistic system. When examined alongside *Quantum Entanglement* the theologian is provided with a rich framework for developing a holistic conception of the Godhead. What is notable in *Quantum Entanglement* is that Esfeld broadens his definition of the kinds of things that can be relata by providing an account that removes the potential challenge (highlighted in §6.1) of a focus on the physical. Esfeld argues that ‘by a “thing” [i.e., something that can stand in relations], I mean *anything that is subject to the predication of properties*, including relational properties (relations) without itself being predicated as a property of something’ (Esfeld, 2004, p. 603 emphasis added). One of the key strengths of this model is that it is open to variability including ‘the scope of the necessity which ontological dependence implies: the necessity can be metaphysical in that it concerns all possible worlds’ (Esfeld, 2001, p. 27).

## Establishing Wholes and Parts in a Boolean Theology

Whether an account is to be taken as an example of bottom-up or top-down holism depends on the manner in which one understands the “instantiation” in ‘with respect to the instantiation of some of the properties that belong to such a family of properties’ (Esfeld, 2001, p. 16). In a generalised conception of holism, Esfeld’s focus is on the fact that the “more than” must touch on the very nature of the object itself – what it means for something *to be an x*. In a bottom-up account the focus is on where these familial properties are held or instantiated. The family of properties that something must have to be considered as part of the holistic system rest in the constituent parts. In this sense the “family” of properties (or the necessary subset of that group) can be exhibited by a single part. It is possible, although not required, that *each* of the constituent parts has *all* properties included within the “family” of properties that makes something a part of *S*[[122]](#footnote-123). In other words, if the whole has specific properties, it is *because* the constituents have them[[123]](#footnote-124). What makes the system holistic rather than atomistic, is the ontological dependence on the existence of other parts (arranged in such a way that there is an *S*). The focus here is how properties of the parts enable the properties of the whole. Although it may be possible to argue for a level of supervenience of the “global” properties on the “local” properties, this is not a necessary metaphysical commitment.

In what follows I examine how the bottom-up conception of holism can lead us to a deeper understanding of the incarnation. Within this discussion it is assumed that the “compositional matter” is not necessarily physical but could be conceived within an informational or dual aspect metaphysics. The reason for this is two-fold: Firstly, Esfeld provides no discussion as to how we are to understand the existent immaterial. Secondly, there is agreement (as seen in Gregersen) that “matter” is now conceived as something very different to the billiard ball “bits” offered by Newton. The assumption that objects (whatever they are composed of), and relations are mutually dependent is the aspect of the metaphysics that is more pertinent here. *What* those relata are made of is a question for another thesis. The key feature of holism for this discussion is that it allows one complex whole to contain various constituent parts and, crucially, allows that these constituent parts may have properties that belong to different “families” (of qualitative, non-disjunctive properties that make something a constituent of *S*).

### Establishing the Holistic System

In applying Esfeld’s ontology to the incarnation, the first question that needs to be answered is to what are we attaching the role of “holistic system” (*G*)? Whether this is attached to Christ, or God will impact how the implications are worked out. To establish the “boundaries” of the system it is necessary to return to the definitions of atomism and holism. In atomism the parts of the whole hold properties independently of one another, the properties of the whole are formed of the aggregate of the properties of the parts. Conversely in holism the parts of the whole hold *properties in virtue of* being within the whole. For example, a grain of sand has specific properties that make it a grain of sand (this includes chemical make-up, mass within certain boundaries etc.). The grain of sand has these properties irrespective of whether it is part of a heap of sand (itself an atomistic system). These properties (of the grain of sand) can be held even if *x* is the only physical object in a possible world. If the “heap of sand” was a holistic system, then it would *only* be possible for the grain of sand to have the specific properties (that define it as such) as a part of the heap of sand and therefore it would be impossible for *x* to be the only existent object within a possible world.

Therefore, to establish whether it is Christ or God[[124]](#footnote-125) that constitutes the whole it is necessary to establish which could be the solely existent object within a possible world. Based on the requirement for unaccompanied existence it would appear definitive that (irrespective of the pre-existence of the Logos) “Christ” cannot be a solely existent object. The definition of what it is to *be* Christ requires the existence of more than one object. Christ is God *incarnate*. Therefore, the existence of Christ, at a bare minimum, requires the existence of God *and* the existence of something in which to be incarnated. This implies that God is the holistic system not Christ. This is further echoed in Gregersen’s claim that rather than being identical with the world[[125]](#footnote-126) God “makes room” for the *other* (by eternal generation) both in begetting the Son and ‘in [the act of cosmological] creation makes room for the otherness of matter’ (Gregersen, 2011, p. 114).

This concept of making room for the other is also seen in Moltmann’s writings on creation where he argues that this “making space” is an act of kenoticism: ‘the *nihil* for his creation *ex nihilo* only comes in to being because […] God withdraws his presence and restricts his power’ (Moltmann, 1985, pp. 86–87). This withdrawal still means that the creation (matter etc) that comes into being in this ceded space “outside” God also ‘still remains in the God who has yielded up that *outwards* in himself’ (Moltmann, 1985, p. 89 original emphasis).This potential to cede space and/or time to the other also points towards the ability for God to be existent in isolation. This is further strengthened by Christ’s contingency: ‘the Son of God became incarnate in our world, but it was not necessary that he do so; there are possible worlds in which no incarnation takes place’ (Flint, 2011, p. 73). If it is possible for God to exist without Christ in a possible world, then the “whole” cannot be Christ.

Finally, Esfeld comments that the kinds of “things” that can be understood as relata must be able to have properties predicated of them but not *be* properties of something else. This (unintentionally) points towards a requirement for a foundational “thing” to which others stand in relation[[126]](#footnote-127). This appears to have echoes of Bohm’s theory that ‘the universe is an unbroken wholeness and parts manifest from this whole […] it exists *underneath* the space-time level of all quantum phenomena’ (Nadeau and Kafatos, 2001, pp. 180–181 emphasis added). There are also echoes of Primas’ ontology in the unbrokenness. For this chapter, the concept that it would be impossible for a part of a holistic system to be the only existent object within a possible world will be taken as an ontological “brute fact”. Moving forward the focus will reside on whether (a’) the constituent properties determine the properties of the whole, and whether (b’) the arrangement of constituents to form the whole differentiates “sub-groups” of constituents that together instantiate properties exhibited by the whole.

Talk of God and Christ as “systems” and “wholes” may seem untheological, as if the notions of God and Christ have been abstracted beyond the traditional understanding of what is meant when we use them in a religious context, but this is not meant to be the case. To understand how a holism that allows for parts can contribute to our theological discussion it is necessary to first establish the “parts” of the holistic system. Even though Esfeld recognises an inherent relationality that is key to the theological discussion, the Boolean approach applies an ontological significance of the parts to the system irrespective of whether these parts are correctly termed as discrete individuals. Whether understood as discrete parts or integrated relata there are key constituents that should be considered fundamental to the incarnation. To examine Christ as a part of God’s holistic “system” I will make use of Flint’s (2011, p. 71) explanation designed for a similar conversation on mereology.

In Christ we find two unique natures the human nature (HN) and the Son’s divine substance (DS). However, if “the Son” is identical with the divine substance then, given their consubstantial existence, the incarnated DS must also be identical with the Father and Holy Spirit. This leads to the persons of the Trinity potentially becoming three aspects of the one God. In order to avoid an indistinct Trinity and an in-depth Trinitarian discussion Flint adopts the following definition of “Divine Substance” as ‘standing for the divine substance *plus* whatever properties or characteristics (e.g., being generated by the Father) distinguish the Son from the other two divine persons’ (2011, p. 71). The *plus*-*whatever* clause allows for enough of an understanding of DS that the discussion can continue but avoids getting tied down in the details of the exact nature of the DS or the additional properties and their relations. I am hopeful that the adoption of Flint’s definition allows this thesis to progress in a comparable manner.

### Establishing the Family of Holistic Properties

Before it is possible to apply this framework to the question of the incarnation it is necessary to establish the properties that make something a constituent of *G* (the Trinitarian God). It is entirely possible for a complex whole to consist of “parts” requiring different “families” of properties that account for their constituting the whole and there is no limit or minimum number of times that each family of properties can be instantiated within one system (Cf. Esfeld, 2001, pp. 14 & 26 respectively). The anthropological equivalent would be the human body[[127]](#footnote-128). There are many organs/systems that constitute the human body, and some systems are instantiated more than once. These organs/systems cannot be understood as constituting a human body without being in the correct arrangement with other parts. But equally importantly the body, as a whole, is able to exhibit properties such as cleansing toxins from blood, being able to hold beliefs etc, only in virtue of these being exhibited by the parts.

Having provided a mundane example for a “family of properties”, the question arises how this can be understood with respect to the incarnation? The obvious, and most defined family of properties are the “divine attributes”. Even if these are limited to omnipotence, omniscience and omnibenevolence there is still a strong set of properties that something must have to be considered a constituent of *G*. Esfeld’s conception allows different families of properties to enable inclusion in the system, alongside the idea that a holistic system could have varying degrees of holism exhibited by its parts. For instance, some properties may be understood at an atomistic level[[128]](#footnote-129) and may provide support to understanding how the three persons of the Trinity all share in exhibiting the omni-properties but differ in other aspects of their natures.

However, although these properties seem definitive, can they accurately be considered as *holistic* properties? For a property to be a suitable candidate for inclusion in the holistic family of properties it must be both “generic” and “determinable”. The property cannot be held simpliciter – this makes mass an appropriate property as it requires further description (i.e., quantifying), and most properties of physical objects fit this criterion. However, it appears that despite the “necessity” of omni properties for a theistic God they are precisely the kinds of properties that *can* be held simpliciter. Furthermore, although necessary for theism there is no necessary correlation between theism, the omni-properties, and a Trinitarian conception of God. It may be that omniscience is an essential property of DS, or even of God, but essentialism does not imply holism.

To be classified as holistic, the property must be a (special kind of) relational property, and it isn’t immediately clear that the omni properties are relational in the correct way. It is possible to argue that the omni properties *are* relational: omniscience requires something to be the subject of that knowledge, omnibenevolence requires something to love, omnipotence implies something over which power can be exerted. However, for the relations exhibited by the omni properties to be considered as *holistic relations* they must exhibit the following:

* 1. The property must be more than an “arrangement” description – i.e., it is part of the family of properties that make something a constituent of G.
	2. The property cannot be held by an object in isolation but rather requires of other things/parts with which the first object is in a relationship with.

Based on HR1 this means that omni-properties cannot simply be referring to a relationship between the Godhead and the world, and additionally HR2 requires relationality. This means that the appropriate kind of property could be one held by the second person of the Trinity that *requires* the existence of the first and third persons to be exemplified.

The challenge for the theologian making use of Esfeld’s categories is that this “general” description is weighted towards a bottom-up approach (‘something can have some of these properties [that make it a constituent of the holistic system] *only if there are other things with which it is arranged* in such a way that there is a whole’ (Esfeld, 2001, p. 24 emphasis added). If therefore the omni properties by necessity require (external) objects to which they apply, this would make God dependent on the existence of some form of creation, or at least the possibility for creation. Furthermore, it is ‘necessary that the description of the property cannot be reduced to a description of non-relational properties and the description of a suitable arrangement’ (Esfeld, 2001, p. 19). With respect to the omni-properties they can all be reduced to a property plus arrangement - for example, it is possible to reduce omniscience to a property of “being able to have unlimited knowledge” and the interrelation between the ability and the objects of that knowledge. Thus, the omni-properties don’t seem to be the correct type of properties at all. This is without the compounding consideration that the necessary relation would seem to run between Godhead and world making the “system” the entirety of the cosmos. This is because holistic relations apply within the system not between the system and other systems/objects.

The key determining factor in establishing families of holistic properties is that ‘the “more than the sum of its parts” does not mean a specific spatial or causal arrangement of the parts, but that *being part of the system touches on the nature* of the thing in question’ (Esfeld, 2013b, p. 11 Sec. 5.1 emphasis added). Therefore, when it comes to God, the property that *most* touches on the very nature, without implying an external contingent relationship is the property (or properties) of being part of a Trinitarian Godhead. This property or family of properties applies only *within* the system of the Godhead and thus removes the challenges of the omni properties bringing the cosmos into God. Being a part of the Trinity is not an arrangement property in the traditional sense. It isn’t reliant on spatial or temporal relations and yet it cannot be reduced to a non-relational property either (or description plus relation). If this “Trinitarian” property (***T***-property) can be classed as a holistic property, depends on whether it allows for a non-trivial form of holism. The holism becomes trivial if the ***T***-property is understood as “the property of being a constituent of a Trinitarian Godhead” because it is necessary for there to be a “suitable arrangement” of the constituent parts. Arguably the fact that it is a “Trinitarian” property (rather than simply “being a divine being”) means that it necessarily contains the “suitable arrangement” without being reducible to non-relational properties plus arrangement. Even if it may not be possible, particularly within the scope of this thesis, to examine the exact nature of this ***T***-property it should provide enough of a working definition to enable the discussion to move back towards the incarnation.

## A Bottom-Up Account of the Incarnation

As Christ is constituted by a HN and DS, it is non-contentious to posit that the DS contains the ***T***-property, which is either the only, or part of the family of properties that is required for something to be a part of the (holistic) Godhead “system” (*G*). Whilst the ***T***-property can provide an account for what unites the persons of the Trinity within *G* this doesn’t yet address the metaphysical paradox of how the HN can be united with the DS to form a constituent part of *G*. Esfeld’s notions of “global holism” provide some sense of the way in which the holistic system *G* could be conceived as allowing for the radical re-arrangement of the system with the incarnation event. This ties in with the related call to discard a metaphysics of individuals in favour of a metaphysics of relations. However, it is first necessary to establish how a bottom -up holistic metaphysics can support a non-paradoxical understanding of the nature of human and divine in the incarnation.

To explain the hypostatic union based on the bottom-up approach something more than acknowledgement of the ***T***-property is needed. It is possible for different constituents to have a different family of properties[[129]](#footnote-130) that make it a constituent of the whole[[130]](#footnote-131). This kind of distinction allows for the family of properties relating to DS to be slightly different depending on whether they related to the Father, Son, or Holy Spirit. This works provided that the Divine Substance (DS) is understood as synonymous to God(*G*); otherwise, it is either another constituent part of God, or it *is* the family of properties. In the latter case the HN in Christ is joined to *God via* its connection to the DS. This notion of inclusion via connection runs the risk of moving the conversation from theistic to pan(en)theistic via (or including) a deep incarnation model such as developed in Gregersen (2020, p. 256) and later expanded (2022) where he argues for two further accounts of *sarx* (flesh):

‘Sarxmeaning4 Interactive communication between creatures and the God with clay, leading to:

Sarxmeaning5 Transformations in living sensitive systems capable of responding internally to the address of the divine wisdom, speaking in and through creaturely differences, structures, meanings and communications.’

The issue of contact providing inclusion into *G* would move beyond an orthodox understanding. An alternative account is that not all the properties instantiated by the constituent must be holistic properties. Therefore, the DS (including the ***T***-property) could form the family of properties that an object must have to be a constituent of *S*, but that the individual *plus-whatever* properties are not to be viewed as holistic properties themselves. It might seem that the obvious solution to ensuring that HN is united with the DS in Christ is to simply say that the properties of HN form an additional part of the *plus-whatever* entailed by being the Son. But this implies that *G* also exhibits the properties of HN – the whole exhibits properties *because* the constituents have them. To return to the earlier anthropological example the human person as a holistic system has the property of being able to filter toxins out of the bloodstream *because* the constituent part “liver” has these properties (in respect to being arranged in a certain way with other things such that there is a human person). It would seem beyond troublesome to create a holistic model of the incarnation that led to the DS in general, or *G*,consisting of human properties.

Thus, it appears necessary to investigate more fully how Christ can be understood as a *single* constituent of *G*. The family of properties that make HN and DS parts of Christ cannot include the property “being a constituent of Christ”, because to do so is to trivialise the notion of holism. Although it might be tempting to conceive of Christ as a secondary holistic system *C* that is part of the greater holistic system *G*, this fails at an ontological level. The holistic properties must touch on the very nature of the object in question, and even if it is possible to argue that containing HN touches on the very nature of *C* the same cannot be said for *G* of which it is a part.

The alternative is to flip the focus of the holism in Christ. If the DS is the family of properties that makes something a part of *G,* then this is exhibited by Christ’s “full divinity”. On this model the inclusion of HN within Christ need not be considered a holistic property. In *Holism in Philosophy of Physics*, Esfeld offers an account of the kinds of properties necessary for something to be part of a holistic system, one of which excludes the inclusion of disjunctive properties, but doesn’t exclude vagueness in the property boundaries. He argues ‘if and only if something has more or less all these properties [the family of properties that make something an *S*] it is a thing of the kind in question’ (2001, p. 12). Yet within the same chapter he speaks to the fact that being an *S* can be attached to only *some* of the family of properties and furthermore that it is ‘*not demanded* that *all the properties* that belong to such a family of properties are holistic properties’ (2001, p. 16). On this account it could be viewed that “potential to be embodied within temporal creation” is a property that sits within the family that makes something a constituent of *G*, but it is neither a holistic property nor one held by all the constituents. Atomism at this level allows HN to be exhibited within the second person without requiring the rest of the Trinity to have this property. To take this further one could argue within this framework that “being incarnate/taking on human nature” or some variation on this theme, is a property within the *DS* that makes something a constituent of *G.* It follows that in the incarnation we do not see the union of something that is “outside” what it means to be divine[[131]](#footnote-132) instead human nature can be included “within” divinity.

This language of including human nature within the Godhead raises a further question regarding its ontological status. The properties included within the holistic family should be qualitative/pure properties[[132]](#footnote-133) which requires that the HN “brought into” *G* is not the HN of Jesus of Nazareth, but rather HN in its entirety. This can sit alongside patristic thought that “what is not assumed is not saved” and/or in Moltmann’s interpretation of Athanasius that ‘God has become human so that we human being can participate in the divine life as God’s sons and daughters’ (Moltmann, 2015, p. 120). With the creed stating Christ is ‘One, not by conversion of the divine essence into Human (of the Divinity into the body), but by assumption of the Human Essence into the divine (into God)’ (Swedenborg, 1841, p. 2) there is much to be said for HN being understood as part of the DS. A robust examination of this account is beyond the scope of this thesis, but such considerations point towards areas of potentially profitable theological investigation for future exploration. When this is brought into dialogue with the concept of global entanglement – *all* quantum systems have previously interacted and therefore remain entangled – there is the potential that HN “in its entirety” reaches globally both in terms of a deep incarnation of all living things, and/or because of the nature of the act of creation. Global entanglement or deep relationality within and across creation gives rise to questions of whether metaphysical holism leads, inevitably, to a panentheistic account of divinity, but this is not fatal to holism being consistent with the incarnation and/or trinitarian theism.

In its current form, the inclusion of HN within the definition of DS points towards a model in which there is (an aspect of) the divine in all (human) nature – as the HN part of the DS is found in all humanity. Esfeld’s model of partially atomistic descriptions/metaphysics within holism isn’t overly helpful when understanding the differences (if there are any) between genuinely atomistic systems (e.g., a pile of sand) and atomistic components of holistic systems. Further in *A Minimalist Ontology* Esfeld and Deckert argue that atomism is established through individuation on the grounds of distance/spatial relation. However, if the bottom-up approach points towards a *mutual indwelling* it is hard to see how that individuation could be arrived at. Indeed, with respect to Christ, if the indwelling is a genuine unity, it is difficult to see how one *could* (on Esfeld’s criteria) individuate the HN and DS within Christ, especially if the HN is *part of* the DS as it pertains to Christ (and other embodied persons). Although this would avoid the “commixture of essence [substance]” and God *transforming* into flesh, there is a question as to what would distinguish Christ from others, if all contain this aspect of the DS. This may be interpreted as a form of “degree Christology”: that Christ has a greater number of the constituent properties that make something a member of *G* than we do, therefore we do not meet the “threshold” to speak of God indwelling fully in us. Instead, we only “touch on” the very edges of the DS (Cf. Ephesians 4:6). This kind of model *may* enable the theist to avoid pan(en)theism as the DS in humans is “minimal”. But if the only individuating “feature” is spatial relation, and one maintains a realist understanding of an immanent God genuinely present in creation, then how one goes about individuating creatures from wider creation, (and between creation and creator) appears to be highly problematic.

Fundamentally the weakness in adopting a bottom-up approach to a holistic account of the incarnation doesn’t rest in the “threat” (perceived or actual) of a move from theistic to pan(en)theistic Christology. Rather the challenge rests in the fact that the attribution of sets of properties to the holistic system (whether atomistic or holistic properties) appears to provide a reworked version of assigning properties in line with the *Qua* propositions. The move doesn’t seem to add to the existing literature regarding the removal of *metaphysical* paradox. Without Esfeld articulating clearly how he conceives of the fundamental “substance” of reality within this metaphysics[[133]](#footnote-134) this approach provides a useful but merely conceptual response to navigating paradoxical properties[[134]](#footnote-135). Whilst this opens interesting avenues for further engagement especially around holistic systems containing atomistic properties and what this may mean for theological thought, it doesn’t deal with the metaphysical paradox at the heart of the enquiry. Bearing this in mind it is necessary to examine whether a top-down account may provide a more fruitful ground for theological discussion.

## A Top-down Account of the Incarnation

Whereas the bottom-up approach started with an examination of the family of properties that makes something a part of a holistic system, the top-down approach examines how interactions between the constituent parts enable groups of constituents to exhibit properties of the whole. Esfeld and Sachse make the following distinction between holism and atomism that is helpful for understanding the requirement of a top-down approach:

If the fundamental […] properties are intrinsic properties, objects possess these properties independently of whether they are alone or accompanied by other objects. By contrast if the fundamental properties are relations, the objects are tied together by these relations instead of existing independently of each other. (Esfeld and Sachse, 2017, p. 47)

It is here in the being “tied together” that we see the mutual ontological dependence. The bottom-up approach examined properties that constituents can exhibit “whether they are alone or accompanied” by other constituents. In contrast the top-down account maintains that properties can *only* be exhibited by constituents “tied together”. The challenge for this model is to find a way that avoids the modalism of scholars such as Pannenberg where the unity of the Trinity doesn’t require full individuation of the persons because they are simply “manifestations” of the divine essence (see Schulz, 2012, pp. 153–156 for a discussion of Pannenberg’s thinking). If the nature of the “individuals”[[135]](#footnote-136) within *G* can *only* stem from the “whole” then there is a risk of slipping into subordinationism. This is because of a dependence on the whole to ‘specify a differentiation within the whole […] and thus including relations among the constituents’ (Esfeld, 2001, p. 24).

The top-down approach to the incarnation offers greater parallels than the bottom-up approach to existing literature on the nature of the Trinity. This is because the top-down account examines how the relationality between the parts, gives rise to the attributes of the whole. Work on the Trinitarian “person” by Cordovilla Pérez (2012) provides a helpful framework to begin the discussion of how a top-down holistic account may be conceptualised. Pérez examines a range of understandings of “person” in relation to the Trinity. He argues that personhood should be defined not in terms of separation/individuation but that ‘to think of *persons* is to think in terms of relations: Father, Son and Spirit are the particular persons they are *by virtue of their relations with each other*’ where a relation is understood as ‘the way by which persons are mutually constituted’ (Gunton cited in Cordovilla Pérez, 2012, p. 131 underlined italics emphasis added). Thus, within a holistic schema personhood occurs because of the “tying together” of sets of properties and relations between the constituents. Cordovilla Pérez draws on von Balthasar to examine how this relationality is foundational to the nature of the persons in the Trinity and is exemplified through the analogy of (divine) persons as ‘gift and giving’ (Cordovilla Perez, 2012, p. 140). However, whilst the Father is to be understood as gifting of Himself to the Son there is a positive “otherness” that distinguishes each of the divine persons. It is possible to conceptualise this otherness in terms of each person having different relational properties to the other persons (that may be included within the family of properties [DS] that make something a part of the whole [*G*]) that are dependent upon the existence of each of the other constituents. However, (and this is crucial), the properties held by the whole that are instantiated by combinations of the constituents are *non-relational* (Cf. Esfeld, 2001, pp. 257–258).

This means that there are non-relational properties of *G* (for example creativity, “gifting”, etc.) that are not and cannot be substantiated by any of the “constituents” of *G* in isolation. These communal properties form part of the family of properties that make something a constituent of the whole, but the whole also has properties which ‘*indicate the manner in which the parts are related with each other*’ (Esfeld, 2001, p. 258). It could be posited that the property of concern is that of Perichoresis or a ***P***-property. Twombly (2015) cites John of Damascus describing the persons of the Trinity as ‘abiding and resting […] not in such a manner that they coalesce or become confused, but, rather so they *adhere* to one another’ (Twombly, 2015, p. 8 emphasis added). In this way perichoresis (in Twombly’s discussion of John) becomes for both the Trinity and the incarnation a Cusansian coincidence of opposites but *through* which the HN can become more than it would in isolation. In joining its union with the DS it ‘actually becomes fully itself’ (Twombly, 2015, p. 71). This echoes Gregersen’s thinking[[136]](#footnote-137) that it is possible to consider the incarnation not as an example of the “combination” of human and divine in Christ, but rather as a *mutual enrichment* in which both aspects are enhanced through their interaction. This enhancement could be understood as Maudlin’s (1998) “more than” and further as an exemplar of the kind of property that can only be exhibited by parts in combination rather than loneliness. In this sense a property (***E***-Property) found alongside the ***P***-property of indwelling adds the “more than” via ‘community’. When one considers the “family” of properties that build towards the nature of what it means to be a part of the Trinitarian godhead, we find ourselves with (at least) three properties (***P***,***T***,and***E*** properties[[137]](#footnote-138)) that all speak to communion (or community) and relationality. All are properties that could not be instantiated by one person of the trinity in isolation, and all have the potential to speak to the unique relationality found in Christ – navigating not only the complex relationality of the Trinity but also the relationality of the creator-creation relationship.

The apparent challenge is that the properties identified as being part of the family of properties speak to relations (between constituent parts and between those parts and the “external” cosmos). Esfeld and Deckert argue that the properties that are shared by the constituent parts must be *non-relational*, and this causes an apparent disconnect. The discussion of relationality in terms of individuation is focused on spatio-temporal distinction, if this is combined with their assumptions of relational properties[[138]](#footnote-139), then the “challenge” becomes a non-issue as the relations *are not* spatio-temporal. What we have instead is a series of properties deeply entwined with the concepts of mutual indwelling and/or enrichment that require the existence of other constituents. One returns to how this can be understood in response to metaphysical paradox – the ***PTE*** properties don’t address how these attributes are navigated across substances (if one considers a break between the material and immaterial). An obvious solution is to argue that an explanation that can deal with inter-substance interaction isn’t needed if we understand the cosmos as being formed of entirely the same kind of substance (whether material, neutral, immaterial, etc.). However with Deckert and Esfeld focused on the “physical” world describable by science, and Richard Healey (1991) arguing in *Holism and Nonseparability* that the nature of ultimate parts[[139]](#footnote-140) is a question for physics and not just philosophy, there is an implicit commitment to a physicalist ontology (1991, p. 399).

