

Chapter 2

Newton's Neoplatonic Ontology of Space: Substantivalism or Third-Way?

Among philosophers of space and time, two aspects of Newton's ontology of space have seldom been questioned: first, that Newton qualifies as a substantivalist, since he reckons space to be an independently existing substance or entity (see §1.1.1); and second, that Newton's views were deeply influenced by his seventeenth century Neoplatonic predecessors, especially Henry More, whose ontology grounds the existence of space upon an incorporeal being, i.e., God or World Spirit. While the majority of the interpretations of Newton's spatiotemporal ontology in the twentieth century supported these conclusions, a number of important investigations over the past several decades have nonetheless begun to challenge even these ostensibly safe assumptions. Among the most important of these reappraisals can be found in the work of Howard Stein (e.g., 1967, 2002) and Robert DiSalle (e.g., 2002, 2006), who both conclude that the content and function of Newton's concept of absolute space should be kept separate from the question of Newton's alleged commitment to substantivalism. More controversially, Stein (2002) further contends that Newton's natural philosophy treats space as akin to a basic fact or consequence of any existing thing, a view categorized as one of the more epistemologically-oriented, third-way alternatives in Chap. 1, i.e., the definitional conception of space, and therefore non-substantivalist. A related, albeit much more nuanced, interpretation that parts company with traditional substantivalism may also be evident in an influential article by J. E. McGuire (1978a), who argues that space for Newton is "the general condition required for the existence of any individual substance" (1978a, 15). As regards the second of our traditional assumptions associated with Newton's spatial ontology, Stein (2002, 269) forthrightly rejects any Neoplatonic content, whereas McGuire's (1983) essay conjectures that, though "Platonic in character", the primary influence on Newton's ontology is "Descartes' *Meditations*, rather than the eclecticism of Renaissance Neo-Platonism, of which we find little evidence in *De gravitatione*" (1983, 152).¹

¹In contrast, we will argue that Cambridge Neoplatonism and elements of the (often similar) Gassendi-Charleton philosophy are the primary influence on Newton's ontology of space. McGuire

This chapter will examine the ontology of Newton's spatial theory in order to determine the accuracy of these novel historical reassessments; namely, that Newton's concept of space is (i) non-substantivalist, (ii) anti-Neoplatonist, and (iii) is in line with the particular third-way interpretation supported by Stein and DiSalle. Many of the themes that will inform our overall investigation of the ontology of space, such as the different ways that an entity can relate to space, will quickly take center stage, thus securing a basis for comparison and further analysis with other spatial hypotheses, whether from the seventeenth century or in contemporary debates, throughout the remaining chapters. While §2.1 will introduce the basic outline of the non-substantivalist and third-way components of these alternative interpretations, §2.2, §2.3, and §2.4 will be devoted to a lengthy critical analysis of the type of third-way case presented in Stein (2002), an investigation that will require a close examination of many of Newton's works, especially the unpublished tract, *De gravitatione*. As will be demonstrated, Newton's spatial theory is not only deeply imbued in Neoplatonism, contra the revisionist trend, but these Neoplatonic elements likewise compromise Stein's definitional, third-way interpretation. Nevertheless, Newton's spatial ontology does in fact accord with another third-way approach, the property theory of space, or P(O-dep), introduced in Chap. 1—and hence Stein's non-substantivalist reading and third-way classification are, on the whole, correct, although for drastically different reasons, and with respect to a different third-way hypothesis. Throughout our investigation, furthermore, the specific details and subtleties of Newton's particular brand of Neoplatonism will be contrasted with the ontologies of his contemporaries and predecessors, and by this means a more adequate grasp of the content of his theory of space will be obtained.

2.1 Two Third-Way Conceptions of Newton's Absolute Space

Before launching into an investigation of the historical details associated with their arguments, it would be helpful at this point to delineate the strategies employed by the principle proponents of a non-substantivalist, third-way interpretation. As

also comments on “the question of Henry More's influence on Newton's doctrine of extended space”, concluding “that it is minimal in the period from 1664 to 1668” (1983, 152; where the four year span, 1664–1668, covers the then accepted period for the composition of Newton's major treatise on the ontology of space, *De gravitatione*—see footnote 10 on the recent dating of this work). However, McGuire later conceded “that a possible influence” on Newton's concept of emanation (see §2.2) “is Henry More” (1990, 105); and, in his most recent work (2000, 2007; McGuire and Slowik 2012), he successfully pursues a number of Neoplatonic threads in Newton's natural philosophy. Nevertheless, these post-1990 reappraisals fall short of openly retracting McGuire's earlier demotion of the Cambridge Neoplatonist influence, and thus the justified authority of McGuire's pre-1990 work is likely to give a misleading impression of his evolving conception of these issues (if examined in isolation from the later output). In private discussion, McGuire has indeed confirmed this potential mischaracterization of his overall Newton scholarship, adding that the new dating of *De gravitatione* provided a crucial stimulus to the evolution of his views. Finally, unless otherwise noted, all references to Neoplatonism refer to the seventeenth century varieties then popular in England.

described in Chap. 1, third-way theories of space reject the standard dichotomy between substantivalism (that space is an entity of some sort) and relationism (that space is a mere relation among entities) for an alternative ontology that aims to combine the best aspects of the traditional pair while avoiding their major weaknesses. While ascertaining the details of these theories, and how they differ from the more sophisticated forms of substantivalism and relationism, is a daunting task, Newton's spatial ontology may present a viable candidate for a third-way interpretation, since Newton's spatial theory is difficult to place using the standard dichotomy.

The first of these third-way interpretations stipulates that, apart from his metaphysics, Newton's concepts of absolute space and time in the *Principia* (N 64–70) are best regarded as definitions, mathematical concepts, or structures required for the successful application of his physics, namely, for the three laws of motion and the theory of gravity (and including the mathematical apparatus associated with these hypotheses). That is, Newton may have engaged in the speculation on the nature of space common among seventeenth century natural philosophers, but the crucially important feature of his overall theory is the realization that “a spatio-temporal concept belongs in physics just in case it is defined by physical laws that explain how it is to be applied, and how the associated quantity is to be measured” (DiSalle 2002, 51). This approach to Newton, as mentioned in Chap. 1, can also be described as the definitional or dynamical interpretation, the latter indicating the role that force plays in singling out inertial and non-inertial motions. In contrast to the advocates of relational motion (Descartes, Huygens, Leibniz), Newton understood that the motions and dynamical interactions of material bodies could not be adequately treated by recourse to their relative motions alone (e.g., the famous bucket experiment in the *Principia*, N 68–70). Yet, while he was correct as regards absolute time and absolute acceleration (and, hence, rotation), absolute spatial position and absolute velocity would eventually be recognized as overly rigid and unnecessary structures for an adequate treatment of acceleration within the context of Newtonian physics. As DiSalle comments, a four-dimensional spacetime structure equipped with an affine connection (neo-Newtonian spacetime) would have sufficed for Newton's purposes (DiSalle 2002, 35).