It is hardly surprising that scientific metaphysics is committed to a form of physicalism, but it does raise challenges that aren’t met by those arguing for an alternative “foundational substance” to matter (e.g., Primas, Gregersen, Clayton etc.). There *are* models that allow for an alternative foundation, one of which, is provided by Joseph A. Bracken in *Panentheism: a Field-Orientated Approach* (2004). Bracken sets himself and Whitehead apart from Peacocke’s model of panentheism (based in fundamental physical entities) as process theologians. He proposes that the foundational entities are “physically real” spiritual entities that are 'constitutive of physical reality at all levels of existence and activity’ (Bracken, 2004, p. 219). Thus, requiring the ontological priority of the immaterial. This is grounded in a strong account of ontological emergence where the Holy Spirit “mediates” the divine community and is the active presence in the creation of new levels of unity within creation. The challenge for the holist seeking to reconcile Bracken with Esfeld/Deckert is that combining the two views appears to lose not only an understanding of individuation within *G*, but also any sense of how these “levels of unity” relate to existing ontological hierarchies, and/or how “spirit” constitutes “physicality”. A detailed account of panentheism falls outside the scope of this thesis. However, as the direction of travel within this section shows there are potentially greater levels of commonality between a top-down Boolean account and a non-Boolean account of the nature of reality, because of a shared commitment to a global “unity”.

Fundamentally the top-down approach places a greater focus on conceptual and philosophical questions of the nature/extent of the system that is exerting downward pressure to individuate groups of constituent parts. Clearly Bracken’s spiritual account would be dismissed from a purely scientific description. But it raises the question whether Esfeld is pulling back from the inevitable conclusions to maintain scientific credibility. The baton is handed back to philosophers (and theologians) to work out the *implications* of a scientifically informed holistic metaphysics that *does* apply to consciousness and the immaterial.

## Conclusion

Because Esfeld’s ontic structural realism is only a moderate version, it maintains many of the difficulties associated with standard metaphysics of individuals. The bottom-up account has potential to support the work described in §3.5 to examine the distinction between assumed properties and necessary or “minimal” properties attached to our concepts of human and divine. In doing so this would support the analysis of whether the apparent contradictions caused by linguistic and metaphysical assumptions can be overcome. Yet this potential contribution comes with a warning that it runs the risk of becoming an ad-hoc variant of the reduplicative strategy by another name.

The ontological commitment to the mutual dependence (MOSR) or priority (SOSR) of relations has potential to be a useful contributor to discussions, such as those provided by Gregersen, on “information” as matter. This conception of Logos as the organising principle of creation appears to have potential conceptual links with theological accounts of God as sustainer. The concerns raised by Esfeld about our potential inability to access the world “as it is” is less problematic within the theological framework of addressing the ineffable. Yet the potential positive contribution arises at a conceptual and/or linguistic level rather than one of constructive metaphysical dialogue.

Nevertheless, with further development and investigation into what a genuinely relational ontology (which includes the “immaterial”) looks like, there is an exciting opportunity for engaging with the appearance of metaphysical paradox. A metaphysics of relations denies the assumption that for things to stand in relation they must have properties over and above their relations. By “thing” there is no necessity for these to be independent things; whilst properties can be predicated of things, things cannot be properties of something else. This relational ontology provides the opportunity to avoid the issues associated with discrete individuals in relation to the incarnation.

What the foregoing sections have shown is that relationality (and unity) lies at the heart of a holistic account of the incarnation. Although I have argued that these accounts have greater success as conceptual rather than metaphysical frameworks there are still questions to be raised around the interaction across (potentially) substantive boundaries. Where the bottom-up approach has echoes of a reduplicative strategy (although using different criteria for “sorting” properties) the top-down approach appears to provide a richer framework for examining the issue, that seems to account for the distinctiveness as well as the unity within Christ. The challenge for the top-down approach is the question of whether Christ is a “nested” holistic system within the cosmos as the sole system[[140]](#footnote-141). The reason this model is so problematic is that the existence of an independent God (appears to) require God to exist over and beyond the cosmos. Yet, the nature of the relationship between the whole and its constituents (top-down) appears to point to panentheism as a necessary “solution”. Establishing the viability of this account requires systematic engagement with the literature on panentheistic incarnation that falls outside the scope of this thesis.

# Developing a Holistic Account of the Incarnation from an application of the works of Hans Primas

From a quantum theoretical viewpoint, the structural problem around the Cartesian cut seems to be similar to that of the Heisenberg cut. If this is true, then we should not speak of an intrinsic cut between res extensa and res cogitans. Similar to the wholeness of the material world we expect a wholeness of spirit-matter. A symmetry breaking, a distinction between spirit and matter may be unavoidable but there is no reason that this cut is in any sense unique. (Primas, 1993, p. 267)

The challenge of for any investigation that seeks to (re-)examine the apparent paradoxicality of the Chalcedonian relationship is that it can seem reducible to a question of whether the Cartesian insistence on the distinction between mind and matter or body and soul is correct in a manner that isn’t representative within Chalcedon thought. The Council was not concerned with the Cartesian division of extended body and rational soul, but the renouncement of prior controversy around the identity of the incarnate Son. In his argument against a (Cartesian) dualist reading of Chalcedon, Stamps (2015) argues that any attempt at Cartesianism creates a problematic unity, not between soul and body, but soul and person:

at Chalcedon, the church reaffirmed its insistence that the Son assumed a reasonable soul […]This affirmation is significant for our purposes because the council is drawing *a distinction between the person of the Son and the soul of Christ*, the latter of which inheres in his human nature. (2015, p. 59 emphasis added)

This contrasts with the Cartesian notion that ‘a person is “pure mental substance”. Having a body might be necessary for a “worthwhile” human existence, but it is not necessary for the existence of human persons’ (Stamps, 2015, p. 58). Thus, it is useful at this point to highlight the precise distinction that “Cartesian” is being taken as synonymous with. For Stamps “Cartesian”[[141]](#footnote-142) dualism contains a commitment to belief that ‘[h]uman persons are to be identified with their souls’ (2015, p. 56). Rickabaugh in contrast argues that the core of mind-body (“Cartesian”) dualism is that the ‘human person is not identical to a physical body but consists of a physical body and a nonphysical substantial soul’ (2019, p. 217). As such, personhood *requires* a unity of the physical and non-physical. Often in neo-Cartesianism ‘the soul is reduced to the mind, where the body alone has physical properties, while the soul alone has pure mental properties’ (Rickabaugh, 2019, p. 220). In contrast, Primas argues that the cartesian division exists only for science, with reality consisting of an unbroken mind-matter unity. Thus, in this discussion of metaphysical paradoxicality the concern is less the “location” of personhood[[142]](#footnote-143) and more with the kinds of “substance” existent in the world.

## An Ontological Prelude

The ontological framework that underpins Primas’ work includes the distinction between “scientific” metaphysics and what I will term a “global metaphysics”. In *Endo- and Exo- Theories of Matter* he notes that the distinction between mind and matter for *scientific investigation* is “inevitable” and yet (as discussed in chapter 5) there is a deep commitment to a nonmaterial realm and a recognition that we must not mistake the useful Cartesian “fiction” for an ontological reality. This is highlighted in the conclusion of *Complementarity of Mind and Matter* where he argues that ‘mind and matter appear as complementary and holistically correlated aspects of the same transcendental non-Boolean reality’ (2009, p. 204). Although there appears to be a conflict in the following paragraph where he states that ‘it does not make sense to assume that the material and the mental domain are interacting, but […] it is most natural to expect that these domains are correlated’ (2009, p. 204). This appears to be limited to the specific discussion of “material” and “mental” domains as tensed and tenseless descriptions that are ‘conceptually different phenomena’ (2009, p. 175). The specificity of the lack of interaction to this case is further evidenced by his earlier claim in the *Cartesian Cut* that ‘all physical theories at our disposal are essentially incomplete […] *they are incapable to deal with the complementarity of matter and spirit’* (1993, p. 251 original emphasis).

Primas’ commitment to the immaterial “aspect” of reality clearly presents an opportunity for the theistic-realist as it avoids the challenges associated with a local materialism/physicalism about human persons. Marmodoro’s (2011) account of an “extended mind” theory of the incarnation captures the challenge that Primas’ account seems to have the potential to address: namely that the second person of the Trinity can be understood as ‘an essentially spiritual – that is non-physical – being’ (2011, p. 206). On the other hand dualism asks ‘whether and how an essentially spiritual being can constitutionally partake of the material world’ (Marmodoro, 2011, p. 206), Marmodoro argues that, although the Son cannot be wholly reduced to the physical, the Son *can* become “extended” into the world, whereby the relationship is ‘extension, instead of constitution’ (2011, p. 222). If one accepts Primas’ premise of a substantial unity, then this notion of incarnation through extension can be applied to dual-aspect metaphysics as well. In denying the *ontological* distinction of material and immaterial Primas presents an ontology in which we are asked to reconceptualise “material” and “immaterial” as categories of our own contextualisation.

The inability of science to explain the immaterial aspect of reality should not dissuade us from acknowledging it within our theology. Primas is clear that the exclusion of the immaterial from scientific discourse is a reflection of epistemology not ontology. The following sections will adopt the following ontological starting point:

Since all predictions of quantum mechanics are experimentally well corroborated, and since the counterintuitive results of quantum theory are no logical paradoxes, we take the holistic structure of the quantum world as a true feature of nature. (Primas, 2003, p. 253)

It is important to remember that unlike Esfeld’s account, for Primas, there are no foundational “parts” whose relations we are trying to understand. Instead, there is a fundamental unity – potentially only indirectly accessible to our contextually dependent decompositions of the universe(s) of discourse. In focusing on the Heisenberg cut Primas avoids the theologically important question of how to understand conscious entities in a unified reality. It will therefore be necessary to draw on the wider scholarship that seeks to provide a scientifically coherent account of a unified theological metaphysics to elucidate this point.

## Moving Towards a “Part-less” Account of the Incarnation

Any compositional model of the incarnation is, by its nature, grounded to some extent in a reductionist ontology. This can be seen by Crisp’s comment:

According to compositional Christologists […] Jesus Christ consists of God the Son and a human soul and a human body (i.e. a human nature), which together compose Christ […] there may well be other ways of carving up the number of parts in the incarnation (2011, pp. 45–46)

Such models assume, against Primas’ thinking, an ontological decomposition into parts which are discrete individuals. Even traditional panentheistic accounts such as a the emergentist analogies provided by Clayton and Peacocke are dependent upon a “nested hierarchy”: ‘parts are contained within the wholes, which themselves become parts with greater wholes, and so forth’ (Clayton, 2004a, p. 87). Thus, the question arises how one can begin to conceptualise an account of the incarnation in which only “part” of the Godhead becomes embodied in a unified world without a descent into modalism.

This section will examine one attempt at distinguishing God and creation within a panentheistic structure. It will provide a framework for examining the implications of Primas’ ontology for our theological discussion. In the following sections I examine the implications for both for “traditional” and “panentheistic” accounts of the incarnation. I argue that Primas’ account presents the theologian with the “hard” problem of holistic theology by challenging our understanding of how the “aspects” of Christ (divine and human natures) are related.

If there are genuinely *no* a priori decompositions of reality, then the “hard” problem of Christology is twofold (a) how did only “part” of the Godhead become incarnate; and (b) what enables us to support (at least) a panentheistic account of the God-world relation so that God is not wholly described by the cosmos? In what follows I will make use of Nesteruk’s (2004) account of an Eastern orthodox panentheism, in combination with Primas’ account of a timed-timeless distinction and Esfeld’s relational ontology. The aim is not to provide an account of how we may make sense of non-Boolean incarnational Christology, but to provide a theological framework for discussion of a unified ontology.

In building an Eastern orthodox account of panentheism Nesteruk draws on patristic thought to establish the distinction between God’s will and God’s substance/essence (*ousia*) as the root of created ontology. This he argues gives rise to the fact that God is present in the world ‘not ontologically […] rather relationally and personally, on the level of his loving kindness’ (Nesteruk, 2004, p. 170). This provides a distinction between (a’) *ousia* – referring to internal relations, characteristics, and metaphysics, and (b’) hypostasis – as the “external” (perhaps objective) character expressed through action (noted as freedom, movement and will). In this sense “nature” is to be understood as a guiding ([neo-]platonic[[143]](#footnote-144)) form with hypostasis acting as the illuminating factor that gives rise or sight to the nature of things. It is the hypostasis that, in Primas’ language, acts to partition the world into an appropriate universe of discourse. However, these partitions are only possible through substance existing in relation (hence the link back to Esfeld’s commitment to OSR and the [co-]priority of relations). This leads to a two-fold account of unity in the created cosmos: (a\*) all “objects” are composed of the same fundamental “stuff” (Nesteruk identifies this as objects sharing in “the same nature”) and (b\*) ‘natural existence acquires the features of existence *for someone’* (2004, p. 171 emphasis added). The idea of acquiring features for “someone” links to Primas’ claim that we have to “create” the objects (Cf. 1993, p. 254). In this sense the distinctions drawn out by Nesteruk speak to Esfeld’s top-down account by allowing for features of the whole that are only made “visible” or instantiated when there are parts existing in appropriate relationships. He goes on to argue ‘the universe as *an expressed and articulated existence* is possible only in human hypostasis; i.e., it acquires some crucial qualities of existence only when it is reflected in the personality of humanity’ (Nesteruk, 2004, p. 173 original emphasis). It is difficult to know if the “crucial qualities of existence” are due to the formation of a relation toward humanity, or if this existence is the same as Primas’ existence of objects – i.e., they are partitioned into individuality.

Finally, Nesteruk argues that although the world was created through and participates in the Logos, the Logos remains ontologically distinct from the world. This means that the link between God and the world is “nonnatural” (not ontological, physical, or biological) but *hypostatic* (relational). The link between God and world should therefore not be reduced to a question of substance/nature. Although the precise relation between creation and the Logos is left unclear, this distinction is arguably based on an assumption of a “standard” metaphysics of objects. Like Primas, Nesteruk focuses on a distinction between the temporally external nature of God and the temporally bound nature of humanity. He argues that the Logos is not bound by temporality: the Logos ‘is not involved in any chain of worldly relations and events’ (2004, p. 174) including being subject to change. There is possibly a link here to Primas’ conceptual distinction between ‘a material domain, a mental domain, and an interface between these two domains’ (Primas, 2009, p. 179). He argues ‘the very relation between the space and time of the universe and its uncreated ground is hypostatic, i.e., it exists only in the person of the Logos of God’ (2004, p. 181). Making use of Maximus the Confessor, Nesteruk brings the panentheistic distinction between God and creation in line with Primas’ distinction between the observed and observing systems.

In this sense the underlying *unity* of reality posited by Primas is joined with an OSR-type *relationality* that gives rise to the distinctions between God and creation arising from division of the cosmos into that which is temporal, and that which is unchanging. Nesteruk’s account of this with reference to the incarnation speaks almost to a reduplicative strategy, albeit one in which it is not possible for the experience of the incarnate Son to impact on God. Even in the incarnation the Logos (as divine) is not affected by the temporality of the world – ‘the Logos experiences the world as being in rest from his works just as God did from his’ (Nesteruk, 2004, p. 173).

Before examining the implications of Primas’ work in detail it is worth briefly noting the work of Peacocke and Michael Brierley. Peacocke’s *The Science of Complexity* (2014) is particularly useful because of his discussion of what he terms the *EPN* approach to panentheism (emergentist/monist-panentheistic-naturalist (2014, p. 338)) and the reconciliation of contemporary science with theology. Brierley provides a useful overview of the common threads across panentheistic approaches, but is of note here for his discussion of the relationship between panentheism and degree Christology (2004, pp. 12–15). The discussion of both authors is not intended to make a presupposition of the necessity of panentheism, but rather to address some of the Christological concerns raised by any holistic (when understood as including a level of substance or priority monism) account of the nature of reality. It also provides some useful background for §7.4 on holistic panentheism and the incarnation.

In his introduction to the edited volume *In Whom We Live and Move and Have Our Being* (2004) Peacocke states that the change in our contemporary (scientific) understanding/knowledge of the nature of the world has driven the resurgence of panentheism. This shift provides a stronger understanding of divine immanence than was initially thought possible with the rise in the scientific (mechanistic) understanding of the world. He goes on to say that this *must* be achieved without diminishing the ontological transcendence (or “otherness” of God). He notes that ‘how this is to be achieved turns crucially in the meaning to be attached to the *en* of “pan*en*theism,” the “in” of the definitions [of panentheism]’ (Peacocke, 2004, p. xix original emphasis). This in turn is often dependent on the presuppositions about the nature of the cosmos “in” God.

As noted above, Peacocke’s account of reality includes a nested hierarchy that commits him to an emergentist ontology - there is a mereological relationship between the different levels of the reality whereby ‘all properties also result, directly in isolation or indirectly in larger patterns, from the properties of microphysical entities’ (Peacocke, 2014, p. 317). It is important to note that within his monism Peacocke is committed to a physicalist metaphysics via what he terms a “layered physicalism”. At the final analysis Peacocke argues everything can be (ontologically) reduced to being formed of “matter” or “energy” (whatever that is ultimately understood by physicists as being constituted of). As already seen with Gregersen and Primas this doesn’t necessarily lead to a “classical” view of matter as discrete “bits of stuff”.

Peacocke is not proposing “local emergentism” as seen in James Franklin’s *Emergentism as an Option in the Philosophy of Religion* (2019). Such accounts hold that the universe has undergone an ontological shift from a state in which materialist atheism was true (there were only “physical” things in existence), to the current state of affairs where consciousness emerges (through chance and suitable complexity[[144]](#footnote-145)) as a new “kind” of thing. Consciousness was neither previously existent (in any part) nor an inevitability due to the way brains work. Franklin describes this as the belief that:

[M]atter contained the potentiality to produce, in one small corner of the universe, entities of a semidivine though limited nature—human consciousnesses with powers of reason and objective moral worth […] of an entirely different kind from those admitted by materialist atheism. But they exist only locally—they do not confer on the universe outside themselves any properties that it did not already have, nor do they connect with or mirror any divinity elsewhere (Franklin, 2019, p. 2)

In contrast, Peacocke is committed to the divine as a genuine (non-emergent) part of the universe, that existed prior to the cosmos, although the cosmos itself is merely physical. In this sense he can be seen to adopt a form of local physicalism but global dualism[[145]](#footnote-146). This may be an unfair characterisation of Peacocke as he also argues that the scientific account of the world points to one in which God is acting in and through (hence panentheism) the natural laws and processes, rather than standing “outside” it. Thus, panentheism should not be considered as a spatial (or substantive) metaphor, but rather one of personhood. The cosmos is not the body of God, instead God is ‘the circumambient Reality enclosing all existing entities, structures, and processes – God’s infinity comprehends and incorporates *all* […] God creates all-that-is *within* Godself’ (Peacocke, 2014, p. 331 original emphasis and capitalisation). In this sense there are correlations between Peacocke’s account and Gregersen’s claim that God makes room for the creation of both Son and cosmos. There are also correlations to Clayton’s claim that ‘the world and God are “nondual” […] there is only one substance that can be called “nature” or “God”’ (2004b, p. 252). This links to Primas’ ontological account of a foundational symmetry that is only broken by our *contextual* decomposition. It is unclear the extent to which Clayton understands panentheism merely as a useful conceptual aid (Cf. 2004a), rather than an ontological commitment that ‘God created the world as a distinct substance. It is separate from God in nature and essence’ (Clayton, 2004b, p. 251). To avoid the challenges of materialist panentheism Peacocke argues that God is a ‘pattern-forming influence’ or ‘best conceived of as something like a flow of information’ (Peacocke, 2014, p. 337). There are similarities with Gregersen’s account of the Logos as the ‘informational principle in creation’ (examined in more detail in §8.2) (Gregersen, 2014, p. 412). However, Peacocke differs from this in insisting on an “ontological divide” between Creator and creation.

The complexity and metaphysical knot-tying involved in adhering to materialist panentheism highlights why Primas’ move to a “matter-spirit” unity holds great promise. It allows us to reconceptualise how we understand the relation between God and the world (whether panentheistic or not) in a manner that moves beyond the unsatisfactory accounts associated with physicalist ontology. However, it also highlights some of the challenges of moving away from a dualistic theism in which God and Creation are separate “substances”. This challenge is concisely captured by Brierley when he discusses degree Christology as a distinctive feature of panentheism. On this model Christ (and arguably divinity in general) is different from humanity in *degree* not in kind. This is because, if the world is *in* God and Christ is *in* the world, then the relationship of Christ-world-God cannot create a dualism of substance that does not exist within the world-God relation. This can be carried through to its conclusion: if God is in the world, God is also in each created being. Therefore God “in” Christ is not a metaphysically unique event. (The issues of degree Christology will be examined further in §7.4, however it is included here to highlight the problem of creating distinctions within unity). It also brings us back full circle to the question posed at the beginning of this section: how can one begin to conceptualise/individuate an account of the incarnation in a unified world?

Primas’ exhortation that the distinctions are patterns that we make for ourselves leads back to Esfeld’s notion of families of properties that make something part of the “system”. It may well be that the conceptual distinction (or “appearance” of objects) rests in the relationship between God (incarnate) and humanity’s interaction with the person of Christ. The properties we have traditionally associated with the divine that aren’t exhibited by/in/through the majority of the cosmos, but *are* exemplified by the God incarnate and the triune Godhead forming patterns recognisable by us ‘*because* of their incorporation into the system-as-a-whole [*G*] – in fact […] the parts would not be behaving as observed if they were not parts of that particular system’ (Peacocke, 2014, p. 232). Although Peacocke is describing chemical systems, the similarity to Esfeld’s metaphysics is unavoidable. This brings me to a set of key starting premises for examining “part-less” incarnation:

1. God substantiates/causes/forms patterns in the cosmos that are detectable to us. (Found implicitly in Primas)
2. The distinction between spirit and matter exists *because of* scientific method rather than ontological need. (Found in Primas)
3. These patterns (however defined) occur only because they are part of a “system” within the fundamental holistic unity. (Found in Peacocke and Esfeld)
4. The (family) of properties that make something a part of this system do not have to be identical across the constituent “parts”. (Found in Esfeld)
5. One (of many) “cuts” that can be made across reality is the distinction between tensed/tenseless finite/infinite. (Found in Primas and Clayton)

The key factor to note is that these distinctions are *not* ontological. In investigating the impact of Primas’ metaphysical writings, I will also draw on the thinking of panentheistic scholars (who are attempting to distinguish parts in a “part-less” cosmos), and Esfeld’s concepts of “families of properties”. I will provide a framework for how/if the paradox of the incarnation can be understood within an orthodox framework and/or within a panentheistic one. These are not the only possible ways to understand Primas’ possible contribution, but as pre-existing mainstream theological positions they provide a way to work through some of the implications within the scope of this thesis. The challenges raised by Primas’ metaphysics are considerable, and yet it hints at a great opportunity to move beyond the dualisms and/or physicalism that can predominate the incarnation conversation.

## Non-Boolean Metaphysics and an Orthodox Incarnation

To describe God as ‘simple’ means that God is ontologically basic. Any attribution of ontological complexity, any postulation of distinction or division into ontological parts, is excluded by this doctrine. (Holmes, 2001, p. 139)

We have to give up on the idea that we can describe the world (including the material and mental domain) in terms of ontologically existing primary elements. (Primas, 2007, p. 8)

This section will make use of contemporary scholarship[[146]](#footnote-147) on the doctrine of divine simplicity (DDS) to examine whether it provides a model for understanding the incarnation considering non-Boolean holism. The intention is not to explicitly reframe non-Boolean incarnation in terms of DDS but to examine the correlations between the two ontologies. Does Primas’ ontology lead to a form of neo-simplicity that is consistent with a scientific theology? Or is a new model needed to navigate non-Boolean theology that preserves theism?

The opening quotes from Holmes and Primas clearly highlight the (at least superficial) similarity between non-Boolean holism and DDS. In the opening to *God Without Parts* Dolezal states that:

It is divine simplicity that enables the Christian to meaningfully confess that God is most absolute [in the Westminster confession of faith][…]adherents of this doctrine reason that if God were composed of parts in any sense he would be dependent upon those parts for his very being and thus the parts would be ontologically prior to him. (2011, pp. 1–2)

Ontological priority of the parts would prevent God from being understood as the “most absolute” or wholly self-sufficient being. Dolezal’s work is noted by both supporters and detractors[[147]](#footnote-148) as providing an invaluable overview of the contemporary conversation (both theologically and philosophically). It clearly shows a commitment to a metaphysics of individuals. Yet, as was noted in Esfeld’s account of Ontic Structural Realism, this does not necessarily require the parts to be ontologically prior to the whole. Primas goes a step further with non-Boolean ontology by arguing that our perceived “elementary” building blocks are in fact ‘not primary, but arise as secondary manifestations, for example as field excitations’ (2007, p. 8). Even at this early stage, although holism and DDS share a commitment to a “part-less” ontology (within certain parameters[[148]](#footnote-149)), it is clear there is a distinction regarding how to deal with the question (or existence of) ontological composition. For Primas there is a unified “something” that is *prior* to our decision to split matter/spirt. Ulrich Mohrhoff argues that ‘the macroworld emerges not from a quantum domain but from a single entity that transcends categorization[sic]’ (2014, p. 624). If a similar understanding is applied to Primas, then this transcendent unity *could* be conceived of as the simple God.

Before continuing further, it is important to note a crucial and not inconsequential divide between two broad branches of DDS that I shall term “Strong” and “Weak” divine simplicity or SDDS and WDDS, respectively. SDDS, adopted positively by Dolezal and challenged by R. T. Mullins, is the doctrine (traditionally understood apophatically) God is *not* ‘physically, logically, metaphysically composite' (Dolezal, 2011, p. 31). SDDS may also require adherence to what Gavin Ortlund terms the “identity account”, ‘that God’s essence is [numerically] identical with his existence and attributes’ (2014, p. 439). The breadth of negation associated with SDDS is at the heart of many of the challenges to the “traditional” version of DDS[[149]](#footnote-150). WDDS on the other hand can be viewed as divine simplicity “light”. On the most permissive version it ‘simply affirms the lack of spatial and temporal parts in God’ (Ortlund, 2014, p. 439). The distinction between SDDS and WDDS is important as it speaks to the need to understand the theological and ontological assumptions and/or commitments that underpin the specific definition of DDS and how mereology interacts with wider issues of ontology.

Dolezal’s discussion provides a detailed account of the broad DDS landscape, but he is committed to SDDS in order to ensure God’s absoluteness (see 2011, chap. 3). He is motivated to adopt SDDS based on Aquinas’ use of an identity model of SDDS. ‘Thomas insists that it is this identity [of God’s act and essence] with being that most fundamentally distinguishes God and sets him apart from all other beings’ (Dolezal, 2011, p. 103). This is picked up in Mullins’ (2013) discussion where, making use of Dolezal, he argues that (many) contemporary accounts of [S]DDS[[150]](#footnote-151) include the premise ‘there cannot be any real distinction between essence and existence in God’ (2013, p. 184). Mullins uses the medieval understanding of “real distinction” which stands in contrast to a noetic or conceptual distinction, i.e., a real distinction is a matter of ontology and not dependent upon the suppositions or perspectives of the observer/thinker. The distinction between the ontological and the conceptual appears to drive back to Primas’ distinction between our necessarily noetic decomposition of reality and the fundamental unity of what exists. When viewed alongside Holmes’ claim that Aquinas ‘insists that it is meaningful to assert that there is a foundation in God for our distinct conceptions of him, whilst insisting that *this foundation is not any real division within his essence*’ (2001, p. 143 emphasis added) the question must be asked whether a non-Boolean ontology *requires* an adherence to SDDS.