We will label this definition-based strategy the “weak third-way” interpretation of Newton's spatial ontology *if* it also accommodates other approaches that *do* take into account the metaphysical disputes common in that era. In reflecting on the question, “What concepts of time, space, and motion [in the *Principia*] are required by a dynamical theory of motion?”, DiSalle offers what is possibly his most forthright endorsement of the weak third-way line:

Asking this question about Newton's theory *does not deny its connection with his profound metaphysical convictions*—not only about space and time, but about God and his relationship to the natural world. On the contrary, it illuminates the nature of those convictions and their relationship to Newton's physics. For Newton, God and physical things alike were located in space and time. But space and time *also* formed a framework within which things act on one another, and their causal relations become intelligible through their spatio-temporal relations—above all, through their effects on each other's state of motion.” (DiSalle 2002, 38; emphasis added).

While acknowledging Newton's "profound metaphysical convictions", which include space, time, and "God and his relationship to the natural world", DiSalle adds that space and time "also" formed a framework for understanding the dynamical relationships among bodies. The implication of this assessment, at least at face value, is that the content or role of space and time may not be exhausted by their constitutive function in Newton's dynamics. Although the evidence is open to interpretation (see footnote 2), the fact that DiSalle does not seriously engage the details of Newton's metaphysics in order to counter the traditional substantivalist position thus lends some support for a weak third-way reading. He later adds that "Newton was not a 'substantivalist', *at least not in the now-standard use of the term*" (emphasis added), since Newton was critical of substance ontologies, and he did not regard the parts of space as possessing an intrinsic individuality, whereas the modern substantivalist (often) views spacetime points as irreducibly basic existents (DiSalle 2006, 37; see also Chaps. 1 and 6). Once again, this appraisal leaves open the possibility that other notions of substance, "not in the now-standard use of the term", might apply in Newton's case.²

The weak third-way reading gains credibility in the first edition of the *Principia* (1687), which contains little metaphysics treating those all-important Neoplatonist concepts, substance and God—yet, later editions of the *Principia* (the General Scholium of the second edition, 1713), the later *Queries to The Opticks*, and various non-published writings (to be discussed below) do indeed pick up these ontological themes, thus trying to infer Newton's overall commitment to the weak thesis remains difficult to gauge. One of the most meticulous investigations of Newton's concepts of space and motion, namely, Rynasiewicz (1995), would seem to be consistent with the weak third-way conception, however. Among twentieth century commentators, one of the earliest cases for a weak third-way interpretation of Newton is Toulmin (1959), although Stein's landmark (1967) is better known today (the latter also hinting towards a strong third-way reading, see below).

Stein (2002), on the other hand, openly sanctions a much stronger position that goes well beyond the weak third-way view: Newton's *metaphysics* does not, in fact, advocate a form of substantivalism—call this the "strong third-way" interpretation of Newton. Whereas the weak interpretation is confined to Newton's handling of the concepts of space and time as they appear in his *physics*, the strong thesis actually engages Newton's metaphysical writings in an attempt to counter the prevailing consensus that Newton endorsed substantivalism or a seventeenth century equivalent. Stein claims that "Newton's 'metaphysics of space' is...that space is (some

²To be specific, private correspondence with DiSalle (Princeton, Spring 2009) seemed to support the weak third-way interpretation, but a presentation at the 2012 meeting of the International Society for the History of Philosophy of Science (King's College, Halifax) by DiSalle, entitled, "Transcendental Philosophy from a Newtonian Perspective", appeared to favor the strong third-way reading (to be discussed below). Huggett's analysis of DiSalle (2008, 404–405) would seem to side with the strong interpretation as well, since DiSalle claims that Newton's concept of absolute space does not allow the material world to possess different, but uniform, positions or velocities (see Chap. 6 for these discussions). Consequently, while DiSalle's work (2002, 2006) is open to a weak third-way construal, it is unclear if that is the position he accepts.

kind of) effect of the existence of anything, and therefore of the first-existing thing” (2002, 268). In essence, Stein interprets Newton's metaphysics as sanctioning a conception of space that fits neither substantivalism nor its chief rival, relationism. Rather, the view that Stein attributes to Newton is very much like Stein's *own* metaphysical interpretation of space (spacetime), as a passage from an earlier essay makes clear: Stein claims that spacetime structures are “an ‘emanative effect’ of the existence of anything” (Stein 1977b, 397), where the phrase in quotation marks, “emanative effect”, is an obvious allusion to Newton's spatial hypotheses (as will be explained shortly). If space is conceived as an “effect of the existence of anything”, as Stein regards both his own theory and Newton's, then it is quite difficult to pin an ontology to this thesis, let alone a commitment to substantivalism. That is, space is not an independently existing substance/entity because it depends (in some manner) on the existence of “anything”, presumably, physical bodies or fields, thus violating the independence clause for substances. But, neither is it a mere relation, since the domain (as the set of possible values) of the spatial relations in a given universe at any instant is not limited to the actual spatial relations among the material existents at that instant, as it is under strict eliminative relationism (see Chap. 1). In short, Stein's metaphysics-avoiding and physics-centered interpretation of Newton, like his own hypothesis, would seem to favor the third-way, definitional conception of space as opposed to the prevailing substantivalist and relationist ontologies.³ Although an in-depth examination of several third-way interpretations of spatial ontology will be confined to Chap. 5, we will ultimately judge the merits of a proposed strong third-way classification for Newton's spatial theory in subsequent sections of this chapter.

2.2 The Case for a Strong Third-Way Interpretation

At a first glance, the strong third-way analysis of Newton's spatial concepts appears quite promising. In his unpublished work, *De gravitatione* (henceforth, *De grav*), which most likely predates the *Principia* by roughly six to eight years (i.e., c. 1680), Newton insists that space “has its own manner of existing which is proper to it and

³Substantivalism, as noted in §1.1.1, is a complex topic, with various interpretations spotlighting different aspects of the concept. However, if forced to give a quick synopsis of the conclusions of this chapter, then Newton's ontology of space is substantivalist *if* one defines substantivalism as an entity that can exist in the absence of all matter; but, Newton's space is not substantivalist *if* that concept denotes an entity that is independent of all other entities—since, as the traditional accounts have correctly insisted, Newton holds that space necessarily depends on God. Additional discrepancies with the modern approaches to substantivalism will be discussed in Parts II and III. Furthermore, while a strong third-way, non-substantivalism fails (since Newton's space is deeply metaphysical and theological), a weak third-way, non-substantivalism is nonetheless a consistent interpretation (although difficult to corroborate). Finally, as noted in Chap. 1, the pairing of Stein and DiSalle under the “definitional” label is conjectural, since Stein's views on space are open to interpretation; but, they are clearly quite similar in their deflationist approach to spatial ontology, hence the common pairing seems warranted.

which fits neither substance nor accident [i.e., property]" (N 21). Space "is not a substance...because it is not absolute in itself, but is as it were an emanative effect of God and an affection of every kind of being; on the other hand, because it is not among the proper affections that denote substance, namely actions, such as thoughts in the mind and motions in body" (21). He adds that space is not a substance since it cannot "act upon things, yet everyone tacitly understands this of substance" (21), but neither is it an accident of body, "since we can clearly conceive extension existing without any subject, as when we imagine spaces outside the world or places empty of any body whatsoever" (22). The substance/accident dichotomy holds that all existents are either self-dependent substances, or the properties (accidents) that can only exist "within", or "inhere in", a substance (see, e.g., Bolton 1998, 179 on the substance/property dichotomy in this period). In contrast, Newton consistently refers to space as an "affection" (*affectio*) or "attribute" (*attributa*)⁴:

Space is an affection of a being just as a being (*Spatium est entis quatenus ens affectio*). No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an emanative effect (*effectus emanativus*) of the first existing being, for if any being whatsoever is posited, space is posited. (25)

Much of the ensuing investigation in this chapter will strive to unravel the complexities of this quite enigmatic passage, but we will first investigate Stein's strong third-way, non-substantivalist interpretation in more detail.

2.2.1 *Space as a Necessary Consequence or Result*

Based largely on the evidence of the above quote, Stein concludes that "Newton does *not* derive his 'Idea' of space—its ontological status included—from his theology (as has often been claimed); for he tells us that if *anything* is posited, space is posited" (Stein 2002, 268). Because God is the first existing thing, "space (in some sense) 'results from' the existence of God" (268), but this does not detract from Newton's general hypothesis that "space (in some sense) 'results from' *the existence of anything*" (268). He adds:

But this sense of the word—simply *a necessary consequence*, with no connotation of "causal efficacy" or "action"—*exactly* fits the rest of what Newton says; indeed, this meaning might have been inferred directly from Newton's words: "[S]pace is an emanative effect

⁴Overall, Newton's concept of substance is difficult to accurately fix relative to his contemporaries and predecessors, largely because he seldom provides any details when employing this term. The same is true as regards his employment of "affection" and "attribute", which seem to denote a property that is necessary for a being's existence, whereas an "accident" (such as red, triangular, etc.) is not. Newton refers to space as an attribute/affection of all being, while denying that it is an accident, thus (apparently) demonstrating its necessity for all being (see also footnote 20). For these metaphysical categories, see, once again, Bolton (1998), as well as Carriero (1990) for more on Newton's use of the term "affection".

of the first-existing being, for *if I posit any being whatever I posit space*”: the second clause tells us precisely what the first clause *means*. (269)

Stein’s strong third-way interpretation of Newton stands out rather clearly in this passage, for, stripped of its ontological connotations, “space as an emanative effect” becomes simply “space as a necessary consequence of the existence of anything”—and, of course, it is just this type of ontologically deflationary reading that Stein counsels, i.e., space as a basic fact, neither causally generated nor possessing causal powers, and hence quite difficult to read as the product of Neoplatonist, or substantialist, dogma. On the whole, only the definitional conception of space would appear to meet the requirements of this stridently non-ontological assessment (but see also §10.5.3).

How plausible is Stein’s case for a strong third-way construal? While some of the objections will have to await subsequent sections of the chapter, wherein the ontology of the Cambridge Neoplatonists will be discussed, there are a few difficulties that can be raised directly. First of all, Newton never explicitly states that space is a *necessary* consequence or result, which is a description that, as noted above, seemingly equates space with a form of logical or conceptual fact, as opposed to an ontological feature of entities.⁵ Presumably Newton would have emphasized this “necessary consequence” notion of space in a more lucid manner, since his application of the relevant terms, especially “emanative effect”, often parallels the decidedly ontological meaning given to these very same terms in earlier Neoplatonist tomes. Moreover, other passages would seem to support the traditional ontological picture of Newton’s spatial theory, such as his comment that space “is something more than an accident, and approaches more nearly to the nature (*naturam*) of substance” (N 22). If Newton’s concept of space, as Stein contends, is more logical than ontological, it would seem to follow that Newton should reject any application of the substance/accident dichotomy to space—one would not expect that he would try to place the concept somewhere between these traditional ontological positions.

Overall, the best evidence for Stein’s interpretation appears in the quotation examined at length above, where Newton claims that “space is an emanative effect of the first existing being, for if any being whatsoever is posited, space is posited” (25), whereupon Stein reasons that “the second clause tells us precisely what the first clause *means*” (Stein 2002, 269). In *De grav*, however, the term “emanative effect” is *not* used with reference to “any being whatsoever”, but *only* to God or the “first existing being”. To avoid the obvious theological implications, Stein takes the phrase, “first existing being”, to pertain to *any* first existing being, presumably even

⁵In a later writing, Newton does refer to infinite space and time as “modes of existence in all beings, & unbounded *modes* & consequences of the existence of a substance that which is really necessary & substantially Omnipresent & Eternal” (Koyré and Cohen 1962, 96–97; see, also, §2.4.1). The use of the term “consequences” in this passage might be taken to support the strong third-way, non-substantialist interpretation—yet, it is used in conjunction with the basic ontological term, “modes”, which denotes the specific way in which a being manifests a general property (e.g., circular is a mode of shape). Consequently, it is not clear whether this passage actually assists or harms Stein’s third-way reading.

a mere corporeal being—but this interpretation strains credibility. On Newton's ontology, only God (or possibly a world soul) can qualify as the first existing being, as the context of *De grav* makes clear. Once again, the evidence for space's incorporeal ontological foundation will emerge in more detail in the ensuing sections, where the distinction between emanation and space as an attribute of “being qua being” will be explained.