At the heart of the relationship between non-Boolean ontology and SDDS lies the query of how exactly one is to understand the strict part-less-ness that seems to be required. This premise is succinctly paraphrased from Aquinas by Hasker as ‘*God is not assembled out of parts and cannot be decomposed in to parts*’ (2016, p. 4 original emphasis). Hasker argues that commitment to the part-less-ness of God distinguishes God from all *material* beings, he claims that this part-full versus part-less distinction isn’t disputed. What he disputes are the kinds of distinctions that are (problematically) carried through under the notion of God not being a composite being ‘including distinctions which cannot at all reasonably be considered as indicating “components” of which God is assembled, or into which God can be decomposed’ (2016, p. 5). This includes the attribution of moral and/or personal attributes as “parts” of God.

Dolezal argues that a genuinely distinct multitude of attributes in the Godhead would mean that ‘those various attributes would be more basic than the Godhead itself in explaining or accounting for what God is’ (2011, p. 125). Making use of Augustine, Mullins argues that whether one states that God is wise, loving, or just, one is in fact making the same claim because they are identical in God (2013, p. 187). This move, identifying God with, for example wisdom, is one of the claims that Hasker finds “unreasonable”. Hasker argues, and I find myself in agreement, that wisdom cannot be understood as a genuine “part” of a being and certainly not one that exists prior to the being that embodies it. He justifies this on the grounds that it isn’t possible to ‘decompose a wise person and have the person and her wisdom as the dissociated elements’ (2016, p. 5) in the same way that one couldn’t separate the “roundness” from the clay. Furthermore, this rejection includes an implicit assumption that the whole is supervening on the parts. If the properties only arise within the holistic system (such as Esfeld’s top-down account) this further challenges that ontological priority.

The attribute challenge has two aspects. The first is platonic in essence and argues that one acquires a property by “participating” in it: for this to be true for God there must be something extrinsic to Godself that is being participated in. The second is the claim made by Dolezal above, that multiple attributes mean the possibility of decomposition in God. This has been addressed by Hasker when he questions whether one can and should understand attributes as genuinely separable from the entity that has them. The first can be removed by denying a participatory model of attributes – i.e., acquiring a property does not occur through participating in something *extrinsic* but is something that can be intrinsic to the entity. The additional clarification needed for DDS is whether one “acquires” or “gains” attributes through change or if these can be held by an entity simpliciter*.* A detailed discussion moves beyond the scope of this thesis, but it is noteworthy that much of the discussion around the impossibility of multiple attributes does not relate to the participatory issue but the problem of God acquiring new properties in virtue of *our engagement with* God. For example Mullins examines the idea that on some accounts temporal creatures referring to God would also require an impossible change within a simple God (2013, p. 183), due to God taking on new properties because of this changed relation. Yet Crisp (2003) argues that these extrinsic accidental properties – e.g. God is now mentioned on this page – are not real changes but “Cambridge changes”. Nothing has changed in Godself, what has changed is something in *our* relationship to God (Cf. Crisp, 2003, pp. 26–7). He uses the impossibility of such change to criticise Stump and Kretzmann’s allowance of accidental (extrinsic) properties. However, whether God “came to” hold active properties (such as being/becoming redeemer) because of our attribution, or because they became actual through the act, it would seem possible (although beyond the scope here) to argue that these could be held eternally and intrinsically by the simple Godhead[[151]](#footnote-152).

Primas allows for the existence of (a limited number) of properties that ‘exist objectively and factually […] independent of any observation’ (1983, p. 103). These properties are restricted to mass, charge and spin in quantum systems in contrast to “emergent” properties that are dependent on us ‘imposing new, contextually selected topologies upon context-independent first principles’ (Primas, 1998, p. 83). In this sense the properties we place on God are “Cambridge properties” – they depend on our contextual decomposition. Thus, whilst God may contain a “multitude” of properties they are held in unity rather than as discrete individuals. Holmes provides a further response by arguing that the (in)comprehensibility of genuine justice, wisdom, and love co-existing within a simple being is not due to paradox but simply human limitations. This should be a valid objection to simplicity as ‘the problems […] raised by the doctrine of divine simplicity are results of an improper assumption that we can understand God’s essence’ (2001, p. 141). Whether one adheres to Holmes’ ineffability argument or Hasker’s denial of attributes as genuine parts there are ways to reconcile even an SDDS account to a scientifically informed (non-Boolean) holistic incarnation. Yet the incarnation would appear to require the presence of real not simply noetic parts in Godself – how can this be accounted for?

Holmes maintains the solution to understanding the incarnation within DDS, is to examine the ontological commitments that underpin simplicity. Despite composition (and therefore *division*) being impossible for a simple being, the incarnation does not require the Son to become divided or separated from the Godhead (indeed such a notion would be problematic from the perspective of salvation). Instead what is required in the incarnation is that the Son is able to become *distinct* from the Father – ‘distinction, however, is said to be different from division’ (Holmes, 2001, p. 146). The correlation here to Primas’ ontology, is the distinction between globally non-Boolean and locally Boolean descriptions of reality. One could argue that Holmes’ “distinction” could be analogous to each ‘description of a holistic universe of discourse requir[ing] *a partition adapted to a particular context*’ (Primas, 2007, p. 27). Such “distinctions” are valid if one does not make the mistake of assuming them to consist of *a priori* divisions within the holistic unity. This appears to be compatible with Primas’ (limited) discussion of properties within a holistic ontology.

Ortlund argues for a “traditional” position that is much more like Hasker’s. On this model attributes are neither “parts” of God, nor are they a part of the divine nature or essence. Gregory of Nazianzus didn’t expand on simplicity except to insist that God was non-composite, and John of Damascus only required simplicity to exclude spatial composition (Ortlund, 2014, p. 440). These accounts of simplicity all fall well within the scope of Primas’ ontology: when he states he is going to ‘restrict the discussion to purely material systems’ (1994a, p. 164), he also refers to quantum endophysics as ‘the *study of the Platonic heaven*, the realm of non-spatial, non-mental, timeless, but nevertheless real entities’ (1994a, p. 166). Within the nonmaterial realm he includes:

[The] experiential world of perceptions, all kinds of subjective consciousness, subconscious or unconscious experience, explicit and tacit knowledge […] “mind” operates as a principle beyond individual consciousness and is not restricted to the “human mind” (Primas, 2003, p. 92).

As noted, although Primas doesn’t account for how this broader consciousness is to be reconciled within a holistic unity, the wider nonmaterial realm appears to be able to “contain” something like God.

Thus, it appears that a non-Boolean holism is entirely compatible with DDS, particularly if one adopts a “weak” or limited view. What the synthesis between DDS and non-Boolean holism doesn’t immediately address is the question of the incarnational “paradox”. However, supporters of DDS argue simplicity does not necessarily exclude the possibility of incarnation, if one correctly understands the ontology that is assumed (Cf. Holmes, 2001, pp. 144–147). Although it doesn’t provide an account of how human nature and simple divine nature can be united, this isn’t surprising due to the epistemic and ontic gap between creation and God. ‘[A]ll the problems, I think – raised by the doctrine of divine simplicity are results of an improper assumption that we can understand God’s essence’ (Holmes, 2001, p. 141). Non-Boolean holism adds to the simplicity discussion in a manner not explicit in other discussions precisely *because* it is addressing the underlying ontology as Holmes notes (in relation to Turretin’s account of simplicity):

‘He saw no problem at all with one person of a simple God becoming incarnate […] the account of God’s being that lies behind his invocations of simplicity must be straightforwardly compatible with the incarnation […] without supposing he was totally blind to the most basic philosophical contradictions in his theology (Holmes, 2001, p. 146)

Further, the contextual ascription of properties/distinction to God via Primas’ ontology can be argued to be in line with Holmes’ argument that Aquinas asserts ‘there is a foundation in God *for our distinct conceptions of him*, whilst insisting that this foundation *is not any real division within his essence’* (Holmes, 2001, p. 143 emphasis added). Although Primas doesn’t provide an account of how we are to understand the specifics of the united *spirit-matter*, the nature of his account of reality (lacking individuals and substance distinctions) removes the necessity for an ontologically simple being to be united with something that is wholly other (composite, physical). The “simplicity” of Primas’ holism speaks to DDS in a manner that isn’t seen within Esfeld’s account (although the relational metaphysics of SOSR may appeal to those trying to maintain a pan(en)theistic account). In this sense Primas’ ontology doesn’t provide solutions to the *how* of the hypostatic union, or indeed answers as to whether one must adopt a degree Christology (something discussed further in the following section regarding panentheism). However just as Holmes notes that “relational” and “personal” ontologies provide spaces in which DDS is less problematic, Primas’ ontology provides a new space in which we are invited to consider what is meant by simplicity in a way that is compatible with contemporary science. It may be that further examination reveals that that Primas’ tensed/timeless distinction (not division) within scientific use of non-Boolean holism is also a valuable (conceptual not ontological) distinction for the theologian. However, investigation of this issue lies outside the scope of this thesis.

## Non-Boolean Metaphysics and a Pan(en)theistic Incarnation

The previous section examined the potential of non-Boolean holism to provide support to the Divine Simplicity account. In this section the implications of taking undivided unity beyond the Godhead to reality in its entirety will be examined to see if panentheism provides a more persuasive account of the incarnation within a non-Boolean ontology. Alongside this will be a brief exploration of degree Christology. If there is no longer an ontological distinction between the divine and humanity is degree Christology required[[152]](#footnote-153)?

To begin this discussion, it is worth returning to Gregersen’s work on “information” as reality related to Christology. In *God, Matter, and Information* (2014) he states ‘I assume that information, taken in a general sense, has to do with the *generation and proliferation of differences*’ (2014, p. 419 emphasis added). In this sense God “as information” is understood as the organising force underpinning reality. Information isn’t to be understood in a univocal sense, rather information performs different “roles”. Of interest to this discussion is Gregersen’s account of “shaping information”. Broadly construed, shaping information is the internal or extrinsic “forces” that provide ‘the form or pattern of existing things’ (Gregersen, 2014, p. 421). This information is both pervasive and deeply contextual within the observed world: for example, in whether the snail and its shell are one shape or two in composite. Gregersen creates a further distinction within this category between “cutting” and “channelling” shaping information. He describes cutting information as ‘the mere production of differences’ in contrast to channelling information which denotes the ‘larger-scale, semi-stable or resilient structures’ found across the classical sciences (Gregersen, 2014, p. 422). This distinction is arguably paralleled in the distinction between *our* contextual decomposition and the fundamental *structure* within the unity. Although Primas explicitly argues that reality is “unbroken”, I don’t see a reason for this to exclude the possibility of an intrinsic organising structure. Aligned with Primas, Gregersen describes the division made by “counting information” as something that comes through (in Primas’ terms) the partitioning of the universe of discourse by ‘biological agents [that] take interest in their own future’ (Gregersen, 2014, p. 423). The “counting” *processes* the shaping information in a manner that echoes Orland’s discussion of counting and simplicity when he argues that the reason 1 + 1 + 1 ≠3 in the Trinity for classical theologians (such as Aquinas, Boethius and Basil the Great) is because ‘the sum total of the equation is "not composed of parts”’ (Ortlund, 2014, p. 448). Thus, for Gregersen as for Primas the “meaning” only arises during *our* contextualisation.

What then does this “counting” and “informational” view of reality mean for our understanding of the nature of the incarnation? Gregersen’s commitment to Logos Christology means that he sees Logos as the divine “blueprint”[[153]](#footnote-154) for the emergence of discrete forms within creation – the active “force” which shapes the underlying structures of the universe. In this he also draws on stoic understanding of the universe as a unified energy-matter field in which the role of the Logos is to explain how a unified structure can be differentiated (echoing back to Holmes’ comment that distinction is different to division). Whilst this has echoes of a Thomistic account of God’s continuing role in creation, it is problematic for Primas’ ontology, because for Primas the “channelling” is not ontological. If the Logos is drawing out/creating the forms then there is an implication that this action occurs at a foundational or ontological level and that there is an ‘*a priori* fixed decomposition of the universe of discourse’ (Primas, 2007, p. 17). However if one focuses on Gregersen’s (2020) third definition of sarx, as the realm of materiality, and this is understood in a non-Boolean sense, then, the incarnation or embodiment of the second person of the trinity could be understood as a God’s “coming into” temporality without requiring a substance change.

This kind of developmental change *within* God rather than *to* God in the incarnation can also be introduced within a process-type account of God such as the one adopted by Bracken (see 2004, 2005, 2015, 2016). Bracken’s field-related panentheistic ontology is a useful account[[154]](#footnote-155) to provide a grounding of how non-Boolean holism may facilitate a panentheistic account of the incarnation (in the same way the DDS account framed the holistic orthodox interpretation). Bracken’s work sits within process theology thought and thus maintains that the incarnation should not be understood as a primarily temporally bound one-off event. Rather it is ‘the pivotal moment in an ongoing process of divine self-communication to the world of creation that began with the Big Bang’ (2016, p. 34). However, it is his discussion of the ‘natural and supernatural at work in Jesus’ (Bracken, 2016, pp. 34–37) that is of assistance in understanding how holism may contribute to a panentheistic account of the incarnation and it is to this that I shall now turn.

Bracken opens his discussion of the two natures in Christ by highlighting the distinction between, on the one hand, the “mixing” of natures within a chemical reaction (e.g., the formation of water) where the natures ‘are incorporated into the nature or principle of operation of the new higher-order reality’ (2016, p. 35) and, on the other, the unity of natures in Christ where the distinction between human and divine remains explicit. It is possible to argue that this is a forced distinction which need not exist if one understands the properties in line with the top-down account discussed in chapter 6. The new properties are not formed by a “mingling” of the natures of the constituents but are held *in light of* the relationship of the parts because they are in a larger whole. For Bracken, the adoption of systems approach to the incarnation should overcome the challenge of composition without the loss of distinction. Whilst he uses language very similar to Esfeld’s account I maintain that Bracken’s account[[155]](#footnote-156) is more closely aligned to Primas’ ontology.

For Bracken, the solution to understanding the “nature” challenge raised by Aristotelian metaphysics is to move to a language of processes or systems (over natures) where the capacity for change is intrinsic to the system. The further advantage is that (as with the multiple [sub-]systems involved in the human body) the systems ‘do not lose their identity or distinctive[ness] […] as a result of being united in a higher-order process’ (Bracken, 2016, p. 35). One way of understanding how ‘systems’ can be combined and yet remain distinguishable in the incarnation can be found within Primas’ account of non- and partially-Boolean descriptions. Within a theistic account of the incarnation the “systems” of human and divine are understood implicitly as existing in separate substance categories (hence the claim of paradoxicality). Yet within a panentheistic account this distinction does not manifest in the same way. One can argue that for a panentheistic account the divine and human are *complementary* – they do not exist in different “categories” but within ‘holistic situations where Boolean fragmentation into parts is not possible’ (Primas, 2007, p. 15).

Although it may be tempting to understand Bracken’s approach as akin to Esfeld’s “families” of holistic properties, the focus on maintaining “local” identity for the sub-systems within the whole aligns more closely to Primas’ families of complementary descriptions. Families of complementary descriptions refer to that fact that once a single pair of complementary descriptions are allowed ‘then there usually exists a whole family of different mutually incompatible pairs’ (Primas, 2007, p. 20). Although they may be “incompatible”, the criteria for each family (or set) need not exclude *all* criteria from each of the other families. This means that even if locally “pairs” exhibit Boolean incompatibility, through creating overlapping families at the points of commonality it is possible to create a “partially Boolean” description (as I noted in the discussion of Primas’ example of the maps in chapter 5). Bracken provides the following systems-based account of the incarnation:

Jesus as God incarnate is a higher-order process or system with divinity (the divine life system) and humanity (the human life system) as its subprocesses or subsystems […] Jesus is […] a divine person functioning equally well in two life systems: one proper to his role within the divine community […] and the other proper to his role within the human community […] everything that Jesus feels, thinks, says and does is simultaneously the effect of his humanity and divinity working together (2016, p. 35)

The first, although minor, challenge with Bracken’s account is that is does not allow for the kind of unified holism required by Primas, as it proposes two exclusive “systems”. Secondly there is a genuine risk in this model, (which I started to address in my response to Esfeld), that it makes divinity a “subsystem” of the person of Christ. Christ is the “higher order” system in which divinity and humanity are nested or reside. Just as establishing the “correct” system for top-down and bottom-up accounts mattered in Boolean holism, so too this account requires the correct structuring of the “Boolean atlas” to provide the appropriate information for a globally non-Boolean account (Primas, 2003, p. 22).

If one considers the locally Boolean (either/or) sets of: ABset1, BCset2, and CAset3, then it is also true to say that there is a set4 that contains ABC. Within set4 the conditions or requirements for being part of set1-3 are all compatible. In this example all the elements of the three sets belong to a shared “subset” making this a coherent Boolean manifold. This “atlas” contains ‘all the relevant information of a non-Boolean description’ (Primas, 2003, p. 22). Whilst the overlapping sections or “charts” must be compatible there does not need to be and, (according to Primas) won’t be, compatibility across *all* sets. For example, the “atlas” of Boolean sets: JKset5, KLset6, LJset7 and NMset8 is partially Boolean because every pair doesn’t belong to the same overlapping subset. And therefore, some properties may only be held by some of the elements in a set/the atlas[[156]](#footnote-157).

In applying Bracken’s structure to Primas’ ontology, it is first necessary to recognise that partitions or subsystems we create are (a’) contextually chosen, (b’) not formed from “individuals” or the pre-existing discrete parts of individuals, and (c’) could be re-decomposed in parts that are equally or even more (in)compatible. The “whole”, or higher order system, is a ‘holistic unity’ (Primas, 2003, p. 27). This means it must be ontologically prior to the existence of Jesus. On a panentheistic account this whole needs to be Bracken’s “divine life system”. Yet on this model it seems as if humanity and divinity are *subsets* of the whole. The problem is this: if Christ was fully divine, not just partially divine or incarnating only an aspect of divinity, then divinity must be greater than Christ. The implication is that the “divine life system” is either the entirety of the Godhead in which case it can’t be a subsystem, or that a part of Christ is exclusively divine and a part exclusively human. The language used by Bracken implies that these “life systems” are entirely separate. The exception is when Bracken talks about Jesus “functioning equally well” in the two systems, where it sounds more performative or “appearing like God/human” rather than *being*. Even conceiving the systems in relation to Boolean sets doesn’t seem to resolve this model into clarity. The subset (or subsystem) comes from the identification of the points of correlation between the higher or primary sets (in the same way the intersections are formed in a Venn diagram). One does not start with the intersection and build out to two or three overlapping circles, but rather one starts with the circles and establishes their point of intersection. Therefore, to say that Christ is formed through or contains two subsystems (one of which is divinity) is to make the divinity in Jesus dependent upon Jesus’ existence. If divinity is a subset of the “contextual” constituents of Christ, then it appears that there must be a larger “set” that includes Christ in his entirety and the rest of the Godhead. Ignoring for a moment the panentheistic commitment to God as (including but more than) the cosmos, although it is possible to conceive of the second person of the Trinity as a “subset” of the Trinity it seems counterintuitive to include divinity as a subset of *that* subset.

The third challenge with Bracken’s “life system” analogy is the language used – Christ is “functioning equally well”. This implies not a mode of being but a way of *engaging with*, in the same way one might say “Nadia functioned equally well within her community of medical colleagues and her community of amateur dramatists”. This is participatory language that implies the thing one is engaging with is both bigger than and existent despite/external to the being participating. However, this is where Primas’ language and focus becomes helpful. The holistic unity is the panentheistic God, greater than, but inclusive of the cosmos. Divinity and humanity can be understood as partially Boolean sets, the exact disjunct between how much lies in the overlap and how much isn’t common across the two is dependent upon one’s own theology and isn’t fundamental to the continuation of this discussion. The crucial element added by Primas’ ontology is that the partition into these sets is *contextual* not ontological. There is no *a priori* divide between humanity and divinity within this framework[[157]](#footnote-158). A possible division can be based in temporality but even then, this is not *a priori*. Divinity and humanity can be understood as existing in or being describable in terms of mutually incompatible pairs of descriptions. One can build a partially Boolean description of Christ by focusing on the areas of complementarity between HN and DS while also recognising those aspects that are not shared across the two sets. We can “paste together” (to use Primas’ phrase) these groups of complementary descriptions to build a non-Boolean global picture and it is only when viewed at the global level (in this instance considering the unity of Christ) the incompatibilities or paradoxes arise. In the same way different map projections make sense “locally” but appear contradictory if one tries to use them all at the same time (and for the same purpose). As Seager notes in his discussion of Primas, ‘the system [combination] of all such patterns [systems] is not coherent; the world *cannot be regarded as the sum of patterns into an overarching world* in which they all appear’ (Seager, 2016, p. 80 emphasis added). This is further emphasised by Primas himself when he clarifies that emergent properties or “hidden structures” within a ‘contextual ontology does not refer to an independent reality […] such hidden structures become manifest only by choosing a topology capable to distinguish the relevant and irrelevant features’ (Primas, 1998, pp. 96–97).

This glimpse into Primas’ wider ontology provides an interesting space for the theologian, especially when viewed alongside Saeger’s commentary on matter. As complementary attributes of reality matter and spirit are not reducible to each other nor are they reducible to another, third kind of fundamental attribute. Rather they must be understood as ‘co-fundamental’ (Seager, 2016, p. 89) – potentially in a similar manner to Esfeld’s mutual ontological dependence between relations and relata. They are shared (non-Boolean) attributes of ‘some single underlying substance which is itself un-representable’ (Seager, 2016, p. 89). In *Non-Boolean Descriptions* Primas argues that the tenseless domain (which can be understood as describing subject independent reality) more closely resembles the Platonic realm of forms than the world of physics. Seager argues this claim is “perplexing” as the implication that matter and spirit are derived from/arise out of a ‘domain beyond or below’ (Seager, 2016, p. 89) the “material” world implies that matter and spirit aren’t *foundational*. From a theological rather than purely philosophical account however this lack of “foundation” is far less problematic. Just as Gregersen speaks of Logos as organising information, in a panentheistic account the “beyond” provides us with the necessary distinction that allows God to be more than the cosmos[[158]](#footnote-159). Primas’ exhibits a firm commitment to a form of neutral/dual-aspect monism as part of his holism. If God is understood as the underlying foundational unity from which the spirit-matter of our experienced (“physical”) cosmos arises, this does not remove the “foundational” nature of the two (in-unity) in the construction of the created world.

Spirit-matter as a co-foundational source of reality provides a clear response to the challenge of metaphysical paradox within the incarnation, as well as supporting our understanding of the way in which God can be conceived of more than the cosmos within a holistic ontology. Within this framework the “parts” of spirit and matter are distinguished only by us, and thus there is no change of substance during the process of the incarnation. The pre-existent distinction between the unity of the divine “realm” and the emergence of the cosmos allows for the possibility of an incarnational model to be about something more significant than Macquarrie’s “staged” degree Christology whereby:

Jesus was probably regarded as a prophet […] At some point, this prophet came to be accepted as messiah. As yet, he remained purely human figure […] he had had such a profound effect on people’s understanding of God that more and more there was a pressure to identify him with God […] the man Jesus was adopted or raised up to be Son of God […] So adoptionism leads into a full doctrine of incarnation (Macquarrie, 1984, pp. 232–233)

The avoidance of degree Christology within panentheism stems from the fact that God is not exhaustively contained within the cosmos. This means that there can be something (other) that becomes incarnate/the Son is incarnated into. If, as seems the case, the ontological model includes a pre-foundational immaterial “something” (that could be understood as God), and the cosmos is formed of an immaterial-material unity, many of the metaphysical “paradoxes” associated with the incarnation are reduced to epistemic paradoxes based in our inability to comprehend the non-Boolean atlas in its entirety. The challenge remains how a being that is wholly transcendent can become immanently located within the historical person of Christ. The move “to” temporality is not an issue due to Primas’ recognition of temporality being a feature of our subjective experience (exo-physics) rather than the world as it is (endo-physics). Yet, there is still the question of the locality of the second person of the Trinity *within* a single human during the incarnation. Without wishing to capitulate to a “fig-leaf” mystery, the purpose of this thesis is not to try and unpack the mechanism of the incarnation but explicate how it may be possible to remove the charge of paradoxicality. I maintain that Primas’ ontology can do the former despite leaving the mechanism to be trusted to faith.

## Conclusion

Primas’ part-less (non-Boolean) ontology has been examined in relation to two existing approaches to the incarnation. Whilst neither account (DDS or panentheism) is new, the novelty rests in the engagement with Primas’ scientifically derived ontology and its application to a “scientific theology”. As noted earlier, I do not think that these are the only avenues for the application of Primas’ work to our theological discussion, but they both provide coherent models for how metaphysical paradox may be overcome.

Primas, more so than Esfeld, requires us to radically reconsider our understanding of the nature of reality – to look beyond our self-created partitions of reality and consider how we might understand a unified cosmos. In many ways this work has a long history within theological discussion of the doctrine of divine simplicity; but if “simplicity” is not just only a theological commitment but an ontological one, then the issues raised by critics of DDS regarding change and individuation need to be revisited. Primas’ holism provides opportunity to do just this, especially if one also incorporates the OSR call to move away from a commitment to individuals and place relationality at the heart of ontology. There are hints of how this may be achieved through building overlapping Boolean charts to create a Boolean atlas, but we need to be aware of the hazard of assuming that it is humanly possible to create an exhaustive atlas as a human enterprise.

There is more work to be done, however the strength of a non-Boolean holism lies in its flexibility to prompt discussions across the theism-panentheism spectrum and challenge us to consider how “information” and the “platonic heaven” may be useful frameworks for understanding the Triune Godhead as well as the complexities of the incarnation. The great strength of Primas’ work for the theologian is his commitment to questioning our metaphysical assumptions regarding exo-physics, whilst recognising the continuing success of Boolean methodologies for the progress of modern science. It is this combination of recognising the potential inaccessibility of the world “as it is” alongside a search for an ontology that points towards that inaccessibility that makes Primas’ ontological scheme so valuable for our theological discussion. As Seager concludes:

Scientific thinkers such as Primas who marry technical sophistication, deep scientific knowledge and openness to metaphysical speculation are vital warriors helping to keep alive rich and open avenues of thought (Seager, 2016, p. 90).