Second, if Newton's emanation concept is merely the claim that “if any being whatsoever is posited, space is posited”, then one would expect a much more general application of this concept to other beings, especially corporeal being. The fact that Newton never entertains the possibility that space could emanate from a material body, or anything other than God (or a world soul), strongly suggests that Stein's readings of “emanative effect” and “first existing being” are much too broad.⁶

Third, concerning Stein's attempt to equate “first existing being” with “any first existing being”, a serious difficulty resides in the historical fact that there were clear precedents among the earlier Cambridge Neoplatonists for employing such phrases, like “first existing being”, with reference to God alone. In More's *Enchiridium Metaphysicum* (1679), there are several instances of such terms in his well-known comparison of the metaphysical titles ascribed to both God and spatial extension:

For this infinite and immobile extension will be seen to be not something merely real...but something divine after we shall have enumerated those divine names or titles which suit it exactly,...Of which kind are those which follow, which metaphysicians attribute to First Being. Such as one, simple, immobile, eternal, complete, independent, existing from itself, subsisting by itself, incorruptible, necessary, immense, uncreated, uncircumscribed, incomprehensible, omnipresent, incorporeal, permeating and encompassing everything, being by essence, being by Act, pure Act. (EM 57)

As is evident given the references to “being by essence”, “being by Act”, etc., More's discussion of “First Being” relies heavily on concepts that originate from Aristotle's *Metaphysics*; in particular, the existence of an eternal, immovable “first” substance required to ground the world's lesser, finite, and mutable substances.⁷ These traits of First Being, therefore, are only applicable to God or a world soul, although More's contention is that most also apply to space: “That which, however, is the first Being and *receives all others*, without doubt exists by itself, since nothing is prior to that which sustains itself” (59; emphasis added). Accordingly, the historical context of the terms and phrases used in Newton's work would seem to fatally

⁶The term “emanative effect” only appears three times in *De grav*. Besides Stein's favorite of these three quotations (i.e., “space is an emanative effect of the first existing being”), there are: “[space] is as it were an emanative effect of God and an affection of every kind of being” (N 21); and, “space is eternal in duration and immutable in nature because it is the emanative effect of an eternal and immutable being” (26).

⁷In his depiction of the traits of infinite extension, More adds that “it is necessary that it be immobile. Which is celebrated as the most excellent attribute of First Being in Aristotle” (1995, 58). In the *Metaphysics* (CWA 1071b 1-1071b 10), Aristotle concludes that “it is necessary that there should be an eternal unmovable substance. For substances are the first of existing things, and if they are all destructible, all things are destructible”.

undercut Stein's somewhat peculiar interpretation of the phrase, "first existing being". In short, the intended meaning of Newton's "first existing being" almost certainly follows More's usage, which, in turn, is based on a long line of Aristotelian/Scholastic argument. More importantly, as the subsequent investigation of *De grav* will demonstrate, Newton likewise demands an infinite, immobile "first existing being" to ground the existence and extension of all lesser, mobile entities.

2.2.2 *Efficient Causation and Cambridge Neoplatonism*

As Stein admits (2002, 271), his interpretation runs counter to the prevailing consensus among Early Modern and Newton scholars that Newton's spatial ontology is thoroughly imbued with Cambridge Neoplatonic natural philosophy: see the commentaries by Burt (1952, 261), Jammer (1993, 110), Koyré (1965, 89), Funkenstein (1986, 96), Hall (2002), to name only a few.⁸ Edward Grant's assessment is fairly representative: "if space is God's attribute, does that not imply it is somehow an accident or property of God" (Grant 1981, 243)? A notable exception to this line of reasoning, however, is presented in an influential early article by J. E. McGuire (1978a), which presents a view of Newton's concept of space that can be interpreted, albeit only superficially, as similar in content to Stein's assessment. McGuire argues that space for Newton is "the general condition required for the existence of any individual substance including its characteristics", and adds that:

The relation between the existence of a being and that of space is not causal, but one of ontic dependence. Newton is defining one condition which must be satisfied so that any being can be said to exist. In short, the phrase, 'when any being is posited, space is posited' denotes an ontic relation between the existence of any kind of being and the condition of its existence. (McGuire 1978a, 15)

Possibly in response to Carriero's (1990) criticisms, McGuire later qualified this account of Newton's spatial theory, concluding that the relation between the divine being and the infinity of space "can be seen (in a curious sense) as a causal dependency, and, moreover, one that has a legacy in theological and philosophical thought" (McGuire 1990, 105). It will be useful to explore these issues in greater

⁸ While providing a brief synopsis of the natural philosophy of the Cambridge Neoplatonists is difficult, the central feature is probably the rejection of a purely mechanical account of the material world (i.e., that all material phenomena can be completely explained through the interactions and impact of inert matter in motion). Rather, the Neoplatonists appealed to God, or spirit, as an active agent, or foundational basis, for all natural phenomena (see, e.g., MacKinnon's summary in More 1925, 315). Concerning the details of Charleton's natural philosophy, which is decidedly Gassendian at least as regards space, an incorporeal basis for space is posited, and thus it is strikingly similar to Cambridge Neoplatonism on this particular issue, although there are important differences on many other issues.

depth, for they shed light on a likely source of Newton's descriptive phrase, "emanative effect".

McGuire contends that there is a Scholastic precedent for construing the relationship between God and space as "under the rubric of *efficient* causation", yet, "since the notion of an eternal and efficient cause does not involve any activity, production, or active efficacy between it and its effect, it is difficult to distinguish natural or ontic dependence in these contexts from the notion of causal dependence between eternal things" (105).⁹ McGuire offers the example of "Augustine's foot eternally embedded in dust, and thus eternally causing its footprint" (105), to characterize this special form of efficient causation that links these eternal "things", namely, God, space, and time, which are not temporally prior to one another. Henry More, in his *The Immortality of the Soul* (1659), had employed the concept of an emanative cause in just this manner in explicating the extension of incorporeal substance. More contends that there exists a spatially extended, immaterial "Secondary Substance" that is coextensive with the extension of material substance: we have a "rationall apprehension of that part of a Spirit which we call the *Secondary Substance*. Whose Extension arising by graduall Emanation from the First and primest Essence [of the immaterial being], which we call the *Center of the Spirit*" (IS 35). More adds that "*an Emanative Effect is coexistent with the very Substance of that which is said to be the Cause thereof*", and explains that this "Cause" is "the adequate and immediate Cause", and that the "Effect" exists "so long as that Substance does exist" (33). And, while relationship between space and God is not openly addressed in this work, it would seem to be tacitly implied since God is included in his definition of spirit (IS 20–24; "Divine Amplitude" is also referenced at IS 23) and in his discussion of the "Spirit of Nature" (IS 449–450), the latter comprising one of the first emanations from God in standard Neoplatonic thought. To sum up, although there remain significant differences between McGuire's and Carriero's understanding of Newton's use of emanation, they nonetheless concur that traditional ontological, and specifically causal, issues are at play, and that there are a number of Scholastic and Neoplatonist precedents for Newton's handling of emanative causation as a unique type of efficient causation.

Stein criticizes the view that Neoplatonism underlies Newton's spatial hypotheses, however. Commenting that "the grounds for thinking that Newton's theory of emanation is neo-Platonic, or 'Cambridge Platonic', are very weak" (2002, 269), Stein asserts that emanation is distinct from creation for the Neoplatonists, and, since all being (except God) is created, thus space is not created, and hence not a being. Yet, as just disclosed, there is a Scholastic-influenced form of causation in the work of More that does fit Newton's use of emanation. It is true that Newton lists

⁹McGuire (2007), following (1990, 105), likewise connects his earlier "ontic dependence" hypothesis with efficient causation: "It seems evident that emanative causation, as Newton understands it, reflects this relationship between God's necessary existence and space's uncreated nature: space exists always because God exists necessarily. Moreover, since the notion of an eternal and efficient cause does not necessarily involve activity, production, creation, or active efficacy between it and its effect, the distinction between ontic and causal dependence essentially collapses" (2007, 123–124).

“uncreated” (*increated*) among the characteristics of space (N 33); but, as Carriero (1990, 113–115) explains, this use of “uncreated” is almost certainly due to the fact that, for Newton, the cause of a created being is prior in time, whereas an emanative cause is co-existent with its effect (i.e., not temporally prior to its effect). This interpretation of Newton’s use of creation is corroborated in *De grav* through his claim that “extension is not created (*creatura*) but has existed eternally” (since extension is an emanative effect of an eternal being; N 31). Equally important, Newton’s hypothesis closely follows More’s line of reasoning, since More both defines an emanative cause as co-existent with its effect, as well as lists “uncreated” among the attributes of space, in the passage quoted in §2.2.1 (EM 57).¹⁰ As Carriero also observes (1990, 114), while Newton states that space is uncreated, he never states that space is uncaused.

Consequently, despite Stein’s best effort to argue for his anti-Neoplatonist, “necessary consequence” reading of Newton’s term “emanative effect”, the historical context renders such an interpretation extremely implausible. In short, since More also defines the spatial extension of incorporeal substance as an emanative effect, and given that More’s hypothesis stands as a clear instance of his Neoplatonist ontology, there can be little doubt as to the direct inspiration, and thus intended meaning, of Newton’s use of the identical phrase “emanative effect”.¹¹

¹⁰ More is less forthcoming on the uncreated status of space in his earlier *The Immortality of the Soul*, although it is strongly implied in his discussion of emanative causation: “By an *Emanative Cause* is understood such a Cause as merely by Being, no other activity or causality interposed, produces an Effect” (IS 32). Newton’s list of the characteristic of space versus matter in *De grav* thus reveals a knowledge of More’s later *Enchiridion*, first published in 1671, as do many of the other features detailed in our investigation (namely, the “being as being” hypothesis, in §2.4). Indeed, it is highly unlikely that Newton was not familiar with this quite important work of More’s later years. The arguments for a later dating of *De grav* (in Dobbs 1991, 130–146), i.e., after 1680, thereby gains support, since Newton’s treatise exhibits the influence of several of More’s major works, including the *Enchiridion*. McGuire (1978a, 41, n. 27) had earlier remained a bit circumspect about the influence of More’s *Enchiridion* based on the earlier date supplied by Hall and Hall for *De grav* (Newton 1962a, 90), i.e., circa 1666; but McGuire has since advocated the later date (2007, 112).

¹¹ In her collection of More extracts, MacKinnon summarizes the emanation concept as follows: “The universe of Neo-Platonism is formed by emanation from the One, through the descending stages of intelligence, the soul, and the world, with formless matter, or unreality, as the ultimate limit of the emanative power” (More 1925, 315). Needless to say, much in *De grav* discloses a penchant for a Neoplatonist, emanationist ontology, such as his comments on the possibility of a world soul: “the world should not be called the creature of that soul but of God alone, who creates it by constituting the soul of such a nature that the world necessarily emanates [from it]” (N 31). Throughout *De grav*, as will be explained, Newton places incorporeal beings (spirits, souls) at the foundation of his hierarchy, with the lesser, corporeal world emanating from these incorporeal beings. Another instance of the use of emanation that parallels Newton’s, although with respect to time, is employed by J. B. van Helmont, a natural philosopher in the early half of the seventeenth century who Newton had studied (see, Ducheyne 2008). Finally, it should be noted that this investigation does not take sides on the complex issues associated with causation in Newton’s natural philosophy, e.g., whether emanative causation more closely resembles an efficient or formal cause, or something else. The main purpose of the discussion of causation is to refute Stein’s (2002) strong third-way interpretation by disclosing Newton’s Neoplatonism. However, if forced on this

Besides emanation, a veritable host of sixteenth and seventeenth century natural philosophers proposed similar hypotheses on the nature of space that closely parallel Newton's, including many thinkers in England with whom he was directly acquainted (most importantly, in addition to More, Isaac Barrow and Joseph Raphson). For example, the idea that space lies outside the Scholastic substance/accident categories was almost commonplace in this period and in the sixteenth century: Fonseca, Amicus, Bruno, Telesio, Patrizi, and Gassendi, to name a few, all favored this notion; and, more significantly, theological concerns are heavily implicated in their respective views. These last two, Francesco Patrizi and Pierre Gassendi, in addition to More, probably comprised the main source of influence on Newton's developing conception of space, although their influence was likely obtained indirectly through More and Walter Charleton, Gassendi's foremost English advocate. One can find a surprising number of close similarities between the individual hypotheses of these natural philosophers and Newton's spatial hypotheses: for instance, an atomistic or stoic cosmology, with a finite material world set within an infinite, three-dimensional void space, is common to all (except Patrizi, who fills all of space with light). Patrizi, like Newton, also emphasizes the mathematical aspect of space, which can receive all geometric shapes, and further argues that, while neither substance nor accident *per se*, space is nevertheless a type of entity not covered by the Scholastic categories; i.e., space is closer to the traditional concept of substance (PS 241), a view that Newton also holds (see §2.2.1, and §9.3.3). Gassendi, whose conception of space is similar to Patrizi's, would also influence later English natural philosophers: Gassendi's theory of space, according to Grant, "is an absolutely immobile, homogenous, inactive (resistanceless), and even indifferent three-dimensional void that exists by itself whether or not bodies occupy all or part of it and whether or not minds perceive it" (1981, 210). More importantly, Gassendi holds that space is both uncreated and co-eternal with God, although, like many Scholastic predecessors, he also believes that God is in every place while not actually extended in the same manner as body (see §2.4 below).¹² It is against this historical backdrop that any assessment of the import of Newton's concept of space must begin, especially the relationship between God and space.

issue, then we might hazard the conjecture that emanative causation is a sort of hybrid of both formal and efficient causation, inspired by More's secondary substance concept of a being's spatial extension in the earlier *Immortality*, and a property view of space that draws on More's later view from the *Enchiridion* (i.e., that space is God's attribute). McGuire's (2007) inference that ontic and causal dependence is hard to separate in the God-space context is accurate as well (see footnote 9). See, also, Gorham (2011), for a more Cartesian interpretation of these issues.