# Conclusion: A “Holistic” Response to the Challenge of Paradox

In the view of deep incarnation, the divine self-embodiment in Jesus the Christ is a process that takes up a particular time and a particular space […] Yet the identity of Christ – both divine and human – cannot be restricted to the categories of time and space (Gregersen, 2020, p. 280)

The aim of this thesis was to challenge the paradox narrative around the incarnation. It should now be clear that I hold the paradoxicality stems from a commitment, both epistemic and ontological, to a Boolean partition of the world into discrete categories. This thesis has not and was never intended to remove the theological mystery around the nature or mechanism of the incarnation. However, it has hopefully removed the legitimacy of the claim that the incarnation is irreconcilably metaphysically paradoxical and “unreasonable” in a scientific age. Whilst the process has raised several “new” questions (some of which are addressed below), it has shown that a rigorous reassessment of our metaphysical presuppositions can enable us to affirm: ‘The Word became flesh and made his dwelling among us. We have seen his glory, the glory of the one and only Son, who came from the Father, full of grace and truth’ (John 1:14 NIV) without paradox.

## Summary of the Response to the Thesis

In chapter one I set out the following thesis:

*One of the foundations for the claim of metaphysical incarnational paradox rests in adherence to an ontological commitment (at some level) to a duality of spirit and matter and its incompatibility with scientific metaphysics. Some contemporary (quantum holistic) interpretations of scientific metaphysics challenge the assumption of a fundamental ontological division of reality. Recognition of a scientifically valid unified ontology provides the grounds to positively reconceptualise our understanding of the kinds of “natures” or substances involved in the incarnation.* *The hypothesis is that reconceptualization of the “parts” involved in the incarnation will reduce/remove the appearance of metaphysical paradox.*

Through an examination of the relationship between paradox and mystery in chapter three I established that the theological use of the two terms is often muddled, and mystery can be adopted to avoid the need for further clarity or investigation. To progress the discussion beyond more than a fool’s errand of trying to establish an agreed definition of paradox I made use of dictionary definitions that highlighted (a) that paradox only required the appearance of contradiction and (b) that paradox could be understood as a conflict between the state of affairs and the accepted scientific account of the world. This provided a strong framework to establish the relationship between theological beliefs about the incarnation and metaphysical assumptions about the fundamental nature of reality. Whilst the reduplicative strategy is viewed as a traditional solution to overcoming the appearance of contradiction in Christ’s attributes, I argued that this either led to minimising the claim of paradox to a mere verbal puzzle or failed to overcome the metaphysical paradox through a reductionist approach.

I established my own fourfold categorisation of the relationship between the appearance of contradiction, paradox, and mystery in the incarnation. I examined several existing responses and established that usually the arrival at paradox was due to the limitations of our linguistic categories and/or metaphysical assumptions about the nature of God or reality. Believing that much of the problematic metaphysics resulted from a misapprehension around the ontology suggested by contemporary science, alongside an often-implicit adoption of substance dualism. In chapter four I set out the shift in scientific metaphysics that has taken place since the discovery of quantum theory. I examined how both classical and holistic metaphysics interacted with issues of theology and this chapter acted as a bridge between the theological positioning of chapter three and the detailed examination of Michael Esfeld’s and Hans Primas’ holistic ontologies from chapter five onwards.

Esfeld offers an account of holism in which the relations and the objects that stand in them are ontologically interdependent and share the same priority. This ontic structural realism (OSR) provided a novel framework to examine a holistic account of the incarnation which still allowed for parts. Esfeld’s top-down and bottom-up accounts of the relationship between properties of the parts and properties of the holistic “sum” provides an interesting conceptual framework that could support the (re-)development of compositional accounts of the incarnation. It is in his under-developed metaphysics of relations (or a version of strong ontic structural realism - SOSR) that I argued there is most potential for a rich interaction with incarnational theology. However, this is an area that needs further research. The biggest barrier to removing paradox via Boolean holism, as it currently stands, is that via omission it is a physicalist enterprise. Esfeld has ‘no intention to apply this reductionism to the mind, consciousness and normativity’ (Esfeld and Deckert, 2020, p. 8). As such, it is currently unclear whether it can progress the conversation regarding the metaphysical paradox of the incarnation any further than the Christian materialist. Nevertheless, whilst it disappoints metaphysically, it does appear to be able to at least reduce, and possibly remove, the linguistic and epistemic paradoxes associated with the incarnation through its conceptual framework.

Finally, in chapter seven I examined Primas’ radically holistic ontology. I made use of the Doctrine of Divine Simplicity and Panentheism as existing accounts that require fundamental simplicity/unity to provide a framework to examine the theological implications of Primas’ non-Boolean holism. I argued that the unity of spirit-matter and capacity for *distinction* not *division* meant that non-Boolean holism is compatible with a model of divine simplicity. The capacity for distinction, when combined with Primas’ families of properties or Boolean atlases means that it is possible to admit both weak simplicity and the incarnation within his ontology. Within a panentheistic framework the spirit-matter unity provides a clear response to the metaphysical paradox although it raises questions about the ontological priority of the creator. In both instances the metaphysical paradox of a change of substance is overcome due to his commitment to what he terms a dual-aspect monism.

The next two sections of this chapter will examine the opportunities and challenges posed in adopting a holistic ontology and whether either account fully meets the challenge of responding to the claim that to join ‘the transcendent, infinite, foundational reality of God and the limited reality of a historical human being – in a ‘mode of union’ which constitutes his [the Son of God’s] present personal reality is to say that he is a living paradox’ (Daley, 2004, p. 195).

## The “Promise” of a Holistic Incarnation

The previous section recaptured the argument that has been set out so far. In this section I will propose how holistic ontology may provide a new way to conceptualise the incarnation. The aim is not to discuss the mechanism of the incarnation but to examine the theological “reasonableness” that Christ was coherently fully human and fully divine. To do so I will draw on the frameworks developed in response to both Primas and Esfeld’s accounts of ontological holism (chapters 6 and 7), in addition to Gregersen’s work on deep incarnation (2020), and the work of Marmodoro and Hill on the metaphysics of compositional models of the incarnation (2008, 2010).

Fundamentally the charge of paradox is laid upon the incarnation because of the claim that:

[T]he eternal Son of God through Jesus the Christ came to embody the world of material flesh shared by human and other biological creatures, and did so in a personally penetrating manner (Gregersen, 2020, p. 253)

Setting aside, for now, the matter of divinity becoming incarnate and the ‘messy and complicated process […] involved in [i]ncarnation’ (Rogers, 2010, p. 95). As established in chapter 3, the challenge arises either because one is a materialist about human persons and therefore requires something immaterial to (at least partially) change substance; or if adhering to a version of substance dualism, one has to reconcile how the immaterial (divine) mind can meaningfully interact with a physical body and the wider world. Without wishing to remove the theological mystery of how the incarnation took place, it seems that to avoid the charge of metaphysical paradoxicality it is necessary to radically overhaul the metaphysical assumptions that mean we arrive at paradox. As set out in this thesis some contemporary scientific accounts point towards an ontology that is fundamentally holistic. However, in their current formulations both Esfeld’s relational holism and Primas’ primal unity fail to fully address the challenges of the incarnation. This is hardly surprising as they were formulated to account for scientific not theological matters; but they still offer conceptual and ontological promise for the theologian. What follows is not intended to be a definitive proof but a considered and critical account of how a scientifically informed holistic theology may fruitfully inform our understanding of the incarnation. Rather like McGrath’s *Scientific Theology*, this is ‘not intended to offer some definitive statements [..] but to offer some suggestions which will stimulate discussion, even if they do not command assent’ (2001, p. 3).

Gregersen identifies five ways in which we can understand Jesus embodying the world of flesh (2020, 2022). Of these the most pertinent to our discussion is what he identifies as *sarx*meaning3 ‘the realm of materiality in its most general extension, without any prior evaluation’ (2020, p. 256). In addition, he establishes two definitions of cosmos in John’s Gospel. Of interest here is ‘Cosmosmeaning1 [which]refers to God’s own creation (like *sarx*meaning1&3) as we have it in John 3,16: “God so loved the world”’ (2020, p. 258). He goes on to argue that Chalcedon raises many questions. Of note is the fact that it does not ‘specify the characteristics of the “divine nature” respectively the “human nature”, and it does not tell us anything about their interrelation in the concrete person of Christ’ (2020, p. 275). Gregersen’s *Deep Incarnation and Chalcedon* provides a systematic overview of how this relationship has been understood. From this it is worth drawing out some historical interpretations that may be re-imagined through a holistic ontology:

1. Athanasius argued that ‘the particular human body of Jesus needed to be neither separated from other human bodies, nor from the materiality of the cosmos at large’ (2020, p. 260).
2. The stoics provided an ontology whereby there was ‘a co-extensive inherence of two elements within a general metaphysical scheme […] the idea of mutual co-inherence is central’ (Gregersen, 2020, pp. 265–266).
3. Gregory of Nyssa’s understanding of the infiniteness of God provides several points for consideration: as infinite reality God ‘must be equally close to the material as God is to the spiritual world’ (2020, p. 270) and this allows us to understand the “logic” of the incarnation as infinite unity means that there is no greater distance between God and the material than between God and the immaterial.
4. Finally, drawing on Schleiermacher, Gregersen notes that ‘[s]ubsuming divinity and humanity under the same umbrella […] [implies] that the two natures meet one another at the same level, while tacitly presupposing a predefined contrast between divinity and humanity’ (2020, p. 276).

These claims can find consonance across the holistic interpretations examined in this thesis. I recognise that wider theological issues may be raised by these interpretations/commitments, and these will be touched on in the following analysis:

1. Non-Boolean holism posits that there is a fundamental unity within the cosmos (the *unus mundus*) which cannot be ontologically distinguished in the discrete categories of spirt and matter (to use Primas’ terminology). Thus, the distinction of Christ from the universe and other entities may be viewed as a contextually chosen decomposition, not a “brute fact” about the ‘separability of nature’ (Primas, 2007, p. 27).
2. Following Pauli, Primas argues that the mental and material domain are ‘complementary aspects of the same reality’ (Primas, 2003, p. 90). Less explicitly Esfeld and Deckert recognise that a radically reductionist worldview cannot include the immaterial (Cf. 2020, p. 8), and in SOSR the co-inherence may be understood as an aspect of the underlying “structure” of reality.
3. As with DI1’ this can be understood in the context of the fundamental unity of reality, whereby the distinction between humans and angels is not ontological but dependent upon the chosen partition. Likewise, if a fully relational ontology is adopted (not Esfeld’s MOSR) this may provide room to consider the ontological interrelatedness of the cosmos.
4. Schleiermacher’s commitment has its closest reflection in Esfeld and Lam’s mutual ontological dependence between relations and their relata (Cf. Esfeld and Lam, 2011, p. 4).

Ironically despite the compositional account being inherently reductionistic, the best way to examine the potential shift provided by holistic ontology is to establish how it may overcome some of the compositional problems. The biggest barrier, at this stage to a full account of holistic incarnation is the lack of information from both Esfeld and Primas on how they understand the nature and/or place of conscious beings within their ontology. Yet despite this there is much to gain from reviewing Marmodoro and Hill’s work on the compositional accounts of the incarnation considering components from both holistic accounts.

I will begin in reverse chronological order with *Compositional Models of the Incarnation* (2010). The presuppositions within the article highlight how the implicit metaphysical assumptions give rise to the appearance of paradox. They identify that there is a particular challenge posed by three-part models of the incarnation (Christ is composed of a human mind as well as a divine mind and human body). This is because since the “parts” of Christ excluding the divine mind would usually be considered a person, the question arises, how do we understand the relationship of two minds in Christ? This is known as the homunculus problem. I posit that the “problem” for these accounts exists prior to this, in the assumption of an ontological divide between the material and immaterial. As they note in their opening, the weakness of the two-part compositional models ‘is that they presuppose mind-body substance dualism’ (2010, p. 470). The reason for this assumption is that the Son was pre-existent to Christ (the incarnate Son) and therefore must be able to exist independently of the human body. It is unclear however why Primas’ dual-aspect monism couldn’t just as easily provide the starting ontology for the discussion. This is especially so if one conceives of this single reality in line with Mohrhoff’s transcendental reality which enables the transition ‘from unity to multiplicity’ (2014, p. 642), and Gregersen’s account of God as ‘present in the midst of the world of nature as the informational principle’ (Gregersen, 2014, p. 412). Indeed, one could follow this line further and argue that if, (as was seen in SOSR), relationality is ontologically prior to the things that stand in those relations, then the divine could be understood as the foundational structure. Thus, even at this stage the move away from a presumed dualism to a holistic ontology starts to remove the paradoxicality.

The real challenge provided by these three-part compositional accounts rests in the hierarchical or relational account of the interaction between the divine mind and a human mind and body ‘compound’ (Marmodoro and Hill, 2010, p. 479). The problem posed by this account is how one is to understand the relationship between the divine and human minds. For there to be “intellectual harmony” in the person of Christ it is necessary for there to be co-ordination, co-action, or control between the two minds. I argue that the problem is caused by the assumption of the need for ontological priority between the two minds. If one accepts Esfeld’s account of mutual ontological dependence that:

[O]bjects and relations imply each other: objects can neither exist nor be conceived without relations that hold between them, and relations can neither exist in the physical world nor be conceived as the structure of the physical world without objects that bear the relations (a concise statement of Esfeld’s position in Mohrhoff, 2014, p. 671).

Then the same mutual interdependence could be understood such that *in the person of Christ*:

1. The human nature (in Christ) and the incarnate divine substance imply each other: the human nature (in Christ) can neither exist nor be conceived without the incarnate divine substance that joins them, and the incarnate divine substance can neither exist in the physical world nor be conceived as the [informative principle?[[159]](#footnote-160)] of the physical world without the human nature (in Christ) that bears the incarnation.

Holding this in mind I will now turn to Marmodoro and Hill’s (2008) discussion of identity and compositional models of the incarnation. For both groups of models there is a productive interaction to be had with holistic ontologies. In line with their approach, I will first address the question of “Identity” models of the incarnation, and then “Relational” models.

‘Identity models of the incarnation hold that there is a single property-bearer in Christ. This single property bearer bears all of the properties that Christ has [human and divine]’ (Marmodoro and Hill, 2008, p. 105). In talking of Christ as a single property-bearer there is a tangential question of whether this “single” bearer could be conceived as a single holistic system. However, this moves off course for the focus here and is potentially repetitive of the discussion in chapter 6. Therefore, for the purpose of this discussion the property-bearer will be considered as an “individual entity” understood in the classical sense. Identity models assume there are sets of properties that may be considered human (H1-Hn) or divine (D1-Dn)[[160]](#footnote-161). Under “complete set” models the sum of the human properties SetHUM and the sum of the divine properties SetDIV should be understood as “proper parts” of SetCHR (the complete sum of both sets in Christ). The challenge of this account is that there appear to be properties of SetHUM that are entirely incompatible with SetDIV. This is addressed in a traditional manner by Thomas Morris who argues, as I did earlier, that the apparent contradiction of these properties resides in the fact that we assume all the components of both sets are *essential* for divinity and humanity. Instead, we should consider that ‘a property’s being common or even universal for members of a kind *does not entail that it is essential for the kind’* (1986, p. 63).

It is possible to analyse the “complete set” identity account from Primas’ non-Boolean framework. On this basis it is possible to understand SetHUM and SetDIV as part of a family of complementary descriptions (remembering that this refers to descriptions where neither is sufficient, and both are required for a full description of the entity/event). In this account SetHUM and SetDIV can be understood as analogous to different map projections: they offer a partially Boolean account because, whilst some attributes overlap, ‘not every pair of elements may belong to a common’ subset (Primas, 2007, p. 23). Therefore SetCHR could be understood in terms of a “Boolean Atlas” as the complete set it structures the “family” of Boolean sets that are then patched together such that SetCHR ‘carries all relevant information of a non-Boolean description’ (Primas, 2007, p. 22). A globally non-Boolean but locally (to each set) Boolean account of the properties of Christ can address the appearance of contradiction. The theological challenge of the contextually relevant decomposition of the unified reality is that it risks implying or potentially requiring a form of modalism. It is these kinds of “new” theological issues that need to be investigated further if holism is to be understood as providing a viable alternative position to the existing options.

Marmodoro and Hill identify two other identity models. The first is the single set model. These models hold that ‘the single nature Christ instantiates is either the divine or the human one’ (2008, p. 111). I argue, with Marmodoro and Hill that single set models are non-starters – they do not provide an account of the person of Christ that fulfils the requirements of Chalcedon, nor, as they note, does it fulfil the soteriological requirement of humanity and divinity within a single person. The other model, (of partial sets) fairs only slightly better (although Marmodoro and Hill argue it also fails to meet the soteriological requirements). I am slightly more sympathetic to the partial identity model, but only on the grounds that it appears to be deemed necessary because it is assumed that the Law of non-Contradiction (LNC) applies in the case of the incarnation. That the incarnation can be described in terms of discrete and exclusive sets, which I am not convinced is possible. Additionally although it may appear that the divine and human attributes (such as those proposed by Davis (2011)) are fundamentally incompatible/paradoxical the question has to be posed whether the incompatible attributes are all *essential* or merely presuppositions.

The discussion of relational models of the incarnation draws on the discussion of the role of embodiment in the incarnation. The question of the importance of embodiment fundamentally depends on the underlying metaphysics one is committed to. For Marmodoro and Hill the issue of whether the Son of God *becomes* embodied or *acquires* a body is tied to a substance dualist approach. They argue that the difficulties faced by the identity models reside in a commitment to a single property-bearer. By assuming a distinction ‘in essence or in substratum’ (2008, p. 115) this allows for a second property-bearer to be bought in to the relationship, to potentially remove the apparent conflicts. If this bearer is a human body, then one arrives at substance dualism which they argue is problematic to maintain. If the bearer is not a human body, it must be a human person: this is what they use as the basis of their examination of the relational models. Putting aside the fact that they are committed to a metaphysics in which there is in some respect a split between the material and immaterial, the discussion is fundamentally grounded in an assumption that the compositional relations exist between discrete objects, traditionally understood.

Marmodoro and Hill divide their discussion of relational models between internal and external accounts. I argue that these can be reconceptualised considering Esfeld’s bottom-up and top-down holistic accounts, respectively. Of the external relations approach they write ‘it is a relation between distinct substances. One may speak of a composite entity, made up of two of them, but not of a greater substantial unity’ (2008, p. 117). Central to this account appears to be a commitment to the constituent parts as discrete entities. Thus, there is a link to Esfeld’s version of bottom-up holism in which:

[W]e begin with the constituents and properties that make something a constituent […] something can have some of these properties only if there are other things with which it is arranged in such a way that there is a whole of the kind in question (Esfeld, 2001, p. 24)

In many senses the holistic interpretation offered by Esfeld for the bottom-up approach echoes the description provided in HI1 above. The focus is that the human nature and the divine substance have individual properties that are brought into a holistic relationship in Christ, but that *requires* the other parts too – there is an intrinsic relationality that stems back to not being the only thing in existence[[161]](#footnote-162). Marmodoro and Hill argue that if the human nature and divine substance in Christ ‘are distinct substances, then it seems hard to see how one could legitimately speak of a single individual that is both divine and human’ (2008, p. 119). Yet it is precisely this capacity that a holistic account brings to the conversation, as one can argue Christ both ‘grew in wisdom and stature’ (Luke 2:52 NIV) and that he was ‘the power of God and the wisdom of God’ (1 Cor 1:23 NIV), because the whole (Christ) has these properties ‘because [his] constituents have them’ (Esfeld, 2001, p. 24). This does not precisely remove the appearance of contradiction. However, it does provide a more coherent framework for how the two can be joined within a holistic unity.

Finally, turning to the internal relations account, Marmodoro and Hill hold that the relationship between the Son of God and the human nature is ‘an *internal* relation holding between two *constituents* of a single, composite substance’ (2008, p. 119). This speaks to Esfeld’s stronger model, that parts only have these properties *because* they have come into an ontologically mutual relationship within a holistic system. These properties touch upon the very nature of what it is to be a part of that system, and as we saw in HI1 it is only in the interrelation between the human nature and divine substance that the Son of God can be incarnate. To repeat an earlier quote from Gunton, the whole is uniquely constituted by these internal relations ‘to think of *persons* is to think in terms of relations: Father, Son and Spirit are the particular persons they are **by virtue of their relations with each** other’ because of ‘the way by which […][they] are mutually constituted’ (Gunton cited in Cordovilla Perez, 2012, p. 131 italic original emphasis; bold added). By necessity, this discussion is brief, but it shows the spaces in which holistic ontology can start to challenge the appearance of contradiction and paradox within the incarnation.

To borrow from Primas’ (2003) conclusion the thoughts drawn together here ‘are of fragmentary and speculative character so that this […] should be considered as an exercise, whose aim is not to solve any concrete problem but to discuss new ways of thinking’ (Primas, 2003, p. 113). By which I mean that a holistic account of the incarnation *does* offer great promise to progress our understanding of the incarnation. What has been achieved here is to show that holistic ontology *“positively reconceptualises our understanding of the kinds of natures or substances involved in the incarnation”*[[162]](#footnote-163). However, there are a great many details to work out both in terms of the implications for whether a “classical” theism with its distinction between the world and God can be maintained, and how we are to understand the, so carefully avoided, place of conscious beings in a holistic universe. Some of these issues will be touched on in §8.6. But the original contribution resides in bringing Esfeld and Primas’ ontologies to bear on our theological understanding of the nature of reality and the paradox of the incarnation serves to start the conversation, not conclude it. With the conclusion of the thesis proper, I shall now turn to providing some final remarks on the limitations of the research in this thesis and the avenues for further research it opens up.

### Theological Challenges to a Holistic Incarnation

Many of the theological challenges to a holistic account of the incarnation, particularly one which draws on quantum theory for support were raised at the start of this thesis. The comments at the beginning still hold now, if one rejects a role for natural theology, or scientific metaphysics within theology the most that can be said about this thesis is that it may be viewed as an epistemic exercise. To proceed with the thesis, it was necessary to maintain that natural theology and scientific metaphysics could make a meaningful contribution to our theological discussion. I maintain, however that the question of metaphysical holism, and the discussions of how such unity can inform our Christological discussion could be addressed without recourse to quantum metaphysics. Thus, the question of the relationship between the quantum and macro-worlds or suitable “complexity” does not necessarily need to be answered to make use of the metaphysics discussed within this thesis. Yet, the argument is strengthened by its grounding in scientific metaphysics.

There are two major theological challenges to holistic incarnation as proposed in this thesis. Firstly, the question of the place and nature of conscious beings in a holistic universe. Secondly the challenge of “where” God resides. Is this as the foundational structure? Or is this as that which contains all things? Or some other formulation? The resolution to these fundamental challenges must inform our understanding of Christ’s unity (and distinction) in a holistic world. But they are so intwined with other matters (metaphysical and theological) that they require their own in-depth analysis. Thus, it is necessary to individually draw the models of incarnation developed here into conversation with existing work on pan(en)theism, simplicity, and emergence to tease out whether whilst resolving the “impossibility” of the metaphysical paradox of Christ, they create more problems than they solve.

### Interpretative Challenges to a Holistic Incarnation

Whilst both Esfeld and Primas offer metaphysical accounts that are relatively “interpretation neutral” (excluding the realism requirement), and thus have broad applicability, by being based in quantum theory the holistic accounts they provide could lead to quite different Christological implications depending on the interpretation one adopts. There is not the space here to respond directly to the challenges, nor to provide a full account of the interaction of the breadth of interpretations with both holistic frameworks, therefore I will examine the Everettian Many Worlds (EMW) account as an example of how the success of Primas and Esfeld’s “neutral” accounts can change depending on the interpretation one adopts. The following should be considered as a starting point for continued, and more detailed interaction between holism and particular interpretations.

Whilst EMW is rejected by Primas, his rejection is based on its “ad-hoc” nature. There is no *a priori* reason to view the two as, in principle, metaphysically incompatible. If one sides with Ney’s interpretation that the branching within EMW is not literal, it becomes possible to see the branches as ‘patterns in the one universal quantum state’ (Ney, 2013, p. 34). Additionally, it may be possible to understand these branches in line with Primas’ decomposition of the whole. However, if one takes this route then there are substantive theological challenges. The challenge of soteriology in relation to EMW has been examined elsewhere (Qureshi-Hurst, 2023) but the issue of concern here is how one can reconcile the coherence of divine simplicity in a many “patterned” world. For Primas there is a unified “something” that is *prior* to our decision to split matter/spirit, and the question raised is how the branching patterns within that unified whole relate to (or are separate from) our contextual decomposition. It is one thing to allow “distinction” within a wholly simple account of divinity (in line with Holmes’ account), but EMW requires the introduction of an *ontological* distinction in relation to the branching. Thus, the distinctions of Primas’ account, when brought into dialogue with EMW become *divisions*. The division becomes apparent as, even at a “local” level, different branches of an entangled system can evolve to be in different states, and even become decoupled. If this is taken to apply at a larger scale to the universal “superposition state” under EMW then it appears that division is reintroduced to Primas’ unus mundus. This is not necessarily fatal to maintaining a coherent account of the incarnation, but it *is* problematic for an account of “simple” divinity.

Esfeld’s structural realism fairs better in relation to (Ney’s account of) Many Worlds. The greater success of Boolean holism regarding this interpretation, I argue, stems from the role of relationality as the “unifying” element within the metaphysics. The joint ontological primacy of relata and their relations means that it is conceivable for there to be a coherence across different “branches” through the removal of the distinction of discrete individuals which find themselves “branching” (even if this is understood within a superposition). The fact (Strong) Ontic Structural Realism removes individuals from our metaphysics means the branching is “merely” a change in foundational relationships. It is potentially in this interaction with EMW that Esfeld’s account starts to have meaningful ontological content for Christology, not just conceptual value. The underpinning relationality seems to provide a coherence to a “branching unity”, although whether this enables Boolean holism to adequately respond to other theological challenges requires separate investigation.

The brief discussion highlights why this thesis should be viewed as providing a starting point to examine how the “interpretation neutral” accounts provided by Primas and Esfeld may respond very differently considering specific combinations of holism (e.g., Boolean/Non-Boolean; top-down/bottom-up), Christological commitments (e.g., simplicity, panentheism) and interpretations of quantum mechanics.

## Holism as a Solution to the Appearance of Metaphysical Paradox

Whilst recognising the breadth of definitions of “paradox” and the range of ways in which the appearance of paradox may be generated within our theological discussion, the focus of this thesis has been the question of whether the incarnation is *metaphysically* paradoxical. I have argued that metaphysical paradoxicality is rooted in our metaphysical *assumptions* rather than a necessary feature of our foundational ontology. Esfeld and Primas’ accounts provide promise for a coherent metaphysics that can remove some of the sources of incarnational paradox, either by providing an alternative to the materialist-dualist dichotomy that can be seen within much Christological discussion (Primas), or by challenging our conception of the existence of discrete objects that are ontologically prior to the relationships they stand in (Esfeld).

In many respects it is still too early to say whether holism is “the” solution to the appearance of paradox, especially prior to working through the specific combinations of metaphysical and theological commitments noted in §8.2. Nevertheless, I believe this thesis has done enough work to show that the metaphysical paradox is only apparent, based on our combinations of assumptions, an (at least implicit) commitment to the universality of the laws of non-contradiction and excluded middle, and a level of confusion between paradox and mystery within our theological discourse. It is reasonable to argue that metaphysical holism is part of the solution to overcoming the appearance of metaphysical paradox in our account of the incarnation.