¹²Translations of Patrizi's spatial hypotheses are provided in Brickman (1943). For Gassendi's philosophy of space, see his *Syntagma philosophicum* (in his *Opera Omnia*, 1658), parts of which are translated in Brush (1972), and Capek (1976). Gassendi's ideas deeply influenced the content of Charleton's discussion of space in his, *Physiologia Epicuro-Gassendo-Charletoniana* (1654), a work known to Newton (see footnote 17). As noted, Gassendi and Patrizi's respective spatial ontologies will be examined in more depth in Chap. 9.

2.3 Neoplatonism and the Determined Quantities of Extension Hypothesis

In order to more accurately assess both Newton's conception of space and its third-way interpretations, this section will examine a host of Neoplatonist-leaning hypotheses in *De grav*, especially the space-body relationship. Once again, the fruits of our analysis will serve as a crucial backdrop to many discussions throughout the remainder of our investigation (especially Chaps. 6, 7, and 9).

2.3.1 *Newton Against Ontological Dualisms*

As described previously, the strong third-way reading insists that the ontological grounding of space need not be specifically theological in kind. In other words, matter, or any being other than God, is sufficient to provide space's ontological foundation, a possibility that is allegedly reflected in Newton's claim that space is "an affection of every kind of being" (N 21). Stein, for example, argues that "on the objective or ontological side, . . . , Newton's doctrine about space and time, in the light of his explicit statements, did not teach that space and time *per se*, or their attributes, depend upon the nature of God" (2002, 297).¹³ Concerning the question, "Can we conceive space without God?" (271), Stein cites a passage from Newton's critical assessment of Descartes' hypothesis that equates spatial extension with matter:

If we say with Descartes that extension is body, do we not manifestly offer a path to atheism, both because extension is not created but has existed eternally, and because we have an idea of it without any relation to God, and so [in some circumstances] it would be possible for us to conceive of extension while supposing God not to exist? (N 31)¹⁴

In commenting on this passage, Stein concludes that, for Newton, "extension does not require a subject in which it 'inheres', as a property; and it can be conceived as existent without presupposing any *particular* thing, God included" (2002, 271).

¹³A similar interpretation of Stein (2002) has been put forward by Andrew Janiak: "Stein (forthcoming) . . . notes . . . that Newton's view is not first and foremost a theological one, for its first premise is that space is an affection of all entities. The fact that God's infinite and eternal existence makes it the case that space is infinite and eternal is logically parasitic on this first premise. That is, given the logical structure of Newton's view, space would emanate from the first existent, whatever that first existent happened to be, because for Newton once we posit an entity we posit space. This just means that spatiality is what we might call—following Galileo's discussion of the primary qualities of objects—a *necessary accompaniment* of the existence of entities" (Janiak 2000, 222, fn.67).

¹⁴The phrase in brackets, "in some circumstances", is excluded from Stein's translation. The differences are not relevant to the above arguments against his overall position, however, so it will not be discussed.

The problem with this rendering of Newton's statement, put simply, is that Newton's ability to conceive space without God does not entail that he believed that space can exist without God. Indeed, a significant part of Newton's argument against Descartes' ontology stems from precisely this worry, namely, that it allows a conception of spatial extension, as the essential property of corporeal substance, without any apparent connection to, or need of, the concept of God. In its place, Newton tentatively advances a Neoplatonic ontology in which *both* spatial extension and body depend upon God.

In *De grav*, Newton's contemplates a world wherein God directly endows spatial extension with bodily properties, such as impenetrability or color, without requiring an underlying corporeal substance to house these accidents: "If [God] should exercise this power, and cause some space projecting above the earth, like a mountain or any other body, to be impervious to bodies and thus stop or reflect light and all impinging things, it seems impossible that we should not consider this space really to be a body from the evidence of our senses" (N 27–28). If we accept this hypothesis, then Newton contends that "we can define bodies as *determined quantities of extension which omnipresent God endows with certain conditions*" (28); the "conditions" being, first, that these determined quantities are mobile, second, that they can bring about perceptions in minds, and third, that two or more cannot coincide. By this process, Newton argues that these bundles of quantities can exactly replicate our everyday experience of material bodies without need of Descartes' material substance, or the Scholastic notion of prime matter (27–31). These determined quantities, moreover, are sustained and moved through the exercise of the divine will alone, and Newton makes repeated references to the relationship between the human mind and human body, on the one hand, and God's will and the determined quantities, on the other, to make this point: "God, by the sole action of thinking and willing, can prevent a body from penetrating any space defined by certain limits" (27). This conception foreshadows Newton's later description of space as God's "sensorium" (in the *Queries to the Opticks*, N 127–140), since the omnipresence of the divine will is directly analogous to the omnipresence of human thought and sensation in the human body—e.g., just as humans can move their limbs at will, God can likewise move bodily quantities through space at will.

Therefore, with respect to the citation provided by Stein above, i.e., (N 31), Newton's point is that any theory, like Descartes', that links bodily extension to corporeal substance alone, so that mental properties are excluded, is apt to mistakenly infer that extended corporeal substance can exist independently of God—Why?: because the divine will is erroneously presumed to be more akin to a mental property on the Cartesian scheme, so that it has little or no relationship with the extension of corporeal substance. Newton's "determined quantities of extension" hypothesis (hereafter, DQE) is, in fact, the means by which he circumvents the supposedly atheistic implications of both Descartes' dualism of mental and material substance, as well as the Scholastic's dualism of primary matter and substantial form. The passage cited by Stein is preceded by an explanation that clearly shows that Newton rejects any theory, such as Descartes', that ties body, and thus bodily extension, exclusively to corporeal substance: "For we cannot posit bodies of this

kind [i.e., on the DQE hypothesis] without at the same time positing that God exists, and has created bodies in empty space out of nothing” (31). For the Cartesians and Scholastics, however:

They attribute no less reality in concept (though less in words) to this corporeal substance regarded as being without qualities and forms, than they do the substance of God, abstracted from his attributes....And hence it is not surprising that atheists arise ascribing to corporeal substance that which *solely belongs to the divine*. Indeed, however we cast about we find almost no other reason for atheism than this notion of bodies having, as it were, a complete, absolute, and independent reality in themselves. (32; emphasis added)

Accordingly, leaving aside issues of conceivability, the quote provided by Stein is not evidence that Newton actually accepts an ontology that allows bodily extension to be “as it were, a complete, absolute, and independent reality in themselves”—i.e., apart from God—rather, Newton argues at length that any theory that allows such an autonomous conception of bodily extension is completely misguided.

Newton’s Neoplatonism is evident throughout his assault on these Cartesian and Scholastic dualisms. Directly *after* the quote provided by Stein, he offers a number of additional criticisms against strictly demarcating the incorporeal and the corporeal via Descartes’ distinction in substances:

Nor is the distinction between mind and body in [Descartes’] philosophy intelligible, unless at the same time we say that mind has no extension at all,...; which seems the same as if we were to say that it does not exist, or at least renders its union with body thoroughly unintelligible and impossible. Moreover, if the distinction of substances between thinking and extended is legitimate and complete, God does not eminently contain extension within himself and therefore cannot create it; but God and extension would be two separate, complete, absolute substances, and in the same sense. But on the contrary if extension is eminently contained in God, or the highest thinking being, certainly the idea of extension will be contained within the idea of thinking, and hence the distinction between these ideas will be such that both may fit the same created substance, that is, but that a body may think, and a thinking being be extended. (31; modified translation)

One of the remarkable facets of Newton’s assessment is that it anticipates the Empiricist’s skeptical analysis of substance, but, for our purposes, the important question pertains to the relationship between eminent containment and emanative causation, two separate, but similarly named, metaphysical hypotheses. While the evidence is sketchy, it is possible that Newton may regard the emanative causation of various attributes, such as extension, as an ontological consequence of their eminent containment in a foundational incorporeal being.¹⁵ If Newton does accept this

¹⁵The distinction between eminent containment and emanative causation is somewhat vague in the literature, but presumably they are distinct hypotheses. For example, one can hold that God eminently contains the reality manifest in, say, a stone, but that God’s creation of a stone does not employ the emanationist model favored by many Neoplatonists. The emanationist form of explanation, such as the type encountered in More’s oeuvre (e.g., EM 135), marshals an assortment of light metaphors to describe the causal process whereby the foundational level entity (the light source) brings about the existence of lesser entities (the light itself, or the shadow), the latter additionally characterized as an image of, or a radiation from, the foundational level being. In the above quotation, Newton may be simply contending that the Cartesian dualism of mind and body undermines Descartes’ own eminent containment hypothesis, so the reference to eminent contain-

type of metaphysical relationship, then his claim that “extension is eminently contained in God” (in the above passage), raises insurmountable obstacles for the strong third-way position, needless to say, as we will elaborate in the next section.

2.3.2 *The Ontological Foundation of Newton's Spatial Ontology*

In previous research devoted to *De grav*, careful attention has seldom been devoted to the aspects of the DQE hypothesis that specifically concern the nature of space. Part of the explanation for this oversight might be due to the context in which the DQE hypothesis is introduced, namely, as an account of the nature of body, and not—explicitly, at least—on the nature of space. Yet, if one desires to understand the ontological presuppositions of Newton's overall spatial theory, then the DQE hypothesis is of crucial importance. In addition, although Newton states that his DQE hypothesis is “uncertain”, and that he is “reluctant to say positively what the nature of bodies is” (N 27), these declarations of uncertainty do not detract from its significance as the only hypothesis that he does, in fact, present and develop. Not only is a large portion of *De grav* allotted to the DQE hypothesis, but (as is evident above) Newton makes repeated claims as to the superiority of this hypothesis in comparison with the Cartesian and Scholastic alternatives: e.g., “the usefulness of the idea of body that I have described [the DQE hypothesis] is brought out by the fact that it clearly involves the principal truths of metaphysics and thoroughly confirms and explains them” (31). In summarizing its importance, he adds: “[s]o much for the nature of bodies, which in explicating I judge that I have sufficiently proved that such a creation as I have expounded [the DQE hypothesis] is most clearly the work of God, and if this world were not constituted from that creation, at least another very like it could be constituted” (33).

Admittedly, since the endorsement of the DQE hypothesis in *De grav* remains tentative, it is possible that other God-based conceptions of corporeal existents may have been amenable to Newton. Yet, there is both direct and indirect evidence that supports the contention that Newton accepted the DQE hypothesis, or a close analogue, throughout his later years. In an unpublished tract from the 1690s brought to light in McGuire (1978b), dubbed “Tempus et Locus” (henceforth, TeL), Newton concludes:

ment in this passage need not imply that Newton actually accepts this view. On the other hand, a bit earlier in *De grav*, Newton remarks that “created minds (since it is the image of God) is of a far more noble nature than body, so that perhaps it may eminently contain [body] in itself” (N 30)—and, importantly, the context strongly favors the view that Newton is elaborating his own view here. However, Newton's statements employing just “emanative effect” and “emanate” are alone sufficient to demonstrate his Cambridge Neoplatonist stance (and thus uphold the argument of this chapter), regardless of whether or not he accepted eminent containment. On the vexed issue of eminent containment in Descartes, see, Gorham (2003).

The most perfect idea of God is that he be one substance, simple, indivisible, live and making live, necessarily existing everywhere and always, understanding everything to the utmost, freely willing good things, by his will effecting all possible things, *and containing all other substances in Him as their underlying principle and place*; a substance which by his own presence discerns and rules all things, just as the cognitive part of a man perceives the forms of things brought into his brain, and thereby governs his own body” (TeL 123; emphasis added).

As for the indirect evidence, in a footnote to Pierre Coste’s French translation of Locke’s *Essay Concerning Human Understanding* (third edition), Coste reports that Newton provided an account of the creation of matter, in 1710, that correlates with the DQE hypothesis in *De grav* (Koyré 1965, 92). Less specific, but also important, is David Gregory’s summary of his 1705 conversations with Newton: “He believes God to be omnipresent in the literal sense...for he supposes that as God is present in space where there is no body, he is present in space where a body is also present” (Hiscock 1937, 29).