## Contribution to the Field

This thesis has for the first time brought the philosophical and metaphysical works of Hans Primas and Michael Esfeld to bear on theological matters, and it is in this interaction that it provides an original contribution to the field of science and religion in relation to the incarnation. However, the arguments contained within this thesis must be understood as starting and not concluding the valuable contribution that metaphysical holism (as conceived by Esfeld and Primas) can and should bring to our re-imagining of what is meant by the claims within Chalcedon. This thesis has tackled head-on the question of whether our “new” (quantum) metaphysics can provide a response to the charge of paradoxicality in the incarnation and answered affirmatively. In the final analysis whilst it may not be possible to claim that paradox has been soundly defeated, I hope, the arguments made here show that the metaphysical “paradox” of the incarnation is not as inevitable as Orji claims (2022, p. 19).

It is possible that the work begun here could be taken up by others to investigate the interactions between these novel ontologies and our theological commitments in further detail. Can Esfeld’s structural realism be profitably brought to bear on an Everettian Many Worlds approach to resolve questions around the saving power of the incarnation in a branching universe? Does Primas’ unus mundus allow us to understand how the Son of God become embodied within the created world? Does either account allow for a non-panentheistic account of divinity?

## Limitations to the Current Thesis and Avenues for Further Research

Within this thesis I have established that the appearance of metaphysical paradox in the incarnation can be attributed, in part, to metaphysical assumptions that can be overcome with a shift to holistic ontology. However, this is the start of the conversation. Therefore, I shall briefly highlight four areas that require further research to understand the full impact of adopting a holistic ontology for Christian accounts of the incarnation.

First, there is a clear need to develop an account of Primas’ understanding of the place and individuation (or not) of conscious entities within his dual aspect/ontologically holistic monism. Given the finite body of relevant works authored by Primas, this may require analysis of his non-English language works and/or comparable philosophical positions. Obvious historical figures for initial exploration include Spinoza and Leibniz, although I am unaware of contemporary thinkers undertaking a scientifically informed approach in either philosophy or theology. Development of further research in this area would allow Primas’ ontology to be brought into greater conversation with the question of Christ’s personhood rather than just Christ’s substance. A significant limitation of this thesis is it does not examine how either account of holism relates to personhood and/or consciousness. This is due in part to the content of Primas and Esfeld’s work and in part due to the focus on “paradox” over personhood. The breadth of theological (and other) accounts of personhood and the range of metaphysical commitments and/or presuppositions that these contain (for example whether embodiment – in a particular kind of body – is necessary and/or sufficient for personhood) means that it was not possible to investigate how either account impacts on traditional accounts of the “personhood” of Christ.

Secondly, along similar lines, despite the shift in Esfeld’s ontology from the ontological priority of relations to the co-priority of relations and relata, in *Minimalist Ontology* he and Deckert explicitly exclude consciousness from their “radical ontological reductionism”. Thus, the question arises what place is there for conscious beings within an OSR ontology (whether strong or moderate)? The absence of this aspect of ontology within both scholars’ work has meant that there have been implicit limits on the applicability of both ontologies beyond the precise question of the appearance of apparent contradiction. Further research in this area would enable theologians and philosophers to apply the ontology to specific theological challenges such as divine action and resurrection. Furthermore, the exclusion of consciousness from either account means that it is not possible to even begin to engage with the paradoxicalities around the two-minds/wills of Christ, whether the Son of God occupies something like the space of the human “soul”, or how we are to understand meaningful interaction between the Son of God and the embodied Christ.

Thirdly, with the growing body of thinking on Christian panentheism there is a valid question of whether Primas’ ontology requires a panentheistic account of God’s relationship to the world. Although with the return to an “atomistic holism” panentheism is less implicit in Esfeld’s ontology, if one were to adopt a stronger form of OSR, or a metaphysics of relations, the same question could be asked of Boolean holism. Arguably with the mutual ontological dependence between relations and objects the question of panentheism is still relevant to Esfeld’s moderate structural realism. The relationship to panentheism, and thus a different understanding of the incarnation seems implicit in any holistic ontology; but there is more work to be done on the interaction between these holistic ontologies and theological holistic accounts. As noted earlier in this this conclusion, it was not possible to examine individual combinations of metaphysical and theological commitments, however it is clear where one sits with each of these commitments will have implications for the success, or otherwise, of either account of holism and the extent to which the success of the “interpretation neutral” accounts presented in their work is able to maintain it’s (theological) advantages when bought into dialogue with specific interpretations (and theological commitments).

Finally, although not brought to bear on this thesis both thinkers make use of scientific accounts of emergence in biology and chemistry. The issue is less pertinent to Primas’ account as he argues that novel properties arise from the contextual decomposition and are *not* ontologically emergent. Although as noted with his exclusion of the mental from his discussion it may be that conscious entities have to be understood as genuinely emergent. Regarding Esfeld’s account it was briefly noted in chapter 7 that, especially for the top-down account, there are strong correlations to the kinds of questions that are raised by emergence with respect to new properties at the level of the whole system. Thus, with the “*Re-Emergence of Emergence*”[[163]](#footnote-164) it is necessary to understand how the discussion of properties of holistic systems relate to the question of novel emergence – are they the same thing by different names? I would argue that this is possibly *the* most crucial area to investigate further (prior to different interpretations) because this directly feeds into the issues raised above around consciousness and embodiment.

## Concluding Remark

Far from being at odds with theology, holistic scientific metaphysics provides the theologian with much to consider, not simply reminding us of the implicit decisions we make on what is relevant to our categorisation, but also in challenging the assumption that to be “scientific” is to be atomistic. Holistic metaphysics provides us with a framework in which to reinterpret the ”absolute” or “living paradox” of Christ, and although it may raise its own set of theological questions, its removal does not cause the ‘destruction of Christianity’ as Macquarrie feared (1998, p. 17).

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# Bibliography

Aerts, D. (2014) ‘Quantum theory and human perception of the macro-world’, *Frontiers in Psychology*, 5, pp. 1–19.

Alcalde, D. (2019) *Cosmology Without God? The Problematic Theology Inherent in Modern Cosmology*. Eugene Oregon: Cascade Books (Veritas, Volume 35).

Allori, V. (2013) ‘Primitive Ontology and the Structure of Fundamental Physical Theories’, in A. Ney and D.Z. Albert (eds) *The Wave Function: Essays on the Metaphysics of Quantum Mechanics*. Oxford; New York: Oxford University Press, pp. 58–75.

Allori, V. (2015) ‘Primitive Ontology in a Nutshell’, *International Journal of Quantum Foundations*, 1(3), pp. 107–122.

Alston, W. (2009) ‘Two Cheers for Mystery!’, in A. Dole and A. Chignell (eds) *God and the Ethics of Belief: New Essays in Philosophy of Religion*. Cambridge: Cambridge University Press, pp. 99–114.

Anderson, J. (2007) *Paradox in Christian theology: An Analysis of its Presence, Character, and Epistemic Status*. Milton Keynes: Paternoster (Paternoster theological monographs).

Aquinas, T. (1259) *The Summa Contra Gentiles*. Translation published 2014. London: Aeterna Press.

Aquinas, T. (1485) *Summa Theologica*. Completed Unabridged works in 1 Volume pubished 2012. Edited by J. Steif. Steif Books.

Athanasius (1892) *‘Four Discourses Against the Arians’ from Nicene and Post-Nicene Fathers, Second Series, Vol. 4. Philip Schaff and Henry Wace [Eds]*. online edition (revised and edited for New Advent). Edited by K. Knight. Translated by J.H. Newman. Available at: https://www.newadvent.org/fathers/2816.htm.

Atmanspacher, H., Amann, A. and Muller-Herold, U. (eds) (1999) *On Quanta, Mind and Matter: Hans Primas in Context*. Dordrecht: Springer Netherlands. Available at: https://doi.org/10.1007/978-94-011-4581-7 (Accessed: 18 May 2022).

Atmanspacher, H. and Primas, H. (2003) ‘Epistemic and Ontic Quantum Realities’, in L. Castell and O. Ischebeck (eds) *Time, Quantum and Information*. 1st edn. Berlin: Springer Berlin Heidelberg, pp. 301–321. Available at: http://philsci-archive.pitt.edu/938/ (Accessed: 17 August 2015).

Ayala, F.J. (1987) ‘Biological Reductionism’, in F.E. Yates et al. (eds) *Self-Organizing Systems*. Springer US (Life Science Monographs), pp. 315–324. Available at: https://doi.org/10.1007/978-1-4613-0883-6\_17.

Baas, N.A. and Emmeche, C. (1997) ‘On Emergence and Explanation’, *Intellectica*, 25(2), pp. 67–83. Available at: https://doi.org/10.3406/intel.1997.1558.

Baillie, D.M. (1963) *God Was in Christ*. Faber & Faber.

Baker, L. (2001) ‘Materialism with a Human Face’, in K.J. Corcoran (ed.) *Soul, body, and survival: essays on the metaphysics of human persons*. Ithaca (N.Y.): Cornell university press, pp. 159–180.

Baker, L.R. (2007) ‘Persons and the Natural Order’, in Peter van Inwagen and D. Zimmerman (eds) *Persons: Human and Divine*. Oxford: New York: Oxford University Press: Oxford University Press, U.S.A., pp. 261–278.

Baker, L.R. (2011) ‘Christian Materialism in a Scientific Age’, *International Journal for Philosophy of Religion*, 70(1), pp. 47–59.

Baker, L.R. (2018) ‘Constitutionalism: Alternative to Substance Dualism’, in J. Loose, A.J. Mengue, and J.P. Moreland (eds) *The Blackwell Companion to Substance Dualism*. Hoboken: Wiley Blackwell (Blackwell companions to philosophy), pp. 341–350.

Barberousse, A. (2018) ‘Philosophy of Physics’, in A. Barberousse, D. Bonnay, and M. Cozic (eds) *Philosophy of Science: A Companion*. Illustrated edition. New York: OXFORD UNIV PR, pp. 405–429.

Barbour, I.G. (1971) *Issues in Science and Religion*. London: Prentice-Hall.

Barbour, I.G. (1984) *Myths, Models and Paradigms: A Comparative Study in Science and Religion*. New York, NY: Harper & Row.

Barbour, I.G. (1990) *Religion in an Age of Science.* London: SCM Press.

Bartels, A., Lyre, H. and Esfeld, M. (2004) ‘Holism in the philosophy of physics: an Introduction’, *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*, 35(4), pp. 597–599. Available at: https://doi.org/10.1016/j.shpsb.2004.09.001.

Basinger, D. (1987) ‘Biblical Paradox: Does Revelation Challenge Logic?’, *Bulletin of the Evangelical Theological Society*, 30(2), pp. 205–213.

Basson, M.M.J. and Koekemoer, J.H. (1997) ‘From Quantum Theory to Quantum Theology: A Leap of Faith’, *HTS Teologiese Studies / Theological Studies*, 53(1/2). Available at: https://doi.org/10.4102/hts.v53i1/2.1617.

Baugus, B.P. (2013) ‘Paradox and Mystery in Theology’, *The Heythrop Journal*, 54(2), pp. 238–251. Available at: https://doi.org/10.1111/j.1468-2265.2011.00735.x.

Beauregard, M. (2017) ‘The Emerging Post-Materialist Paradigm: Toward the Next Great Scientific Revolution’, *Interalia Magazine*, 12 December. Available at: https://www.interaliamag.org/articles/mario-beauregard/ (Accessed: 15 November 2021).

Beauregard, M., Trent, N.L. and Schwartz, G.E. (2018) ‘Toward a Postmaterialist Psychology: Theory, Research, and Applications’, *New Ideas in Psychology*, 50, pp. 21–33. Available at: https://doi.org/10.1016/j.newideapsych.2018.02.004.

Bielfeldt, D. (1999) ‘Nancey Murphy’s Nonreductive Physicalism’, *Zygon®*, 34(4), pp. 619–628. Available at: https://doi.org/10.1111/0591-2385.00240.

Bird, A. (2007) ‘Scientific and Theological Realism’, in M. Scott and A. Moore (eds) *Realism and Religion: Philosophical and Theological Perspectives*. Pre-print author copy. Available at: https://seis.bristol.ac.uk/~plajb/research/papers/Scientific\_and\_Theological\_Realism.pdf (Accessed: 4 January 2022).

Bonnay, D. (2018) ‘Scientific Explanation’, in A. Barberousse, D. Bonnay, and M. Cozic (eds) *Philosophy of Science: A Companion*. Illustrated edition. New York: OXFORD UNIV PR, pp. 3–52.

Bracken, J.A. (2004) ‘Panentheism: a Field-Orientated Approach’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. 211–221.

Bracken, J.A. (2005) ‘Creatio Ex Nihilo: A Field Oriented Approach’, *Dialog*, 44(3), pp. 246–249. Available at: https://doi.org/10.1111/j.0012-2033.2005.00264.x.

Bracken, J.A. (2015) ‘Panentheism in the Context of the Theology and Science Dialogue’, *Open Theology*, 1(1), pp. 1–11. Available at: https://doi.org/10.2478/opth-2014-0001.

Bracken, J.A. (2016) ‘Incarnation, Panentheism, and Bodily Resurrection: A Systems-Oriented Approach’, *Theological Studies*, 77(1), pp. 32–47. Available at: https://doi.org/10.1177/0040563915619977.

Brierley, M.W. (2004) ‘Naming a Quiet Revolution: The Panenheistic Turn in Modern Theology’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. 1–15.

Brigandt, I. and Love, A. (2017) ‘Reductionism in Biology’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Spring 2017. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/spr2017/entries/reduction-biology/ (Accessed: 18 January 2022).

Brown, W.E. (1990) ‘Quantum Theology Christianity and the New Physics’, *Journal of the Evangelical Theological Society*, 33(4), pp. 477–487.

Bub, J. (2023) ‘Quantum Entanglement and Information’, in E.N. Zalta and U. Nodelman (eds) *The Stanford Encyclopedia of Philosophy*. Summer 2023. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/sum2023/entries/qt-entangle/ (Accessed: 29 September 2023).

Callender, C. (2020) ‘Can We Quarantine the Quanutm Blight?’, in S. French and J. Saatsi (eds) *Scientific realism and the quantum*. First edition. Oxford: Oxford University Press, pp. 57–77.

Calosi, C. and Morganti, M. (2016) ‘Humean Supervenience, Composition as Identity and Quantum Wholes’, *Erkenntnis (1975-)*, 81(6), pp. 1173–1194.

Caponigro, M. (2017) ‘Quantum Entanglement Vs Non-Locality’. ISHTAR, Bergamo University. Available at: https://philpapers.org/rec/CAPQEV (Accessed: 1 October 2023).

Castellani, E. (ed.) (1998) *Interpreting Bodies: Classical and Quantum Objects in Modern Physics*. Princeton, NJ: Princeton University Press.

Chakravartty, A. (2020) *Scientific Ontology*. S.l.: Oxford University Press.

Chan, J. (2015) ‘A Cartesian Approach to the Incarnation’, in J.R. Farris and C. Taliaferro (eds) *The Ashgate Research Companion to Theological Anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate, pp. 355–367.

Clayton, P. (2003) ‘God and World’, in K.J. Vanhoozer (ed.) *The Cambridge companion to postmodern theology*. Cambridge New York Melbourne Madrid Cape Town: Cambridge University Press (Cambridge companions to religion), pp. 203–218.

Clayton, P. (2004a) ‘Panentheism in Metaphysical and Scientific Perspective’, in P. Clayton and A.R. Peacocke (eds). Grand Rapids, Mich: William B. Eerdmans Pub, pp. 73–91.

Clayton, P. (2004b) ‘Panentheism Today: A Constructive Systematic Evaluation’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. 249–264.

Clayton, P. (2005) ‘Kenotic Trinitarian Panentheism’, *Dialog*, 44(3), pp. 250–255. Available at: https://doi.org/10.1111/j.0012-2033.2005.00265.x.

Clayton, P. (2006) *Mind and Emergence: From Quantum to Consciousness*. Oxford [England]; New York: Oxford University Press.

Clayton, P. (2014) ‘Unsolved Dilemmas: The Concept of Matter in the History of Philosophy and in Contemporary Physics’, in P.C.W. Davies and N.H. Gregersen (eds) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press, pp. 47–79.

Clayton, P. and Peacocke, A.R. (eds) (2004) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub.

Cohen, S.M. and Reeve, C.D.C. (2021) ‘Aristotle’s Metaphysics’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Winter 2021. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/win2021/entries/aristotle-metaphysics/ (Accessed: 18 April 2023).

Connolly, P.J. (2015) ‘Space Before God? A Problem in Newton’s Metaphysics’, *Philosophy*, 90(351), pp. 83–106.

Cooper, J.W. (2000) *Body, Soul, and Life Everlasting: Biblical Anthropology and the Monism-Dualism Debate*. Grand Rapids, Mich: Eerdmans.

Cooper, J.W. (2007) *Panentheism: The Other God of the Philosophers: From Plato to The Present*. Nottingham, England: Apollos.

Cooper, J.W. (2015) ‘Scripture and Philosophy on the Unity of Body and Soul: An Intergrative Method for Theological Antropology’, in J.R. Farris and C. Taliaferro (eds) *The Ashgate Research Companion to Theological Anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate, pp. 27–42.

Cordovilla Perez, A. (2012) ‘The Trinitarian Concept of Person’, in G. Maspero and R.J. Wozniak (eds) *Rethinking Trinitarian Theology: Disputed Questions and Contemporary Issues in Trinitarian Theology*. London: T & T Clark, pp. 105–145.

Cottingham, J. (2008) *Cartesian Reflections: Essays on Descartes’s Philosophy*. Oxford; New York: Oxford University Press.

Crain, S.D. (2006) ‘God Embodied in, God Bodying Forth the World: Emergence and Christian Theology’, *Zygon®*, 41(3), pp. 665–674. Available at: https://doi.org/10.1111/j.1467-9744.2005.00767.x.

Crisp, O. (2003) ‘Jonathan Edwards on Divine Simplicity’, *Religious Studies*, 39(1), pp. 23–41. Available at: https://doi.org/10.1017/S0034412502006236.

Crisp, O. (2007) *Divinity and Humanity: The Incarnation Reconsidered*. Cambridge, UK; New York: Cambridge University Press (Current issues in theology).

Crisp, O. (2011) ‘Compositional Christology Without Nestorianism’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 46–66.

Crisp, O. and Rea, M.C. (eds) (2011) *Analytic Theology: New Essays in the Philosophy of Theology*. First published in paperback. Oxford: Oxford University Press.

Crisp, O.D. (2017) ‘Jonathan Edwards, Idealism, and Christology’, in J.R. Farris and S.M. Hamilton (eds) *Idealism and Christian Theology*. New York: Bloomsbury Academic (Idealism and Christianity, Volume 1), pp. 145–175.

Cross, R. (2002) *The Metaphysics of the Incarnation: Thomas Aquinas to Duns Scotus*. Oxford; New York: Oxford University Press.

Crull, E. (2023) ‘Interpretation Neutrality for Quantum Theology’, *Zygon®*, 58(1), pp. 246–264. Available at: https://doi.org/10.1111/zygo.12871.

Culp, J. (2021) ‘Panentheism’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Winter 2021. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/win2021/entries/panentheism/ (Accessed: 27 August 2022).

Cupitt, D. (1975) ‘The Finality of Christ’, *Theology*, 78(666), pp. 618–628. Available at: https://doi.org/10.1177/0040571X7507801202.

Cusanus, N. (1440) ‘On Learned Ignorance (De docta ingorantia 1440)’, in H.L. Bond (tran.) *Selected Spiritual Writings*. translation published 1997. New York: Paulist Press.

Daley, B.E. (2004) ‘Nature and the “Mode of Union”: Late Patristic Models for the Personal Unity of Christ’, in S.T. Davis, D. Kendall, and G. O’Collins (eds) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press, pp. 164–196.

Davies, P. (2014) ‘Universe from Bit’, in *Information and the Nature of Reality: From Physics to Metaphysics*. Cambridge: Cambridge University Press, pp. 83–117.

Davies, P.C.W. and Gregersen, N.H. (eds) (2014) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press.

Davis, S.T. (2011) ‘The Metaphysics of Kenosis’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 114–133.

Davis, S.T., Kendall SJ, D. and O’Collins SJ, G. (eds) (2004) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press.

Dodds, M.J. (2014) ‘Science, Causality, and God: Divine Action and Thomas Aquinas’, *Angelicum*, 91(1), pp. 13–36.

Dolezal, J.E. (2011) *God Without Parts: Divine Simplicity and the Metaphysics of God’s Absoluteness*. Eugene, Or: Pickwick Publications.

Drees, W. (2003) ‘“Religion and Science” Without Symmetry, Plausibility, and Harmony’, *Theology and Science*, 1(1), pp. 113–128. Available at: https://doi.org/10.1080/14746700309642.

Duddy, T. (1999) ‘Toland, Berkeley, and the Irrational Hypothesis’, *Eighteenth-Century Ireland / Iris an dá chultúr*, 14, pp. 49–61.

Esfeld, M. (1999a) ‘Holism in Cartesianism and in Today’s Philosophy of Physics’, *Journal for General Philosophy of Science*, 30, pp. 17–36.

Esfeld, M. (1999b) ‘Physicalism and Ontological Holism’, *Metaphilosophy*, 30, pp. 319–337.

Esfeld, M. (2001) *Holism in Philosophy of Mind and Philosophy of Physics*. Dordrecht; Boston: Kluwer Academic Publishers (Synthese library, v. 298).

Esfeld, M. (2004) ‘Quantum Entanglement and a Metaphysics of Relations’, *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*, 35(4), pp. 601–617. Available at: https://doi.org/10.1016/j.shpsb.2004.04.008.

Esfeld, M. (2009) ‘Philosophical Holism’, in Gertrude Hirsch Hardon (ed.) *Unity of Knowledge (in Transdisciplinary Research for Sustainability) Vol. 1.* Oxford: Eolss Publishers Co Ltd, pp. 110–127.

Esfeld, M. (2011) ‘Science and Metaphysics: The Case of Quantum Physics’, in A. Reboul and K. Mulligan (eds) *Philosophical Papers Dedicated to Kevin Mulligan*. [Genève]: Université de Genève, Faculté des Lettres, pp. 1–17.

Esfeld, M. *et al.* (2012) ‘The Ontology of Bohmian Mechanics’, *Version cited is author pre-print* [Preprint]. Available at: http://philsci-archive.pitt.edu/9381/ (Accessed: 24 May 2022).

Esfeld, M. (2013a) ‘Ontic Structural Realism and the Interpretation of Quantum Mechanics’, *European Journal for Philosophy of Science*, 3(1), pp. 19–32. Available at: https://doi.org/10.1007/s13194-012-0054-x.

Esfeld, M. (2013b) ‘Philosophical Holism’, *UNESCO Encyclopedia of Life Support System*, Social Sciences and Humanities. Available at: http://www.unil.ch/files/live//sites/philo/files/shared/EOLSS-PhilHolism03.pdf (Accessed: 1 October 2015).

Esfeld, M. (2013c) ‘Reductionism Today’, *Version cited is author pre-print* [Preprint]. Available at: http://philsci-archive.pitt.edu/10030/ (Accessed: 1 October 2015).

Esfeld, M. (2014a) ‘Physics and Intrinsic Properties’, in R.M. Francescotti (ed.) *Companion to Intrinsic Properties*. Author Pre-print cited from http://philsci-archive.pitt.edu/9847/1/Intrinsic-prop.pdf. De Gruyter. Available at: https://doi.org/10.1515/9783110292596.

Esfeld, M. (2014b) ‘Quantum Humeanism, or: Physicalism Without Properties’, *The Philosophical Quarterly*, 64(256), pp. 453–470.

Esfeld, M. *et al.* (2017) ‘The Physics and Metaphysics of Primitive Stuff’, *The British Journal for the Philosophy of Science*, 68(1), pp. 133–161. Available at: https://doi.org/10.1093/bjps/axv026.

Esfeld, M. (2018) ‘Metaphysics of Science as Naturalized Metaphysics’, in A. Barberousse, D. Bonnay, and M. Cozic (eds) *Philosophy of Science: A Companion*. Illustrated edition. New York: OXFORD UNIV PR, pp. 142–170.

Esfeld, M. (2021) ‘“Thing” and “Non-Thing” Ontologies’, in R. Bliss and J.T.M. Miller (eds) *The Routledge Handbook of Metametaphysics*. Version cited is from author draft [21-12-17]. Taylor and Francis. Available at: http://philsci-archive.pitt.edu/14235/ (Accessed: 26 May 2022).

Esfeld, M. (2022) ‘Against Levels of Reality: The Method of Metaphysics and the Argument for Dualism’, in Ioannidis Stavros et al. (eds) *Levels of Reality in Science and Philosophy: Re-examining the Multi-Level Structure of Reality*. Author pre-print [July 2021]. Springer International Publishing. Available at: http://philsci-archive.pitt.edu/19424/ (Accessed: 7 March 2022).

Esfeld, M. and Deckert, D.-A. (2020) *A Minimalist Ontology of the Natural World*. First issued in paperback. London New York: Routledge (Routledge studies in the philosophy of mathematics and physics, 3).

Esfeld, M. and Lam, V. (2011) ‘Ontic Structural Realism as a Metaphysics of Objects’, in A. Bokulich and P. Bokulich (eds) *Scientific Structuralism*. Version cited is author pre-print. Springer, pp. 143–159. Available at: http://philsci-archive.pitt.edu/5531/1/OSR-objects.pdf (Accessed: 1 June 2022).

Esfeld, M. and Sachse, C. (2017) *Conservative Reductionism*. Oxford: Routledge (Routledge Studies in the Philosophy of Science, 8).

d’Espagnat, B. (2003) *Veiled reality: An Analysis of Present-Day Quantum Mechanical Concepts*. Boulder, Colo: Westview Press (Frontiers in physics, 91).

Evans, C.S. (2004) ‘The Self-Emptying Love: Some Thoughts on Kenotic Christology’, in S.T. Davis, D. Kendall SJ, and G. O’Collins SJ (eds) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press, pp. 246–272.

Evans, C.S. (2006) *Kierkegaard on Faith and the Self: Collected Essays*. Waco, Tex.: Baylor University Press.

Farris, J.R., Hamilton, S.M. and Spiegel, J.S. (eds) (2017) *Idealism and Christian Theology: Volume 1*. Paperback edition. New York: Bloomsbury Academic (Idealism and Christianity, Volume 1).

Farris, J.R. and Taliaferro, C. (eds) (2015) *The Ashgate Research Companion to Theological Anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate.

FitzPatrick, P.J. (2006) *In Breaking of Bread: The Eucharist and Ritual*. Digitally printed 1st paperback version. Cambridge: Cambridge University Press.

Flint, T.P. (2011) ‘Should Concretists Part with Mereological Models of the Incarnation?’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 67–87.

Forrest, P. (2000) ‘The Incarnation: A Philosophical Case for Kenosis’, *Religious Studies*, 36(2), pp. 127–140.

di Francia, G.T. (1998) ‘A World of Individual Objects?’, in E. Castellani (ed.) *Interpreting bodies: classical and quantum objects in modern physics*. Princeton, NJ: Princeton University Press, pp. 21–29.

Franklin, J. (2019) ‘Emergentism as an Option in the Philosophy of Religion: Between Materialist Atheism and Pantheism’, *Suri: Journal of the Philosophical Association of the Philippines*, 8(2), pp. 1–22.

French, S. and Saatsi, J. (eds) (2020) *Scientific realism and the quantum*. First edition. Oxford: Oxford University Press.

Gao, S. (2018) *The meaning of the wave function: in search of the ontology of quantum mechanics*. Cambridge: Cambridge university press.

Geach, P.T. (1980) ‘Logic in Metaphysics and Theology’, in P.T. Geach (ed.) *Logic Matters*. New edition. Berkeley, Calif.: University of California Press, pp. 289–327.

Goetz, S. (2015) ‘Substance Dualism’, in J.R. Farris and C. Taliaferro (eds) *The Ashgate research companion to theological anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate, pp. 125–137.

Gorman, M. (2014) ‘Christological Consistency and the Reduplicative Qua’, *Journal of Analytic Theology*, 2(1), pp. 86–100. Available at: https://doi.org/10.12978/jat.2014-1.120811061413a.

Goswami, A. (2008) *God is Not Dead: What Quantum Physics Tells Us About our Origins and How we Would Live*. Charlottesville, VA: Hampton Roads Pub.

Goswami, A., Reed, R. and Goswami, M. (1993) *Self-Aware Universe: How Consciousness Creates the Material World: How Consciousness Creates the Material Universe*. Reprint edition. New York, NY: Jeremy P Tarcher.

Gottlieb, P. (2019) ‘Aristotle on Non-contradiction’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Spring 2019. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/spr2019/entries/aristotle-noncontradiction/ (Accessed: 18 January 2021).

Goulder, M.D. (ed.) (1979a) *Incarnation and Myth: the Debate Continued*. London: SCM Press.

Goulder, M.D. (1979b) ‘Paradox and Mystification’, in M.D. Goulder (ed.) *Incarnation and Myth: the Debate Continued*. London: SCM Press, pp. 51–59.

Green, J.B. (2008) *Body, Soul, and Human Life: The Nature of Humanity in the Bible*. Grand Rapids, Mich: Baker Academic (Studies in theological interpretation).

Gregersen, N.H. (2000a) ‘God’s Public Traffic: Holist versus Physicalist Supervenience’, in N.H. Gregersen, W.B. Drees, and Görman, Ulf (eds) *The Human Person in Science and Theology*. Edinburgh: T & T Clark, pp. 153–188.

Gregersen, N.H. (2000b) ‘Varieties of Personhood’, in N.H. Gregersen, W.B. Drees, and Görman, Ulf (eds) *The Human Person in Science and Theology*. Edinburgh: T & T Clark, pp. 1–17.

Gregersen, N.H. (2004) ‘Three Varieties of Panentheism’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. 19–35.

Gregersen, N.H. (2011) ‘The Triune God and the Triad of Matter’, in M. Fuller (ed.) *Matter and Meaning: Is Matter Sacred or Profane?* Newcastle: Cambridge Scholars, pp. 103–117.

Gregersen, N.H. (2013) ‘Deep Incarnation and Kenosis: In, With, Under, and as: A Response to Ted Peters’, *Dialog*, 52(3), pp. 251–262. Available at: https://doi.org/10.1111/dial.12050.

Gregersen, N.H. (2014) ‘God, Matter, and Information: Towards a Stoicizing Logos Christology’, in P.C.W. Davies and N.H. Gregersen (eds) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press, pp. 405–443.

Gregersen, N.H. (ed.) (2015) *Incarnation: On the Scope and Depth of Christology*. Fortress Press. Minneapolis: 1517 Media.

Gregersen, N.H. (2020) ‘Deep Incarnation and Chalcedon: on the Enduring Legacy of a Cappadocian Concept of mixis’, in T. Marschler and T. Schartl (eds) *Herausforderungen und Modifikationen des klassischen Theismus--Band 2. Inkarnation*. Münster: Aschendorff Verlag (Studien zur systematischen Theologie, Ethik und Philosophie, Band 16/2), pp. 253–290.

Gregersen, N.H. (2022) ‘The Gowland Lecture: The God with Clay: Theology in a World of Mass, Energy, and Information’, in. *Science and Religion Forum Annual Conference 2022*, Woodbrooke Conference Centre. Available at: https://www.youtube.com/watch?v=kXq2BI-wIbA (Accessed: 14 June 2022).

Gregersen, N.H., Drees, W.B., and Görman, Ulf (eds) (2000) *The Human Person in Science and Theology*. Edinburgh: T & T Clark. Available at: http://public.eblib.com/choice/publicfullrecord.aspx?p=742350 (Accessed: 6 October 2014).

Grounds, V.C. (1964) ‘The Postulate of Paradox’, *Bulletin of the Evangelical Theological Society*, 7, pp. 3–21.

Harries, K. (2015) ‘Nicholas of Cusa on Learned Ignorance: Seminar Notes’. Yale University. Available at: https://cpb-us-w2.wpmucdn.com/campuspress.yale.edu/dist/8/1250/files/2012/09/Cusanus-On-Learned-Igorance-17z8dxd.pdf (Accessed: 7 September 2021).

Hasker, W. (2016) ‘Is Divine Simplicity a Mistake?’, *American Catholic Philosophical Quarterly*, 90(4), pp. 699–725. Available at: https://doi.org/10.5840/acpq201691295.

Healey, R. (2020) ‘Pragmatist Quantum Realism’, in S. French and J. Saatsi (eds) *Scientific realism and the quantum*. First edition. Oxford: Oxford University Press, pp. 123–146.

Healey, R. and Gomes, H. (2022) ‘Holism and Nonseparability in Physics’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Spring 2022. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/spr2022/entries/physics-holism/ (Accessed: 29 September 2023).

Healey, R.A. (1991) ‘Holism and Nonseparability’, *The Journal of Philosophy*, 88(8), pp. 393–421. Available at: https://doi.org/10.2307/2026702.

Hebblethwaite, B. (1987) *The Incarnation: Collected Essays in Christology*. Cambridge [Cambridgeshire]; New York: Cambridge University Press.

Henson, S.C. (2018) *God and natural order: physics, philosophy, and theology*. London: Routledge.

Hepburn, R.W. (1960) *Christianity and Paradox: Critical Studies in Twentieth-Century Theology*. Nabu Public Domain Reprint. Nabu Press.

Hick, J. (1977) *The Myth of God Incarnate*. third impression. London: SCM Press.

Hodgson, P.E. (2005) *Theology and Modern Physics*. Aldershot, Hants, England; Burlington, VT: Ashgate Pub (Ashgate science and religion series).

Holmes, S.R. (2001) ‘“Something Much Too Plain to Say”: Towards a Defence of the Doctrine of Divine Simplicity’, *Neue Zeitschrift für Systematische Theologie und Religionsphilosophie*, 43(1), pp. 137–154. Available at: https://doi.org/10.1515/nzst.43.1.137.

Holmes, S.R. (2014) *Two Views on the Doctrine of the Trinity*. EBook. Grand Rapids, Michigan: Zondervan.

Honner, J. (1991) ‘A New Ontology: Incarnation, Eucharist, Resurrection, and Physics’, *Pacifica: Australasian Theological Studies*, 4(1), pp. 15–50. Available at: https://doi.org/10.1177/1030570X9100400103.

Hopkins, J. (1983) *Nicholas of Cusa’s Metaphysic of Contraction*. online edition. Minneapolis: A.J. Banning Press. Available at: https://jasper-hopkins.info/.

Hopkins, J. (1985) *Nicholas of Cusa on Learned Ognorance: A Translation and an Appraisl of De Docta Ignorantia*. 2nd ed (online edition). Minneapolis: Banning Press. Available at: https://jasper-hopkins.info/DI-Intro12-2000.pdf.

Horgan, T. and Potrc, M. (2000) ‘Blobjectivism and Indirect Correspondence’, *(author preprint) Facta Philosophica*, 2, pp. 249–70.

Horgan, T.E.E. and Potrc, M. (2009) *Austere Realism: Contextual Semantics Meets Minimal Ontology*. Reprint edition. Cambridge, Mass: MIT Press.

Hosle, V. (1999) ‘Rationalism, Determinism, Freedom’, in H. Atmanspacher, A. Amann, and U. Muller-Herold (eds) *On Quanta, Mind and Matter: Hans Primas in Context*. Dordrecht: Springer Netherlands, pp. 299–323. Available at: https://doi.org/10.1007/978-94-011-4581-7 (Accessed: 18 May 2022).

van Inwagen, P. and Sullivan, M. (2021) ‘Metaphysics’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Winter 2021. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/win2021/entries/metaphysics/ (Accessed: 5 September 2022).

Ismael, J. and Schaffer, J. (2020) ‘Quantum Holism: Nonseparability as Common Ground’, *Synthese*, 197, pp. 4131-4160 (version cited publisher online pre-print, pp30).

Jantzen, G. (1984) *God’s world, God’s body*. London: Darton, Longman and Todd.

Kaiser, C.B. (1976) ‘Christology and Complementarity’, *Religious Studies*, 12(1), pp. 37–48.

Kaufman, G.D. (1995) *In Face of Mystery: A Constructive Theology*. 1. Harvard Univ. Pr. paperback ed. Cambridge, Mass.: Harvard Univ. Press.

Keller, C. (2007) *On the Mystery: Discerning Divinity in Process*. Fortress Press.

Kierkegaard, S. (1845) *Philosophical Fragments: Johannes Climacus*. translation published 1985. Translated by H.V. Hong and E.H. Hong. Princeton, N.J: Princeton University Press (Kierkegaard’s writings, 20).

Kim, J. (1989) ‘The Myth of Nonreductive Materialism’, *Proceedings and Addresses of the American Philosophical Association*, 63(3), pp. 31–47. Available at: https://doi.org/10.2307/3130081.

Koons, R.C. and Bealer, G. (eds) (2010) *The Waning of Materialism*. Oxford; New York: Oxford University Press.

Koperski, J. (2015) *The Physics of Theism: God, Physics, and the Philosophy of Science*. Hoboken, New Jersey: Wiley Blackwell.

Koperski, J. (2020) *Divine Action, Determinism, and the Laws of Nature*. Abingdon, Oxon; New York, NY: Routledge.

Kronz, F.M. and Tiehen, J.T. (2002) ‘Emergence and Quantum Mechanics’, *Philosophy of Science*, 69(2), pp. 324–347. Available at: https://doi.org/10.1086/341056.

Ladyman, J. (2020) ‘Structural Realism’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Winter 2020. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/win2020/entries/structural-realism/ (Accessed: 21 September 2022).

Ladyman, J. and Ross, D. (2007) *Every Thing Must Go: Metaphysics Naturalized*. 1st edition. Oxford; New York: OUP UK.

Lam, V. and Esfeld, M. (2012) ‘The Structural Metaphysics of Quantum Theory and General Relativity’, *Journal for General Philosophy of Science*, 43(2), pp. 243–258. Available at: https://doi.org/10.1007/s10838-012-9197-x.

Lamont, J. (2004) ‘Aquinas on Subsistent Relation’, *Recherches de théologie et philosophie médiévales*, 71(2), pp. 260–279.

Le Poidevin, R. (2009a) ‘Identity and the Composite Christ: An Incarnational Dilemma’, *Religious Studies*, 45(2), pp. 167–186.

Le Poidevin, R. (2009b) ‘Incarnation: Metaphysical Issues’, *Philosophy Compass*, 4(4), pp. 703–714. Available at: https://doi.org/10.1111/j.1747-9991.2009.00222.x.

Le Poidevin, R. (2011) ‘The Incarnation: Divine Embodiment and the Divided Mind’, *Royal Institute of Philosophy Supplements*, 68, pp. 269–285. Available at: https://doi.org/10.1017/S1358246111000129.

Leftow, B. (2004) ‘A Timeless God Incarnate’, in S.T. Davis, D. Kendall, and G. O’Collins (eds) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press, pp. 273–299.

Leftow, B. (2011) ‘The humanity of God’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 20–45.

Lemanska, A. (2014) ‘The Significance of the Philosophy of Nature for Theology’, in *God and nature: selected issues in the philosophy and theology of nature*. Warszawa: Wydawnictwo Uniwersytetu Kardynała Stefana Wyszyńskiego, pp. 135–153.

Lewis, D. (1987) *Philosophical Papers Volume II*. Oxford University Press.

Locke, J. (1979) *An Essay Concerning Human Understanding*. Edited by P.H. Nidditch. Oxford: New York: Clarendon Press; Oxford University Press (The Clarendon edition of the works of John Locke).

Losch, A. (2009) ‘On the Origins of Critical Realism’, *Theology and Science*, 7(1), pp. 85–106. Available at: https://doi.org/10.1080/14746700802617105.

Ludwig, P. (2018) ‘Reduction and Emergence’, in A. Barberousse, D. Bonnay, and M. Cozic (eds) *Philosophy of Science: A Companion*. Illustrated edition. New York: OXFORD UNIV PR, pp. 285–316.

MacKay, D.M. (1974) ‘“Complementarity” in Scientific and Theological Thinking’, *Zygon*, (9), pp. 225–244.

Macquarrie, J. (1970) *God Talk: Examination of the Language and Logic of Theology*. New impression edition. London: SCM-Canterbury Press Ltd.

Macquarrie, J. (1984) *In Search of Deity: An Essay in Dialectical Theism*. London: SCM Press.

Macquarrie, J. (1990) *Jesus Christ in Modern Thought*. London: Philadelphia: SCM Press; Trinity Press International.

Macquarrie, J. (1998) *Christology Revisited*. London, England: SCM Press.

Marion, J.-L. and Carlson, T.A. (1994) ‘Metaphysics and Phenomenology: A Relief for Theology’, *Critical Inquiry*, 20(4), pp. 572–591. Available at: https://doi.org/10.1086/448728.

Marmodoro, A. (2011) ‘The Metaphysics of the Extended Mind in Ontological Entanglements’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 205–227. Available at: http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199583164.001.0001/acprof-9780199583164 (Accessed: 18 October 2014).

Marmodoro, A. and Hill, J. (2008) ‘Modeling the Metaphysics of the Incarnation’, *Philosophy and Theology*, 20(1/2), pp. 99–128. Available at: https://doi.org/10.5840/philtheol2008201/25.

Marmodoro, A. and Hill, J. (2010) ‘Composition Models of the Incarnation: Unity and Unifying Relations’, *Religious Studies*, 46(4), pp. 469–488. Available at: https://doi.org/10.1017/S0034412510000119.

Marmodoro, A. and Hill, J. (eds) (2011) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press. Available at: http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199583164.001.0001/acprof-9780199583164 (Accessed: 18 October 2014).

Massar, S. and Pironio, S. (2012) ‘A Closer Connection Between Entanglement and Nonlocality’, *Physics*, 5, p. 56. Available at: https://doi.org/10.1103/PhysRevLett.108.200401.

Maudlin, T. (1998) ‘Part and Whole in Quantum Mechanics’, in E. Castellani (ed.) *Interpreting Bodies: Classical and Quantum Objects in Modern Physics*. Princeton, NJ: Princeton University Press, pp. 46–60.

Maudlin, T. (2009) *The Metaphysics Within Physics*. Oxford: Oxford University Press.

Maudlin, T. (2019) *Philosophy of Physics: Quantum Theory*. Princeton: Princeton University Press (Princeton foundations of contemporary philosophy).

McGaughey, D.R. (1997) *Strangers and Pilgrims: on the Role of Aporiai in Theology*. Berlin; New York: Walter de Gruyter.

McGrath, A.E. (2001) *A Scientific Theology: Nature: 1*. Grand Rapids, Mich: William B Eerdmans Publishing Co.

McGrath, A.E. (2002) *A Scientific Theology: Reality: 2*. Edinburgh; New York: Continuum International Publishing Group Ltd.

McGrath, A.E. (2011) *A Scientific Theology: Theory: 3*. New edition edition. London: T & T Clark International.

McGrath, A.E. (2019) *The Territories of Human Reason: Science and Theology in an Age of Multiple Rationalities*. Newyork, NY: OUP Oxford.

McLaughlin, B. and Bennett, K. (2021) ‘Supervenience’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Summer 2021. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/sum2021/entries/supervenience/ (Accessed: 31 January 2022).

McMullin, E. (2014) ‘From Matter to Materialism ... and (Almost) Back’, in P.C.W. Davies and N.H. Gregersen (eds) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press, pp. 15–46.

Merricks, T. (2007) ‘The Word Made Flesh: Dualism, Physicalism, and the Incarnation’, in Peter van Inwagen and D. Zimmerman (eds) *Persons: Human and Divine*. Oxford: New York: Oxford University Press: Oxford University Press, U.S.A., pp. 281–300.

Milbank, J. (1995) ‘Only Theology Overcomes Metaphysics’, *New Blackfriars*, 76(895), pp. 325–343.

Miller, C.L. (2017) ‘Cusanus, Nicolaus [Nicolas of Cusa]’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Summer 2017. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/sum2017/entries/cusanus/ (Accessed: 11 September 2021).

Misner, Charles.W. (1978) ‘The Immaterial Constituents of Physical Objects’. Ulm, 19 September. Available at: http://www2.physics.umd.edu/~misner/Ulm%20talk.pdf (Accessed: 13 October 2023).

Mohrhoff, U. (2014) ‘Manifesting the Quantum World’, *Foundations of Physics*, 44(6), pp. 641–677. Available at: https://doi.org/10.1007/s10701-014-9803-3.

Moltmann, J. (1985) *God in Creation*. 1st Edition. Translated by M. M. London: SCM Press.

Moltmann, J. (2015) ‘Is God Incarnate in All That Is?’, in N.H. Gregersen (ed.) *Incarnation: On the Scope and Depth of Christology*. Fortress Press. Minneapolis: 1517 Media, pp. 119–131.

Moore, A. (2016) ‘Theological Realism’, in *Routledge Encyclopedia of Philosophy*. 1st edn. London: Routledge. Available at: https://doi.org/10.4324/9780415249126-K3584-1.

Morris, T.V. (1986) *The Logic of God Incarnate*. Digital reprint 2001. Eugene, Or.: Wipf et Stock.

Mullins, R.T. (2013) ‘Simply Impossible: A Case against Divine Simplicity’, *Journal of Reformed Theology*, 7(2), pp. 181–203. Available at: https://doi.org/10.1163/15697312-12341294.

Murphy, N. (1999) ‘Physicalism Without Reductionism: Toward a Scientifically, Philosophically, and Theologically Sound Portrait of Human Nature’, *Zygon®*, 34(4), pp. 551–571. Available at: https://doi.org/10.1111/0591-2385.00236.

Nadeau, R. and Kafatos, M.C. (2001) *The Non-Local Universe: The New Physics and Matters of the Mind*. 1. issued as paperb. Oxford: Oxford University Press.

Nesteruk, A.V. (2004) ‘The Universe as Hypostatic Inherence in the Logos of God: Panentheism in the Eastern Orthodox Perspective’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. 169–183.

Ney, A. (2013) ‘Introduction’, in A. Ney and D.Z. Albert (eds) *The Wave Function: Essays on the Metaphysics of Quantum Mechanics*. Oxford; New York: Oxford University Press, pp. 1–51.

Ney, A. and Albert, D.Z. (eds) (2013) *The Wave Function: Essays on the Metaphysics of Quantum Mechanics*. Oxford; New York: Oxford University Press.

O’Collins, G. (2004) ‘The Incarnation: The Critical Issues’, in S.T. Davis, D. Kendall, and G. O’Collins (eds) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press, pp. 1–27.

Omnès, R. (2002) *Quantum philosophy: understanding and interpreting contemporary science*. Princeton, NJ: Princeton Univ. Press (Princeton paperbacks).

Orji, C. (2022) *Exploring Theological Paradoxes*. 1st edition (eBook). Routledge.

Ornes, S. (2019) ‘Quantum Effects Enter the Macroworld’, *Proceedings of the National Academy of Sciences*, 116(45), pp. 22413–22417. Available at: https://doi.org/10.1073/pnas.1917212116.

Ortlund, G. (2014) ‘Divine Simplicity in Historical Perspective: Resourcing a Contemporary Discussion’, *International Journal of Systematic Theology*, 16(4), pp. 436–453. Available at: https://doi.org/10.1111/ijst.12068.

Pannenberg, W. (1990) *Metaphysics and the Idea of God*. Edinburgh: T & T Clark. Available at: https://doi.org/10.5040/9780567691088?locatt=label:secondary\_bloomsburytheologyAndReligionOnline (Accessed: 25 February 2021).

Paul, L.A. (2012) ‘Metaphysics as Modeling: The Handmaiden’s Tale’, *Philosophical Studies*, 160(1), pp. 1–29. Available at: https://doi.org/10.1007/s11098-012-9906-7.

Peacocke, A.R. (2004) ‘Introduction’, in P. Clayton and A.R. Peacocke (eds) *In Whom we Live and Move and Have our Being: Panentheistic Reflections on God’s Presence in a Scientific World*. Grand Rapids, Mich: William B. Eerdmans Pub, pp. xviii–xxii.

Peacocke, A.R. (2009) ‘Emergence, Mind and Divine Action: The Hierachy of the Sciences in Relation to the Human Mind-Brain-Body’, in P. Clayton and P. Davies (eds) *The Re-Emergence of Emergence: The Emergentist Hypothesis from Science to Religion*. Reprinted. Oxford: Oxford University Press, pp. 257–278.

Peacocke, A.R. (2014) ‘The Sciences of Complexity: A New Theological Resource?’, in P.C.W. Davies and N.H. Gregersen (eds) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press, pp. 315–356.

Peoples, G.A. (2015) ‘The Mortal God: Materialism and Christology’, in J.R. Farris and C. Taliaferro (eds) *The Ashgate Research Companion to Theological Anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate, pp. 331–343.

Plantinga, A. (1999) ‘On Heresy, Mind, and Truth’, *Faith and Philosophy: Journal of the Society of Christian Philosophers*, 16(2), pp. 182–193. Available at: https://doi.org/10.5840/faithphil199916221.

Polkinghorne, J. (1988) *Science and creation: The Search for Understanding*. 6. impr. London: SPCK.

Polkinghorne, J. (1994) *The Faith of a Physicist*. New Jersey: Princeton University Press.

Polkinghorne, J. (2003) *Belief in God in an Age of Science*. New Haven, Conn.; London: Yale Nota Bene (Terry lecture series).

Polkinghorne, J. (2005a) *Exploring Reality: The Intertwining of Science and Religion*. London: SPCK.

Polkinghorne, J. (2005b) ‘The Continuing Interaction of Science and Religion’, *Zygon®*, 40(1), pp. 43–49. Available at: https://doi.org/10.1111/j.1467-9744.2005.00641.x.

Polkinghorne, J. (2006) *Science and creation: the search for understanding*. Philadelphia: Templeton Foundation Press.

Polkinghorne, J. (2008) *Theology in the Context of Science*. London: SPCK.

Polkinghorne, J. (ed.) (2010) *The Trinity and an Entangled World: Relationality in Physical Science and Theology*. Grand Rapids, Mich: Wm. B. Eerdmans Pub.

Polkinghorne, J. (2011) *Science and Religion in Quest of Truth*. London: Society for Promoting Christian Knowledge.

Primas, H. (1977) ‘Theory Reduction and Non-Boolean Theories’, *Journal of Mathematical Biology*, 4(3), pp. 281–301. Available at: https://doi.org/10.1007/BF00280978.

Primas, H. (1983) *Chemistry, Quantum Mechanics and Reductionism: Perspectives in Theoretical Chemistry*. 2nd Corrected Edition. Berlin, Heidelberg: Springer.

Primas, H. (1991) ‘Reductionism: Palaver Without Precedent’, in E. Agazzi (ed.) *The Problem of Reductionism in Science: Colloquium of the Swiss Society of Logic and Philosophy of Science, Zürich, May 18–19, 1990*. Dordrecht: Springer Netherlands (Episteme), pp. 161–172. Available at: https://doi.org/10.1007/978-94-011-3492-7\_9.

Primas, H. (1993) ‘The Cartesian Cut, The Heisenberg Cut, and Disentangled Observers’, in K.V. Laurikainen and C. Montonen (eds) *Foundations of Modern Physics 1992: The Copenhagen Interpretation and Wolfgang Pauli*. Helsinki, Finland: WORLD SCIENTIFIC, pp. 245–268. Available at: http://www.worldscientific.com/doi/abs/10.1142/9789814535984 (Accessed: 7 June 2022).

Primas, H. (1994a) ‘Endo- and Exo-Theories of Matter’, in H. Atmanspacher and G.J. Dalenoort (eds) *Inside Versus Outside: Endo- and Exo-Concepts of Observation and Knowledge in Physics, Philosophy, and Cognitive Science*. Berlin; New York: Springer-Verlag (Springer series in synergetics, 63), pp. 163–193.

Primas, H. (1994b) ‘Mesoscopic Quantum Mechanics’, in P. Busch, P. Lahti, and P. Mittelstaedt (eds) *Symposium on The Foundations of Modern Physics: Proceedings of the Fourth Conference*. Cologne, Germany: WORLD SCIENTIFIC, pp. 324–336. Available at: https://www.worldscientific.com/doi/abs/10.1142/9789814535335 (Accessed: 7 June 2022).

Primas, H. (1994c) ‘Realism and Quantum Mechanics’, in D. Prawitz, B. Skyrms, and D. Westerståhl (eds) *Logic, Methodology, and Philosophy of Science IX*. *International Congress of Logic, Methodology, and Philosophy of Science*, Amsterdam; New York: Elsevier (Studies in logic and the foundations of mathematics, v. 134), pp. 609–631.

Primas, H. (1998) ‘Emergence in Exact Natural Sciences’, *Acta Polytechnica Scandinavica*, Ma 91(Version cited is the author pre-print), pp. 83–98.

Primas, H. (2003) ‘Time-Entanglement Between Mind and Matter’, *Mind and Matter*, 1(1), pp. 81–119.

Primas, H. (2007) ‘Non-Boolean Descriptions for Mind-Matter Problems’, *Mind and Matter*, 5(1), pp. 7–44.

Primas, H. (2009) ‘Complementarity of Mind and Matter’, in H. Atmanspacher and H. Primas (eds) *Recasting Reality: Wolfgang Pauli’s Philosophical Ideas and Contemporary Science*. Berlin, Heidelberg: Springer, pp. 171–209. Available at: https://doi.org/10.1007/978-3-540-85198-1\_9.

Pykacz, J. (2015) *Quantum Physics, Fuzzy Sets and Logic: Steps Towards a Many-Valued Interpretation of Quantum Mechanics*. 2015th edition. Cham Heidelberg New York: Springer.

Quine, W.V. (1981) *Theories and Things*. Harvard University Press.

Quitterer, J. (2015) ‘Hylomorphic Christology’, in J.R. Farris and C. Taliaferro (eds) *The Ashgate Research Companion to Theological Anthropology*. Farnham Surrey, England; Burlington, VT: Ashgate, pp. 345–354.

Qureshi-Hurst, E. (2023) ‘The Many Worries of Many Worlds’, *Zygon®*, 58(1), pp. 225–245. Available at: https://doi.org/10.1111/zygo.12868.

Ramsey, I.T. and Smart, N. (1959) ‘Symposium: Paradox in Religion’, *Proceedings of the Aristotelian Society, Supplementary Volumes*, 33, pp. 195–232.

Ranft, P. (2012) *How the Doctrine of Incarnation Shaped Western Culture*. Lexington Books.

Rickabaugh, B. (2019) ‘Alister Mcgrath’s Anti-Mind-Body Dualism: Neuroscientific and Philosophical Quandaries for Christian Physicalism’, *Trinity Journal*, 40, pp. 215–240.

Rogers, K.A. (2010) ‘Incarnation’, in C. Taliaferro and C.V. Meister (eds) *The Cambridge Companion to Christian Philosophical Theology*. Cambridge; New York: Cambridge University Press (Cambridge companions to religion), pp. 95–107.

Rohmann, K. (1999) ‘Nicholas of Cusa: His Idea of the Coincidence of Opposites and the Concept of Unity in Unification Thought’, *Journal of Unification Studies*, 3(Online Edition), pp. 117–129.

Rosenblum, B. and Kuttner, F. (2010) *Quantum enigma*. London: Duckworth.

Roy, S. (2011) ‘Quantum Entanglement and the Philosophy of Relations’, in M. Kapoor, K. Ghoshal, and S. Bhowmik (eds) *Emerging Perspectives in Philosophy (A Critical Reflection of Thought)*. Budge Budge College, India, pp. 115–128.

Roy, S. (2016) ‘Quantum Entanglement and the Philosophy of Relations: Jaina Perspective’, in. *International Conference on Science and Jain Philosophy*, Indian Institute of Technology, Mumbai.

Ruetsche, L. (2013) *Interpreting Quantum Theories: The Art of the Possible*. Oxford: Oxford University Press.

Schaffer, J. (2018) ‘Monism’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Winter 2018. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/win2018/entries/monism/ (Accessed: 10 March 2022).

Schleiermacher, F. (1928) *The Christian Faith*. 2nd edition. Edited by H.R. Mackintosh and J.S. Stewart. London; New York: Bloomsbury T&T Clark.

Schulz, M. (2012) ‘The Trinitarian Concept of Essence and Substance’, in G. Maspero and R.J. Wozniak (eds) *Rethinking Trinitarian Theology: Disputed Questions and Contemporary Issues in Trinitarian Theology*. London: T & T Clark, pp. 146–176.

Seager, W. (2016) ‘Primas, Emergence, and Worlds’, in H. Atmanspacher and U. Muller-Herold (eds) *From Chemistry to Consciousness: The Legacy of Hans Primas*. New York, NY: Springer Berlin Heidelberg, pp. 71–93.

Seevinck, M.P. (2004) ‘Holism, Physical Theories and Quantum Mechanics’, *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*, 35(4), pp. 693–712. Available at: https://doi.org/10.1016/j.shpsb.2004.08.001.

Sellars, W. (1992) *Science, Perception and Reality*. Atascadero, Calif: Ridgeview Publ.

Senor, T. (2011) ‘Drawing on Many Traditions: An Ecumenical Kenotic Christology’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 88–113.

Senor, T.D. (2007) ‘The Compositional Account of the Incarnation’, *Faith and Philosophy*, 24(1), pp. 52–71.

Shimony, A. (1989) ‘Search for a Worldview Which Can Accomodate Our Knowledge of Microphysics’, in J.T. Cushing and E. McMullin (eds) *Philosophical Consequences of Quantum Theory: Reflections on Bell’s Theorem*. Notre Dame, Ind: University of Notre Dame Press (Studies in science and the humanities from the Reilly Center for Science, Technology, and Values, v. 2), pp. 25–37.

Shimony, A. (1999) ‘Holism’, in H. Atmanspacher, A. Amann, and U. Muller-Herold (eds) *On Quanta, Mind and Matter: Hans Primas in Context*. Dordrecht: Springer Netherlands, pp. 231–246. Available at: https://doi.org/10.1007/978-94-011-4581-7 (Accessed: 18 May 2022).

Shults, F.L. (2008) *Christology and Science*. Grand Rapids, Mich.: William B. Eerdmans Pub. Co.

Simmons, E.L. (2014) *The Entangled Trinity: Quantum Qhysics and Theology*. Minneapolis: Fortress Press (Theology and the sciences).

Smedes, T.A. (2003) ‘Is Our Universe Deterministic? Some Philosophical and Theological Reflections on an Elusive Topic’, *Zygon®*, 38(4), pp. 955–979. Available at: https://doi.org/10.1111/j.1467-9744.2003.00548.x.

Smith, W. (2005) *The Quantum Enigma: Finding the Hidden Key*. 3rd rev. ed. Hillsdale, N.Y: Sophia Perennis.

Snowden, J.H. (1915) ‘Philosophical Idealism and Christian Theology’, *The Biblical World*, 46(3), pp. 152–158.

Snyder, D.C. (1986) ‘Faith and Reason in Locke’s Essay’, *Journal of the History of Ideas*, 47(2), pp. 197–213. Available at: https://doi.org/10.2307/2709810.

Sorensen, R. (2003) *A Brief History of the Paradox: Philosophy and the Labyrinths of the Mind*. Oxford University Press.

Southgate, C. (ed.) (2005) *God, Humanity, and the Cosmos*. 2nd ed., rev. expanded. London; New York: T & T Clark.

Stamps, R.L. (2015) ‘A Chalcedonian Argument Against Cartesian Dualism’, *The Southern Baptist Journal of Theology*, 19(1), pp. 53–66.

Stapp, H.P. (1989) ‘Quanutm Nonlocality and the Description of Nature’, in J.T. Cushing and E. McMullin (eds) *Philosophical Consequences of Quantum Theory: Reflections on Bell’s Theorem*. Notre Dame, Ind: University of Notre Dame Press (Studies in science and the humanities from the Reilly Center for Science, Technology, and Values, v. 2), pp. 154–174.

Stapp, H.P. (2011) ‘Quantum Reality and Mind’, in S. Kak, R. Penrose, and S. Hameroff (eds) *Quantum Physics of Consciousness*. EBook. Cambridge, Mass: Cosmology Science Publishers, pp. 290–470.

Stapp, H.P. (2014) ‘Minds and Values in the Quantum Universe’, in P.C.W. Davies and N.H. Gregersen (eds) *Information and the Nature of Reality: From Physics to Metaphysics*. Canto classics edition. Cambridge: Cambridge University Press, pp. 134-153.

Stevenson, J. (ed.) (1995) *Creeds, Councils and Controversies: Documents Illustrating the History of the Church AD 337-461*. Rev. ed., 5. impr. London: SPCK (SPCK church history).

Studtmann, P. (2021) ‘Aristotle’s Categories’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Spring 2021. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/spr2021/entries/aristotle-categories/ (Accessed: 15 September 2023).

Stump, E. (2004) ‘Aquinas’ Metaphysics of the Incarnation’, in S.T. Davis, D. Kendall, and G. O’Collins (eds) *The Incarnation: An Interdisciplinary Symposium on the Incarnation of the Son of God*. Paperback ed. Oxford: Oxford Univ. Press, pp. 197–218.

Susskind, L. and Friedman, A. (2014) *Quantum Mechanics: The Theoretical Minimum*. New York: Basic Civitas Books.

Swedenborg, E. (1841) *The Athanasian Creed, extracted from the Apocalypse or Book of Revelations Explained*. Freeman & Bolles, Boston.

Swinburne, R. (2011) ‘The Coherence of the Chalcedonian Definition of the Incarnation’, in A. Marmodoro and J. Hill (eds) *The Metaphysics of the Incarnation*. eBook. Oxford: Oxford University Press, pp. 153–167.

Taliaferro, C. and Goetz, S. (2008) ‘The Prospect of Christian Materialism’, *Christian Scholar’s Review*, 37(3), pp. 301–321.

Tan, S.-K. (2017) ‘Jonathan Edwards’s Dynamic Idealism and Cosmic Christology’, in J.R. Farris and S.M. Hamilton (eds) *Idealism and Christian Theology*. Paperback edition. New York: Bloomsbury Academic (Idealism and Christianity, Volume 1), pp. 177–196.

Torrance, A.B. (2019) ‘Kierkegaard’s Paradoxical Christology’, *Participatio: Supplementary Volume*, 5, pp. 60–82.

Torrance, T.F. (1969) *Theological Science*. 1st Edition edition. London, New York etc.: Oxford University Press.

Torrance, T.F. (1980) *The ground and grammar of theology: consonance between theology and science*. New Ed. published 2001. Edinburgh: T & T Clark.

Torrance, T.F. (1997) *Space, Time, and Incarnation*. Edinburgh: T & T Clark.

Torrance, T.F. (2016) *The Christian Doctrine of God, One Being Three Persons*. 2nd edition. T&T Clark.

Tracy, D. (1996) *Blessed rage for order: the new pluralism in theology: with a new preface*. Chicago: University of Chicago Press.

Twombly, C.C. (2015) *Perichoresis and Personhood: God, Christ, and Salvation in John of Damascus*. Eugene, Oregon: Pickwick Publications (Princeton theological monograph series, 216).

Tyson, P.G. (2014) *Returning to Reality: Christian Platonism for our Times*. Eugene, Oregon: Cascade Books (Kalos series, 2).

Van Horn, L. (2010) ‘Merricks’s Soulless Savior’, *Faith and Philosophy*, 27(3), pp. 330–341. Available at: https://doi.org/10.5840/faithphil201027333.

Van Horn, L. (2018) ‘Dualism Offers the Best Account of the Incarnation’, in J. Loose (ed.) *The Blackwell Companion to Substance Dualism*. Pre-print copy (via author). Hoboken, NJ: Wiley/Blackwell (Blackwell companions to philosophy), pp. 440–452. Available at: https://www.academia.edu/34947914/Dualism\_Offers\_the\_Best\_Account\_of\_the\_Incarnation?auto=download.

Van Inwagen, P. (1995) *God, Knowledge & Mystery: Essays in Philosophical Theology*. Ithaca: Cornell University Press.

Varzi, A. (2019) ‘Mereology’, in E.N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. Spring 2019. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/archives/spr2019/entries/mereology/ (Accessed: 4 September 2022).

Velmans, M. and Nagasawa, Y. (2012) ‘Introduction to Monist Alternatives to Physicalism’, *Journal of Consciousness Studies*, 19(9–10), pp. 7–18.

Wainwright, W. (2009) ‘Theology and Mystery’, in T.P. Flint and M.C. Rea (eds) *The Oxford Handbook of Philosophical theology*. Oxford: Oxford Univ. Press (Oxford handbooks in religion and theology), pp. 78–102.

Wang, R.L. (2022) ‘Information is non-physical: The rules connecting representation and meaning do not obey the laws of physics’, *Journal of Information Science*, p. 01655515221141040. Available at: https://doi.org/10.1177/01655515221141040.

Weber, M. and Esfeld, M. (2013) ‘Holism in the Sciences’, *UNESCO Encyclopedia of Life Support System*, Social Sciences and Humanities, pp. 1–16.

Webster, E.C. (1984) *Crosscurrents in Adventist Christology*. ePrint. New York: Peter Lang Inc., International Academic Publishers. Available at: http://www.sdanet.org/atissue/books/webster/index.htm.

Westphal, M. (2007) ‘The Importance of Overcoming Metaphysics for the Life of Faith’, *Modern Theology*, 23(2), pp. 253–278. Available at: https://doi.org/10.1111/j.1468-0025.2007.00372.x.

Wiles, M. (2011) *The Remaking of Christian Doctrine*. New edition edition. SCM Press.

Woodfin, Y. (1972) ‘Ontological Thresholds and Christological Method’, *Religious Studies*, 8(2), pp. 137–146.

1. Within this thesis inclusive terms will be used to refer to God and humanity. The exceptions to this will be in the discussion of the incarnate Christ where it is appropriate to refer to God’s interaction with *His* body and within direct citations where the author’s original language will be maintained for accuracy, however in such instances use of “man” should be read as “human”/ “humanity”. [↑](#footnote-ref-2)
2. The terms of “functional” and “ontological” Christology are described by Macquarrie in *Jesus Christ in Modern Thought* (p. 7 as quoted above). However, a similar division can also be found in Wiles’ *Remaking Christian Doctrine* and, more implicitly in the work of Polkinghorne, and McGrath’s *Territories of Human Reason*. [↑](#footnote-ref-3)
3. This thesis places greater emphasis on the investigation of the nature of Christ’s *substance* rather than how we may understand the nature of his *being*. This relates to the appearance of metaphysical paradox being grounded, to a large degree, in assumptions about the nature and number of kinds of existent substance. [↑](#footnote-ref-4)
4. The metaphysical shift examined within this thesis provides the grounds for a holistic investigation of the life of the second person of the trinity in its entirety, however, the focus within this thesis is the hypostatic union within Christ as God incarnate. [↑](#footnote-ref-5)
5. Boolean is preferred in this context over “binary” as the latter can be misunderstood as referring to there only being two options either/or. Whereas Boolean categorisation speaks more closely to concepts such as the Law of Non-Contradiction (LNC)/Law of Excluded Middle (LEM) discussed more fully in §3.1 – whereby the “either/or” nature of the categorisation refers to being able to create discrete sets for categorisation (in contrast to non-Boolean or multivalent logic). For example, Aristotle’s multiple categories of being are still an example of Boolean categorisation because they are ‘mutually exclusive and jointly exhaustive of the things there are’ (Cf. Cohen and Reeve, 2021, sec. 1). [↑](#footnote-ref-6)
6. What is meant by the terms material and immaterial, as well as why such terminology may be considered problematic is discussed in §2.5. [↑](#footnote-ref-7)
7. See §8.6 for discussion on potentially profitable avenues for discussion in this and other areas. [↑](#footnote-ref-8)
8. As the purpose of this thesis is not to expound historical approaches to Christology but rather examine the implication of non-dualist ontology/metaphysics it is enough to note the challenges faced by the medievals in approaching Chalcedon through (philosophically motivated) ontological lenses. [↑](#footnote-ref-9)
9. There is a potential link here, although it falls outside the scope of the thesis, of whether this is echoed in Esfeld’s moderate ontic structural realism and mutual ontological dependence (discussed in chapter 6). [↑](#footnote-ref-10)
10. This is not to deny that the scriptural “data” itself was written for a variety of purposes and contains the authors’ interpretation etc. However, drawing on van Inwagen, Le Poidevin argues ‘the data [biblical accounts], which are themselves (relatively speaking) uninterpreted’ (2009b, p. 706) in comparison to for example the “theories” (Creeds). [↑](#footnote-ref-11)
11. This is not to ignore the dialogue between scholars such as Milbank (1995) and Marion (1994) on whether theology can only be saved through a phenomenological rather than metaphysical turn (see also Westphal, 2007), but (a) such discussion moves out of the realms of systematic theology to philosophical theology and (b) revolves around a particular account of metaphysics that is more tightly bound than the notion of metaphysics in science and theology as “ontological commitments” (see van Inwagen and Sullivan, 2021, sec. 4) [↑](#footnote-ref-12)
12. For example, a pre-commitment to a wholly simple model of God should not be the reason one pursues a holistic ontology, rather one should start with the ontology and then establish the theological implications. [↑](#footnote-ref-13)
13. Nonsense words generated through a word generator at www.soybomb.com/tricks/words [↑](#footnote-ref-14)
14. The question of whether there *can* be a paradox without a full understanding/account of the terms involved will be briefly examined in chapter 3. [↑](#footnote-ref-15)
15. The additional challenge faced by the historical approach, noted by Cooper, is that adherents also need to show scripture advocates a monistic rather than dualist view – unless they are able to show this within the bible (not wider theological literature/creeds etc) then they ‘hold an anthropology which is at odds with their professed view of scripture and which sides with scientific naturalism’ (Cooper, 2015, p. 41) [↑](#footnote-ref-16)
16. The challenges of and argument for a locally materialist view about human persons can be found in the dialogue between Van Horn and Merricks (Merricks, 2007; Van Horn, 2010, 2018) [↑](#footnote-ref-17)
17. This does not necessitate a claim that the Son of God, as divine, was limited in the same way that we are, or that there wasn’t the possibility for miracles to occur. Instead as Christ was human in all the ways that we are human (excluding sin) then scientific understanding about the materiality, or not, of human persons is relevant to our understanding of what it means to say “God became human” even if there are limits to what we can say. [↑](#footnote-ref-18)
18. Much of the “paradox” debate surrounding the incarnation rests on the assumption that the global dualism required by Christian theology stands in conflict with the assumed materialism of contemporary science. Primas and Esfeld each present a scientific ontology that challenges the “naive” materialism often used within discussions of paradox. This is examined in further detail in §1.5.3. [↑](#footnote-ref-19)
19. The following comments draw on samples from three edited volumes on the incarnation: Farris and Taliafero (Eds.) *The Ashgate Research Companion to Theological Anthropology* (2015); Marmodoro and Hill (Eds.) *The Metaphysics of the Incarnation* (2011); Davis, Kendall and O’Collins (Eds.) *The Incarnation* (2004). The examples are indicative rather than exhaustive. [↑](#footnote-ref-20)
20. The bracketing within panentheism includes both pantheistic and panentheistic approaches, providing a shorthand for “pantheistic or panentheistic” where the comment only refers to panentheism the brackets will be removed. [↑](#footnote-ref-21)
21. This does not mean that there is an *a priori* assumption that the difference between humanity and divinity is simply one of degree. [↑](#footnote-ref-22)
22. Willem Drees objects to the metaphor of “building bridges” between science and religion, arguing that the notion of a bridge assumes the boundaries of science and religion are fixed, the disciplines are of the same “intellectual standing”, and there is a symmetry in the relationship. This will be addressed in §1.5.3E as a challenge to the method of this thesis. However, in relation to Barth’s criticisms of natural theology, the extent to which one views this as a fatal criticism is dependent on (i) how one views the role of natural theology and (ii) the extent to which one agrees with Drees’ prioritisation of scientific knowledge. [↑](#footnote-ref-23)
23. See §2.1.15-2.1.17 for discussion of some of the boundaries around the extent to which science engages with metaphysics, and the challenges of applying realist interpretations to quantum mechanics. [↑](#footnote-ref-24)
24. Whether they are irreconcilable and/or opposites will be examined as part of the main thesis discussion. [↑](#footnote-ref-25)
25. The purpose of these sections is not to provide an exhaustive survey of the literature but instead expand on wider matters of scope and approach. [↑](#footnote-ref-26)
26. Cf. chapter 2. [↑](#footnote-ref-27)
27. In order to maintain the flow of the text above, I will be working with the following texts by Esfeld (1999b, 1999a, 2001, 2004, 2009, 2013c, 2011; Esfeld *et al.*, 2012; 2013b, 2014b; Esfeld *et al.*, 2017; 2021, 2022; Esfeld and Deckert, 2020; Esfeld and Lam, 2011; Esfeld and Sachse, 2017) [↑](#footnote-ref-28)
28. As with Esfeld the references have been placed here to avoid interrupting the flow of the text above. I will focus on the following texts by Primas (1983, 1993, 1994a, 1994b, 1994c, 1991, 1998, 2003, 2007, 2009; Atmanspacher and Primas, 2003) [↑](#footnote-ref-29)
29. Nestorianism was a 5th C contention that the divine and human natures of Christ were so separated from each other that they were "not in contact." Docetism, by contrast, was a very early view that the human nature and life of Christ were not real but matters of appearance only. Both positions were adjudged heretical. [↑](#footnote-ref-30)
30. This distinction is examined in detail in chapter 4. But briefly – ontological reductionism assumes that the “parts” of the whole being examined are genuine parts – i.e., the whole is constituted by other entities – cells are traditionally understood as ontological parts of leaves. Methodological reductionism holds that it can be useful to break a whole down in to “parts” to understand it more clearly however the method shouldn’t be mistaken for ontology. [↑](#footnote-ref-31)
31. There is no consensus on whether nonlocality should be hyphenated or not. Therefore, within this thesis unless referencing or citing texts where it is hyphenated, the unhyphenated version will be used for consistency. [↑](#footnote-ref-32)
32. Although chapter 3 engages more directly with alternative accounts of paradox, the decision to focus engagement with potential critics within discrete aspects of the thesis allows the main body of the thesis to be focused on the positive development of the potential interaction of Primas and Esfeld’s metaphysics with our understanding of the incarnation. As neither Primas nor Esfeld’s work has been brought to bear on theological matters to date, there isn’t a body of theological criticism to the work that is being undertaken here. Therefore, criticisms fall into more generalised objections to natural theology, and the interaction of science and religion as a constructive enterprise etc. which are noted briefly here. Specific metaphysical concerns about interpretations of Quantum mechanics require entire volumes themselves (e.g., Castellani, 1998; Ney and Albert, 2013; French and Saatsi, 2020) as well as monographs such as Laura Ruetsche’s *Interpreting Quantum Theories* (2013) and Shan Gao’s *The Meaning of the Wave Function* (2018). These are addressed in part in §2.1.3 and in §8.2. These challenges are contained to either “end” of the thesis as it is necessary to acknowledge, but then put to one side, the questions of realism (QM) and validity of the method beyond analogy (NT). Otherwise, one would be faced with having to continually argue for foundational premises and never progress beyond proofs for them. [↑](#footnote-ref-33)
33. This is an interesting claim in terms of “success” and it is unclear how Drees is defining this for theology, although one is led to assume he is referring to its “success” in terms of explanatory power (presumably of the natural world) as all the successes listed are not things one would expect theology to succeed at (expansion of its scope of explanation, unification of explanatory schemes, manipulation of the natural world). [↑](#footnote-ref-34)
34. In particular *Inside Versus Outside* (1994), *On Quanta, Mind and Matter* (1999) and *From Chemistry to Consciousness* (2016) [↑](#footnote-ref-35)
35. In the example that follows the notation and equations are taken from Susskind and Friedman §1.3 “An Experiment” (2014, pp. 4–11) [↑](#footnote-ref-36)
36. The Measurement Problem is specifically dealt with in §5.1.3 *The Measurement Problem and Primas and Esfeld on Entanglement*. [↑](#footnote-ref-37)
37. Boolean logic is the formalisation of Aristotle’s propositional logic is examined further in §3.1 and §5.1. The key principle to note here is that a set of Boolean statements something is either *A* or ***not****-A*. [↑](#footnote-ref-38)
38. The examples that follow are adapted from Susskind and Friedman §1.5 “Propositions” (2014, pp. 14–18) [↑](#footnote-ref-39)
39. In *Chemistry, Quantum Mechanics and Reductionism*, Primas argues that quantum mechanics ‘casts severe doubt on *isolated* [localized] systems. In contrast to classical theories, quantum mechanics predicts an *entanglement* of a system with its surroundings under the influence of even extremely weak interactions’ (1983, pp. 10–11 original emphasis). [↑](#footnote-ref-40)
40. In *Holism in Philosophy of Mind and Philosophy of Physics* Esfeld argues that ‘quantum theory does not conform to separability [local action] […] One may go as far as attributing a mixed state to each of the two systems. But the mixed state does not completely determine the state-dependent, local properties of each of these systems’ (2001, p. 207). [↑](#footnote-ref-41)
41. Questions at the interface of philosophy of mind and theology on the nature of the physical realm and emergence of consciousness/mind (a common theme of Nancey Murphy’s work) are prevalent in panentheistic discussions, whilst important, philosophical discussion of these matters is beyond the scope of this thesis. [↑](#footnote-ref-42)
42. For a brief overview in relation to scientific critical realism see Peacocke (1993, pp. 11–14); For a brief overview of the relationship to critical realism in theology see (1993, pp. 14–19). [↑](#footnote-ref-43)
43. This relates to my earlier inclusion of Cooper’s discussion of making theology “scientific” in order to secure a greater degree of validity (see §1.4). [↑](#footnote-ref-44)
44. Scientism holds that scientific knowledge/explanation is the *only* valid account of the nature of the world. Within theological work this can be presented as a drive to “raise” the religious theory to the same level of explanation as science so that it can share in accessing “the” truth. [↑](#footnote-ref-45)
45. In *Theology and Modern Physics* Hodgson argues that one of the challenges to the science-theology relationship stems from the use of everyday terms in scientific arenas. The challenge is that not only are new words sometimes created (like quark or electron) but, more challengingly old words continue to be used but with a meaning that is new or refined to both the common usage and the old scientific use. It could be argued that this is no different to the analogous use of religious language but when the language being used is also (potentially) not directly referring to reality, this adds further to the theologian’s challenge in adopting scientific language to describe God. [↑](#footnote-ref-46)
46. In *Veiled Reality* d’Espagnat argues: ‘the notion of “something” (perhaps […] gods or God, or whatnot; let us just say “something”) the existence of which is not dependent upon […] our existence is considered as logically necessary, and if, on the other hand, it is realized that […] the detailed features of this “something” are beyond our reach, then only two possibilities remain: either this “something” is altogether unknowable, and “pure X”, or it is such that we can get, or guess, some knowledge about it, but merely general or merely allegorical. (d’Espagnat, 2003, p. 355 original emphasis) [↑](#footnote-ref-47)
47. In Esfeld’s work this is via the exclusion of the immaterial from the discussion, whereas Primas explicitly argues for a unified reality. [↑](#footnote-ref-48)
48. There are numerous definitions for paradox, and not all define paradox as an actual contradiction. The variance between apparent and actual contradictions in relation to the incarnation will be discussed further in chapter 3, at this point it is only necessary to have in mind that paradox is based in tension (whether this is genuine or apparent is not pertinent at this time). [↑](#footnote-ref-49)
49. Contradiction and Aristotle’s law of the excluded middle will be examined in detail in §3.1 [↑](#footnote-ref-50)
50. The idea of paradox as being in balance aligns more closely to McGaughey’s concept of aporia. [↑](#footnote-ref-51)
51. All page references to *Exploring Theological Paradoxes* refer to the eBook edition. [↑](#footnote-ref-52)
52. The (New) King James, (New) Revised Standard, American Standard and Webster translations all use “strange”. Other translations use “remarkable” (New International and New American Standard), and its synonyms including “extraordinary” (English Standard and Complete Jewish), “amazing” ((New) Living Translation and New Century), and “wonderful” (Lexham English). [↑](#footnote-ref-53)
53. This and Boolean logic will be examined further in chapter 5. [↑](#footnote-ref-54)
54. The plausibility/possibility of the divine becoming incarnate in a human is not the focus for this thesis. Any serious engagement with the incarnation, unless adopting a “degree” Christology assumes that it was/is possible even if it is incomprehensible. [↑](#footnote-ref-55)
55. In addition to those discussed in this chapter the challenge is highlighted in the works of Leftow, Luke Van Horn, J. Cooper, Angus Menuge, and R. Lucas Stamps to name but a few. Any theologian dealing with compositional accounts or trying to reconcile an immaterial divinity with humanity in Christ is at some level engaged with a bivalent metaphysics. [↑](#footnote-ref-56)
56. Basson and Koekemoer examine “multivalent” logic in relation to science and theology, Hans Primas (2007) examines “non-Boolean” logic in relation to mind-body problem; Pykacz (2015) examines multivalued and fuzzy logic in relation to interpretations of quantum mechanics. [↑](#footnote-ref-57)
57. Wainwright uses this terminology to refer to recent volumes in which there is absence of any entry on mystery identifying: *A Companion to Philosophy of Religion* (Quinn & Taliafero Eds.), and only one entry in each of *The Oxford Handbook of Philosophy of Religion* (Wainwright Ed.), *The Blackwell Guide to Philosophy of Religion* (Mann Ed.), and *Companion Encyclopaedia of Theology* (Bryne & Houlden Eds.) [↑](#footnote-ref-58)
58. It is interesting to note that there is a tacit adherence to binary (or discrete) logic through the admission that it cannot be *fully* described by a single concept. This relates to non-Boolean descriptions discussed in chapter 5. [↑](#footnote-ref-59)
59. Kenotic accounts such as those proposed by Forrest (2000) fall in to the second category whereas Aquinas’ reduplicative strategy can be argued to fall in to first. However, as discussed here it can also be seen as challenging our metaphysical assumptions as well. [↑](#footnote-ref-60)
60. We see something similar in Esfeld’s “bottom-up” account of holism in *Holism in Philosophy of Mind*. However, Esfeld’s “borrowing” has a more permanent feel more akin to “bestowing”. How the concept may relate to Esfeld’s “families of properties” is examined in chapter 6. [↑](#footnote-ref-61)
61. See Merricks (2007) *The Word Made Flesh: Dualism, Physicalism, and the Incarnation*, in: Peter van Inwagen, Zimmerman, D. (Eds.), Persons: Human and Divine and Merricks, (2001) *How to Live Forever without Saving Your Soul*, in: Corcoran, K.J. (Ed.), Soul, Body, and Survival: Essays on the Metaphysics of Human Persons. [↑](#footnote-ref-62)
62. See Van Horn (2018) *Dualism Offers the Best Account of the Incarnation*, in: Loose, J. (Ed.), The Blackwell Companion to Substance Dualism and Van Horn (2010) *Merricks’s Soulless Savior* [↑](#footnote-ref-63)
63. This relates to an assumed possibility of Boolean categorisation of properties. [↑](#footnote-ref-64)
64. Davis identifies these as: being necessary, living forever, omnipotence, omniscience, and incorporeality (2011, p. 119). Although he acknowledges the challenge of establishing precisely which attributes are essential and which accidental, these seem to offer an uncontroversial starting point for the purpose of the discussion in this section. [↑](#footnote-ref-65)
65. Davis identifies these as: being contingent, finite lifespan, non-omnipotence, non-omniscience, and corporeality (2011, p. 119). As noted in fn75, though there may be discussion regarding whether these criteria are sufficient to categorise human beings, they serve to allow the conversation to progress. [↑](#footnote-ref-66)
66. Cusanus focuses on the coincidence of all things in the Absolute Maximum in *Learned Ignorance*. *De Visione Dei*, 1453 contains similar discussions regarding Absolute Infinity. [↑](#footnote-ref-67)
67. As with many solutions this appears to work for a general discussion of creature versus creator, but it is unclear how *two realities* could be contained within one person in the incarnation. [↑](#footnote-ref-68)
68. The question of whether God can contain injustice/evil etc is beyond the scope of this thesis. [↑](#footnote-ref-69)
69. This picks up on Cusanus’ claim that the finite and infinite are two different “realities”. [↑](#footnote-ref-70)
70. In line with P4 he argues that we don’t have enough information to know if the incarnation is *de facto* impossible. [↑](#footnote-ref-71)
71. Cupitt responds to Hebblethwaite in *Jesus and the Meaning of God* (Goulder, 1979a, pp. 31–40; pp. 43–46) [↑](#footnote-ref-72)
72. Davis identifies these as (divine-human): necessary-contingent, eternality-finiteness, omnipotence-non-omnipotence, omniscience-non-omniscience, incorporeality-corporeality (Davis, 2011, p. 119). [↑](#footnote-ref-73)
73. Hepburn’s *Christianity and Paradox* pre-dates the *Myth* debate by almost two decades. [↑](#footnote-ref-74)
74. The dialogue occurs within and across the two volumes: *The Myth of God Incarnate* (Hick, 1977) and *Incarnation and Myth: The Debate Continued* (Goulder, 1979a) [↑](#footnote-ref-75)
75. As noted at the start of this chapter the metaphysical account here and for P5 are examined together in §3.5.4 due to their centrality to the thesis. [↑](#footnote-ref-76)
76. Instead of recognising that the examples we have met to date have all shared a contingent property, which has made it appear necessary. [↑](#footnote-ref-77)
77. The idea of non-binary (non-Boolean) descriptions and their role within this discussion are dealt with more fully in chapter 5. For now, it is enough to note that non-Boolean descriptions each half of the pair (or more) of descriptions is *necessary* but neither considered in isolation is *sufficient*. [↑](#footnote-ref-78)
78. For this example, the question of whether we could produce a minimal definition of God is put to one side as it goes beyond the scope of this thesis. [↑](#footnote-ref-79)
79. Here "mental" is broadly understood. This is neutral on whether our minds are an immaterial or emergent phenomena or are entirely reducible to our brains. [↑](#footnote-ref-80)
80. These are not the only metaphysical frameworks, and indeed the terminology around “material”/“physical” and “immaterial” itself is contested, particularly in relation to scientific metaphysics. However, for the purpose of this current discussion, it is assumed that the non-contentious, and “folk” position is to hold that the divine is, in some meaningful sense “non-material” and that within the incarnation this required some level of interaction with a “material” human body. [↑](#footnote-ref-81)
81. Pannenberg, also highlights the distinction made by Heidegger that theology should be understood as reflection on faith rather than the “science of God”. If one views theology in the former sense one arrives at a description of theology in which an account of metaphysics is not only unnecessary but also unhelpful. [↑](#footnote-ref-82)
82. Without a form of supervenient or emergent metaphysics of the relationship, one arrives at either substance dualism, or strict materialism where the appearance of genuine “mental” properties is reduced to brain processes. [↑](#footnote-ref-83)
83. This relates to Dodd’s (2014) examination of the move away from understanding God’s causality univocally as only being able to act as a divine “force”. [↑](#footnote-ref-84)
84. This is not a correlation made by Van Horn in either text, however based on his description of how Christ becomes a soul the shift appears to be a change in relations (or perhaps form) rather than change in substance or kind. [↑](#footnote-ref-85)
85. The reason for basing this discussion on Crisps’ compilation of Edwards’ Christology is that his Christology is spread across his ‘labyrinthine theology […] is piecemeal or fragmentary […] not full developed in hi extant writings and […] that it may even be inconsistent or paradoxical in places’ (Crisp, 2017, p. 145). As the purpose is to examine an example of how metaphysical paradox can be overcome rather than to interrogate the Christology/metaphysics itself, a precis of the key metaphysical features suffices. [↑](#footnote-ref-86)
86. Whilst all these terms have various definitions, Edwards’ commitment to the metaphysical principles described below can be established from across his writings. [↑](#footnote-ref-87)
87. Crisp highlights that Edwards does not construct a systematic account of Christology, and both his metaphysics and Christology (such that it is) are dispersed across his writings. Thus ‘it is a perfectly legitimate exercise: the implication of a given view are contained within that view […] even if the person who espouses the view in question does not draw out these implications’ (Crisp, 2017, p. 157) [↑](#footnote-ref-88)
88. Roman numerals refer to the Discourse, Arabic numbers to the paragraph. [↑](#footnote-ref-89)
89. The epistemic uncertainty comes in to play when the events/states are too complex for us to calculate – the randomness is not a feature of reality but our capacity to calculate current and future states. [↑](#footnote-ref-90)
90. D1-D5 adapted from (Smedes, 2003, p. 958) “what is determinism?” (a)-(e) [↑](#footnote-ref-91)
91. Moore identifies similar criteria in (2016): that God exists independently; that God can be known; and that God may be spoken about truthfully (statements about God are “truth-apt”) [↑](#footnote-ref-92)
92. It may seem odd in a thesis that is arguing against reductionism/for holism time is put in to developing a model of reductionism that is less easily refuted. However the importance of this is twofold: (a) the metaphysics of quantum theory has been universally described as providing a “paradigm shift” in order for it to be a paradigm shift it must change the way we interact with, or understand the world; (b) reductionist metaphysics, as seen in chapter 3 has direct and challenging links to both our understanding of the incarnation as paradoxical and to the perceived metaphysical conflict between scientific and theological accounts of the world. [↑](#footnote-ref-93)
93. Adapted from Murphy’s example (1999, p. 557) which are in turn developed from Terrence E. Horgan. [↑](#footnote-ref-94)
94. When the S-properties are not multiply realisable, and B-properties produce the same S-properties in *all* circumstances. [↑](#footnote-ref-95)
95. As described in Murphy’s (1999) paper [↑](#footnote-ref-96)
96. Although Murphy discusses the role of hierarchies in *Physicalism Without Reductionism* (1999) these point more towards an epistemic hierarchy in which she is arguing for the reinstatement of theology at the top of the hierarchy (natural sciences – social sciences – theology) especially when this is examined alongside her commitment to ontological reductionism. [↑](#footnote-ref-97)
97. Whether a pan(en)theistic account is required by/implicit in a holistic account of Christology is not important at this point. [↑](#footnote-ref-98)
98. I am using “metaphysical holism” to refer to the claim that there are systems in the world (and even the world itself) that can be understood as not being composed of/characterized by the intrinsic properties of the parts i.e., it stands in opposition to atomism. In some literature this is referred to as “ontological holism”. [↑](#footnote-ref-99)
99. I.e., the question of whether the “wavefunction” is a mathematic tool which only refers to our knowledge rather than being a realistic entity. [↑](#footnote-ref-100)
100. This is found in sections 2-4 of *Philosophy and the Scientific Image of Man* in his collected works ‘Science Perception and reality’ (Sellars, 1992, chap. 1). The chapter was originally published in Colodny, R.G., 1962. Frontiers of science and philosophy, University of Pittsburgh Press, Pittsburgh. [↑](#footnote-ref-101)
101. This raised a question for theologians as to how the manifest image that includes the immaterial can be reconciled with a primitive ontology from which it is excluded. Likewise, how primitive ontologies may be understood if reality is not fundamentally material. [↑](#footnote-ref-102)
102. Esfeld does not address the potential ethical/theological concerns of whether this could be an exclusionary account of “social community”. The discussion of such goes beyond the scope of this thesis, however I don’t think that this account is intended, nor need be understood, as exclusionary. It is a matter of how one defined the ‘properties that make something a constituent part of a social community’ (Esfeld, 2013b, pp. 11, Sec. 5.2). [↑](#footnote-ref-103)
103. The issue of vagueness is dealt with by Horgan and Potrč (2000, 2009). [↑](#footnote-ref-104)
104. There is a particular correlation to the top-down account examined in chapter 6. [↑](#footnote-ref-105)
105. As with many matters this is dependent on the interpretation that is adopted and the extent to which one views the formalism as descriptive of reality or simply function/instrumental. [↑](#footnote-ref-106)
106. This is effectively the either/or exhibited by Esfeld’s and Primas’ accounts of holism. For Esfeld genuine partition into proper parts is possible, for Primas any such division is not occurring at an ontological level. [↑](#footnote-ref-107)
107. One could still allow a form of priority monism because it does not require that they are "made up” of different stuff. Likewise, elsewhere Esfeld talks about holism in relation to something touching on the nature of the system, but this can include parts that are very different “kinds” to their wholes – whilst this may not deal with paradox in the “expected” way (i.e., removal of the challenge of two kinds of thing) it may still provide alternatives to the current narrative. [↑](#footnote-ref-108)
108. Adapted from Ladyman (2020) Section 3. The third version which even Ladyman terms “extreme” isn’t pertinent to this discussion. [↑](#footnote-ref-109)
109. The term adopted by Ladyman and Ross, to refer to metaphysics that assumes the existence of individuals in contrast their OSR metaphysics. [↑](#footnote-ref-110)
110. This specification is made by Lam and Esfeld. It raises an interesting, although slightly tangential, question of whether there is an implicit adoption of similar position to Primas. I.e., that this ontology holds for “scientific” metaphysics without excluding the potential of a “domain” outside the investigation of science. This in turn raises a potential link to Ulrich Mohrhoff’s metaphysics in *Manifesting the Quantum World* (2014). These links will be touched on in the concluding sections of chapter 6. [↑](#footnote-ref-111)
111. Esfeld and Deckert use this term to refer to the metaphysical position they ascribe to Aristotle that ‘the fundamental physical objects do not have an intrinsic essence’ and as such are ‘bare substrata’ (2020, p. 25). [↑](#footnote-ref-112)
112. It is possible to avoid this “inevitable” metaphysical consequence if one adopts a position that includes hidden variables (e.g., superluminal signals, backward causation, or similar approaches). In *Holism in Philosophy of Mind* (chapter 8) Esfeld examines Bohm’s holistic hidden variable approach, however a discussion of this is outside the scope of this thesis. [↑](#footnote-ref-113)
113. This conception of “global” entanglement would appear to be strengthened by any form of origin narrative that starts with a single act of creation (whether *ex nihilo*, Big Bang/singularity, or some other alternative). [↑](#footnote-ref-114)
114. It is perhaps unsurprising that there are similarities to the key or founding principles in both Esfeld’s and Primas’ work as Esfeld worked with Primas’ research group at Zürich from 1994 following the completion of his (Esfeld’s) doctorate at Münster (see Atmanspacher, Amann and Muller-Herold, 1999, p. 296 ‘contextual background’ to Hosle’s Rationalism, Determinism, Freedom) [↑](#footnote-ref-115)
115. A partial Boolean set is a set in which certain operations are defined for only certain elements of the set. [↑](#footnote-ref-116)
116. These echoes are also identified by Shimony in *Holism* (1999, pp. 236–239) [↑](#footnote-ref-117)
117. The symmetry breaking process that gives rise to these distinctions is discussed in more detail in *Complementarity of Mind and Matter* (2009, pp. 185–186). It can most succinctly be understood as the idea that within a non-Boolean universe there are *no distinctions*, no patterns etc. It is only in the introduction of our choice of a perspective through which we decide what is (ir)relevant that we can see “patterns” and distinction. The fundamental symmetry (Platonic realm) is inaccessible. It can ‘only be retrospectively inferred by contextual symmetry breakings’ (Primas, 2009, p. 186). [↑](#footnote-ref-118)
118. These 6 steps (except where explicitly cited) are adapted from (Esfeld, 2004, sec. 4 (pp 614-616)) [↑](#footnote-ref-119)
119. See: *God, matter, and information: towards a Stoicizing Logos Christology* (2014) and *The
Triune God and the Triad of Matter* (2011). [↑](#footnote-ref-120)
120. Addressed in further detail in chapter 8. [↑](#footnote-ref-121)
121. This is echoed in *Quantum Entanglement*– ‘one can claim that (a) relations require relata, that is, things which stand in the relations, but that (not b) these things do not have any intrinsic properties that underlie the relations in which they stand’ (Esfeld, 2004, p. 602) [↑](#footnote-ref-122)
122. This assumption is included within the conclusion to chapter one in *Holism in Philosophy of Mind* where Esfeld writes ‘each of the constituents has the properties of the family that make something a constituent of *S*’ (Esfeld, 2001, p. 27). This could be understood as having all/enough of the properties of what it is to be part of the system “dogness” to be included in that category. i.e., even if a dog comes to have only three legs it does not cease to have the attributes necessary to be a member of that “system”. [↑](#footnote-ref-123)
123. E.g., a community can be said to have the property of being “caring” because this is something that the constituent individuals have, likewise a human can be said to have the property of being able to cleanse toxins from the blood because this is a property of a constituent organ - the liver. (Cf. Esfeld, 2001, pp. 23–24) [↑](#footnote-ref-124)
124. Although a trinitarian God is assumed with Christin theology, at this point the “internal” composition of the Godhead is not relevant to the focus in the distinction between “divinity” and “divinity made incarnate” as potential holistic systems. [↑](#footnote-ref-125)
125. Gregersen argues that a pantheistic model is undesirable because it leaves open the room that *any* biological, historical, or physical event whether loving, neutral, or evil is a ‘natural revelation to *exactly the same extent*’ (Gregersen, 2011, p. 113 emphasis added) e.g., that the holocaust reveals God as much as resurrection. [↑](#footnote-ref-126)
126. He goes on to note that “things” do not necessarily have to be in individuals, and that the demarcation of things as individuals may require further properties or conditions to be met. [↑](#footnote-ref-127)
127. It is possible to disagree with my definition of a human person as a holistic system on the grounds that a functional definition of the organs does not establish that the human organism is a holistic system. It is possible to produce functional individual organs in isolation from the human organism itself and therefore they do not require a “suitable arrangement”. In response to this I would argue that I am not defining the human organism in functional terms, I do not think that it is necessary for the “functions” of different organs to be carried out individually either by biological or artificial organs to make the case for a human person existing. However, I do believe that for a human organism to be considered a person the properties that make the parts of a human “constituents of” the system are entirely ontologically dependent upon there being other things (whether mechanical or biological) that are arranged in such a manner that there is a holistic system. Alternatively, it is possible to argue that something can only be said to exhibit a holistic property if, when it is instantiated, there are many objects that instantiate the same property(ies). Esfeld’s definition of a holistic system allows for variability in the number of times a family of properties that makes something constituent of a system are instantiated in that system. This means that it is possible to understand an organism as a holistic system even though each family of properties may only be instantiated once or twice. The advantage to using the example of a human person is that is readily allows for the discussion of non-contentious “parts” that are not overly complicated by questions about the transitivity of their properties but allow for an uncomplicated understanding of the nature of families of properties. There is no implication in the use of the anthropological example that there is an analogy between God and the body/world. It is purely for illustrative rather than analogical purposes. [↑](#footnote-ref-128)
128. I.e., the property can be held by objects not within the system, or with the part being the only thing in existence. [↑](#footnote-ref-129)
129. One complex whole can contain various constituent parts and, crucially, these constituent parts may have properties that belong to different “families”. [↑](#footnote-ref-130)
130. In Esfeld’s writing there is a clear commitment to allowing different families of properties to “attach” various constituent parts to the whole (again he uses the properties of organs that makes them part of the human body as an example). He also notes that ‘the same system can be holistic with respect to some of the properties […] but atomistic with respect to others of them’ (Esfeld, 2001, p. 16) [↑](#footnote-ref-131)
131. It is important to remember that *G* has already been specified as the Trinitarian Godhead and not “divinity” in general and therefore the (family of) constituent properties do not need to be compatible with for example deism, or non-incarnate theistic accounts. This allows for the inclusion of HN in a manner that wouldn’t be possible with an account of divinity that needed to apply across concepts of God. [↑](#footnote-ref-132)
132. Properties that do not only apply to a specific individual (person/thing/object). [↑](#footnote-ref-133)
133. His philosophy of mind in *Holism in Philosophy* is an epistemological examination of the structure of belief systems rather than one which addresses the hard problems of consciousness and/or the nature of mental events. Thus, his ultimate claim that a global holism should be rejected due to its incompatibility with a holism of beliefs neither provides ontological justification for rejecting it as only being applicable at the quantum level nor provides a framework for examining the immaterial/physical interaction across mundane persons and/or the special case of Christ. [↑](#footnote-ref-134)
134. Esfeld’s brief argument that it is impossible to combine global quantum holism and a substantive “mental” holism resides on the assumption that any attempt to do so assumes, with d’Espagnat, that the physical and mental are complementary *aspects* of the same “object”. This proposition, far from being a solution Esfeld argues leads of necessity to psycho-physical parallelism because complementary aspects cannot have a causal effect on each other and thus contradicts his aims to revise cartesian philosophy of mind. A more comprehensive account of the arguments around this position are not possible, but it is important to note that again Esfeld’s commitment to a particular model of cartesian philosophy of “mind” is the explicit barrier to considerations of a global account, and these obstacles don’t necessarily continue to exist with alternative ontological commitments. [↑](#footnote-ref-135)
135. Here I am not assuming a metaphysics of individuals over relations (or another model) but using individuals to refer to the “separate” persons of the Trinity (Father, Son, and Holy Spirit). [↑](#footnote-ref-136)
136. I am grateful to Niels Gregersen for his comments during a meeting of the Science and Religion Forum in Birmingham (2022) that have prompted this representation. Any misrepresentation of his views is entirely due to my own poor record keeping. [↑](#footnote-ref-137)
137. ***T***rinitarian, ***P***erichoretic and ***E***nrichment properties. [↑](#footnote-ref-138)
138. Given their commitment to a minimalist ontology in which the only things that exist are matter points ‘individuated by distance relations and change of these relations’ (Esfeld and Deckert, 2020, p. 57) this seems a reasonable assumption. [↑](#footnote-ref-139)
139. Ultimate parts are parts of a whole that do not themselves have further proper parts (i.e., parts that do not constitute the whole) [↑](#footnote-ref-140)
140. Donald Davidson argues that that whole universe is to be understood as a closed system and therefore one is removed from questions regarding indeterminism. However, the universe as a single system (with the implication of pantheism) raises an array of questions that fall outside the scope of this thesis, yet it is useful to note that alternative accounts (beyond theism) can be accounted for whilst remaining in line with the findings of contemporary science. [↑](#footnote-ref-141)
141. He notes that his three criteria of “Cartesianism” allows for the inclusion of scholars who pre-date Descartes and, potentially, for the exclusion of Descartes himself. [↑](#footnote-ref-142)
142. The location question lies at the heart of Stamps’ discussion in *A Chalcedonian Argument Against Cartesian Dualism* whereas the “metaphysics” question that is of concern in this thesis is more in the direction of Rickabaugh’s concluding call that ‘dualists must seriously engage the physicalist challenge to work out metaphysically rich accounts of embodiment within the framework of dualism’ (2019, p. 239) [↑](#footnote-ref-143)
143. Nesteruk does not make the link to Platonic forms, however given the role and activity he envisions for “nature”, it appears that nature is understood as a (neo-)platonic type of guiding power that shapes the way in which the *ousia* is shaped or structured within “individual” objects. [↑](#footnote-ref-144)
144. This is implied rather than explicit in Franklin’s work. [↑](#footnote-ref-145)
145. It is possible that Peacocke would have denied such a characterisation of his work, as he strongly identifies his work within a panentheistic framework – however his commitment to a physicalism about the natural world and clear distance from “local emergentism” would appear to place him at least in sympathy with this school of thought if not a fully committed local materialist. [↑](#footnote-ref-146)
146. In particular the work of Stephen Holmes (2001, 2014), Dolezal (2011) and Ortlund (2014) in conversation with authors such as Mullins (2013) and Hasker (2016) who challenge the coherence of (strong) divine simplicity. [↑](#footnote-ref-147)
147. Ortlund (2014) and Hasker (2016) both make significant use of Dolezal’s work in their examination for and against simplicity respectively. [↑](#footnote-ref-148)
148. DDS has no commitment to a part-less ontology at the mundane or created level, and often implicitly argues against such claiming instead that it is simplicity that stands God apart from the created universe. Despite repeated reference to a platonic heaven/unity between spirit and matter Primas does not explicitly deal with theological matters however it seems reasonable to assume that had he applied his ontology to theological concerns he wouldn’t have suddenly started including parts. [↑](#footnote-ref-149)
149. As will be examined shortly, that idea that SDDS is the “traditional” version of DDS is debated and Ortlund’s *Divine Simplicity in Historical Perspective* paints a very different account of the historical roots that align the traditional model more closely with WDDS. [↑](#footnote-ref-150)
150. Mullins doesn’t acknowledge that he is addressing SDDS as “simply impossible” and doesn’t examine whether the criticisms still pertain to the WDDS model. This differs slightly from Hasker (2016) who at least describes the DDS he is critiquing as a strong doctrine of divine simplicity, even if he never explicates what might be meant by a “weak” version, although as Hasker concludes by stating that ‘the strong doctrine of divine simplicity *is* a mistake, one from which theology needs to be liberated’ (2016, p. 39) one is left with the impression that he doesn’t necessarily adhere to the view that WDDS is a mistake. [↑](#footnote-ref-151)
151. There are difficulties associated with arguing that God holds “creator”, “redeemer” intrinsically due to the question of whether God could have been free to have not created/saved etc or if these acts were necessarily part of God if this means that God’s freedom is limited. This issue is dealt with in depth in *God without Parts* (Dolezal, 2011, chap. 6) [↑](#footnote-ref-152)
152. Even though a full examination of the literature on degree Christology won’t be possible within the scope of this thesis, I will make use of Macquarrie’s degree account to examine this as a possible implication of adopting a pan(en)theistic Christology. [↑](#footnote-ref-153)
153. Gregersen uses the term “divine informational resource” (2014, p. 434). [↑](#footnote-ref-154)
154. For this discussion I will focus primarily on Bracken’s 2016 article *Incarnation, Panentheism, and Bodily Resurrection* as it has the most detail on how Bracken sees the theory working in relation to the incarnation over other articles that prioritise discussions of God’s will and/or wider questions of theological cosmology. [↑](#footnote-ref-155)
155. Bracken’s language of systems, and examples of “subsystems” within the body as able to maintain their identity despite combination does align with Esfeld’s direction of thinking especially with their shared focus on the relational nature of “society” in their modelling. However, as the following discussion shows this similarity of language should not be taken for a necessary similarly of ontology. [↑](#footnote-ref-156)
156. See Primas (Primas, 2007, sec. 3.5) [↑](#footnote-ref-157)
157. As noted elsewhere Primas’ ontology does not deal with the question of divinity, however in reference to the mind matter divide he states: ‘The traditional characterization of the mental and physical

domains does not allow us to construct a workable theory for the mind-matter problem’ (2003, p. 29). (This is a useful analogy if one assumes God is immaterial and we are at least partially material, however that is understood) [↑](#footnote-ref-158)
158. This correlation is seen in Culp’s (Culp, 2021, sec. 2) discussion of panentheism and contemporary accounts of process theism (see Cooper, 2007). [↑](#footnote-ref-159)
159. This terminology is taken from Gregersen’s account that ‘The “father” is the ultimate source of divine life and the existence of the cosmos, the “Son” or Logos is *the informative principle in God*, and functions also as the informational resource of creation, while the “Holy Spirit” is the divine energy that also energizes the world of the living’ (2014, p. 412 emphasis added) [↑](#footnote-ref-160)
160. For the sake of simplicity, it will be assumed that these can be classified into Boolean sets. [↑](#footnote-ref-161)
161. For simplicity, and brevity I am not accounting for the Trinitarian Godhead as the holistic system of which Christ is a part, as was the case in chapter 6. In this summation it is only necessary to show how the distinct properties can be brought into a coherent whole in the incarnation. [↑](#footnote-ref-162)
162. As set out in the statement of my thesis. [↑](#footnote-ref-163)
163. To borrow the title from Clayton, P. and Davies, P. (eds) (2009) *The Re-Emergence of Emergence: The Emergentist Hypothesis from Science to Religion*. [↑](#footnote-ref-164)