In short, what the DQE hypothesis reveals about Newton’s spatial ontology is that God, or some spiritual entity at (or near) the level of God, is the emanative cause of corporeal being, and perhaps eminently contains corporeal being. All of Newton’s examples of emanative causation and eminent containment in *De grav*, as revealed above, involve a mental/spiritual entity as the source—i.e., God, the world soul, created minds—and either matter or space as the emanative effect or the eminently contained entity. Thus, leaving aside the question of God’s attribute of extension, since body is at (or near) the lowest rung in the hierarchy of being, and thereby *depends* for its existence on these incorporeal beings, space *cannot* be the emanative effect of matter/body. Put differently, it would be highly unorthodox for Newton to have conceived spatial extension as the emanative effect of a material being or beings, especially given the deep disparity in Newton’s characterization of space and matter: “extension is eternal, infinite, uncreated, uniform throughout, not in the least mobile, nor capable of inducing changes of motion in bodies or change of thought in the mind; whereas body is opposite in every respect” (N 33). Newton’s final use of “emanative effect” in *De grav* makes this point quite clearly, i.e., that space’s qualities could only originate from God: “space is eternal in duration and immutable in nature because it is the emanative effect of an eternal and immutable being” (26). Indeed, the hierarchical relationship between God and body, mediated via God’s attribute of spatial extension, is very likely the motivation behind Newton’s DQE hypothesis, since he constantly criticizes the opposition (i.e., Cartesians, Scholastics) for “ascribing to corporeal substance that which solely belongs to the divine” (31; see §2.3.1)—and, once again, what the Cartesians and Scholastics have erroneously ascribed to corporeal substance is extension. Therefore, the strong third-way theorist’s contention that, for Newton, “space (in some sense) ‘results from’ *the existence of anything*” (Stein 2002, 268), is inconsistent with the DQE hypothesis—apparently, only God or an incorporeal being akin to a world soul can be the emanative cause of space.¹⁶

¹⁶McGuire (1978a, 15) explores a hypothetical interpretation that would allow beings other than God to ground the existence of space; yet, as disclosed in personal discussion, McGuire’s purpose was only to explore the implications of an emanationist ontology, and not to put forward the view

Apart from the issue of incorporeal being, any interpretation that would posit matter as the emanative origin of space is likewise unacceptable given the basic ontological relationship between body and space on the DQE hypothesis. Material bodies are, in effect, portions of space that exhibit certain empirical properties, such as impenetrability or color, hence body *presupposes* spatial extension—body cannot, therefore, be the emanative cause of space. Newton emphasizes body's dependence on space in describing the DQE hypothesis, furthermore: “extension takes the place of the substantial subject in which the form of the body [i.e., the determined quantities] is conserved by the divine will” (N 29). It would be quite odd, consequently, if Newton additionally held that the determined quantities, as the forms or properties, were the ontological foundation of their own, as it were, substantial subject.

At this point, we should return to the topic of attributes and their dependence on God. Throughout Newton's analysis in *De grav*, God as the foundation of all possible substances, attributes, or accidents is constantly acknowledged, and this includes space:

For certainly whatever cannot exist independently of God cannot be truly understood independently of the idea of God. God does not sustain his creatures any less than they sustain their accidents, so that created substance, whether you consider its degree of dependence or its degree of reality, is of an intermediate nature between God and accident. And hence the idea of it no less involves the concept of God, than the idea of accident involves the concept of created substance. And so it ought to embrace no other reality in itself than a derivative and incomplete reality. Thus the prejudice just mentioned must be laid aside, and *substantial reality is to be ascribed to these kinds of attributes* [i.e., extension], which are real and intelligible things in themselves and do not need to be inherent in a subject [i.e., an accident inherent in corporeal substance], *rather than to the subject* [i.e., corporeal substance] *which we cannot conceive as dependent* [upon God], much less form any idea of it. And this we can manage without difficulty if (besides the idea of body expounded above) we reflect that we can conceive of space existing without any subject when we think of a vacuum. And hence some substantial reality fits this. (32–33; emphasis added)

Since this passage clarifies to some degree the relationship between God and the attribute of extension, it is worth examining in more detail. As described in §2.3.1, Newton rejects the Cartesian and Scholastic accounts on the grounds that they foster a mistaken conception of corporeal substance that is independent of God (as well as incoherent). In its place, Newton champions a view that regards extension as an affection or attribute of God, which naturally implies that the concept of extension, unlike corporeal substance, “cannot be truly understood independently of the idea of God”. Indeed, having rejected corporeal substance, Newton then argues that we should ascribe “some substantial reality” to extension as opposed to corporeal substance, with the possibility of a vacuum (matterless void) offered as further evidence against assigning extension to corporeal substance. One should not, accordingly, construe the term “subject” (*subjecto*) as referring to *any* subject, whether God or a lesser substance; rather, “subject” consistently refers to corporeal substance in the

that Newton actually accepted this hypothetical scenario. Unlike Stein, McGuire has always accepted that Newton's theology is central to understanding his theory of space (see, e.g., 1978a, 38–39).

above passage. It is only on this interpretation that Newton's overall argument is rendered coherent: it would be inconsistent for Newton to criticize the Cartesians and Scholastics for positing a conception of corporeal substance that is independent of God, *and then* put forward his own preferred thesis that makes spatial extension independent of all "subjects", taken broadly, and thus God. With respect to the pivotal sentence italicized in this quotation, we can give a more accurate rendering as follows: "substantial reality is to be ascribed to the attribute of spatial extension, which is a real and intelligible thing-in-itself and does not need to be an accident inhering in corporeal substance, rather than ascribe substantial reality to corporeal substance, which we cannot conceive as dependent upon God, much less form any coherent idea of it." Implicit in this statement, not surprisingly, is the belief that the substantial reality of the attribute space is dependent upon God, an idea that provides the basis of Newton's preference for the DQE hypothesis.

Newton's DQE hypothesis, therefore, quite clearly assigns to space a form of substantial reality, an admission that may help to elucidate Newton's earlier claim that space "approaches more nearly to the nature of substance" (22). Yet, while space is declared to have "some substantial reality", it is also an attribute of God, and is neither a substance nor an accident (i.e., given his rejection of the substance/accident dichotomy regarding space), a point nicely encapsulated in the passage quoted earlier: space "is not a substance...because it is not absolute in itself, but is as it were an emanative effect of God" (21). The strong third-way interpretation of Newton is, as a result, quite correct in claiming that Newton's absolute space is not a substance. Nonetheless, given that space is an emanative effect of an incorporeal being (God), the substantial reality that Newton does bestow upon extension makes it practically equivalent—"approaches more nearly"—to the traditional substance concept: not only can space exist absent all corporeal existents, but, on the DQE hypothesis, spatial extension replaces corporeal substance as the container of his mobile, determined bodily quantities (see, also, footnote 21). Consequently, the more radical anti-Neoplatonist and non-theological reading of Newton's spatial theory championed by the strong third-way theorists is simply not upheld under a close scrutiny of the relevant texts.

2.4 Space as an Affection of Being

In order to more adequately diagnose the defects of the strong third-way interpretation, two important features of Newton's spatial theory must be addressed: first, why did Newton utilize affections/attributes in place of the more familiar accidents, as manifest in his well-known claim that "space is an affection of a being just as a being" (N 25)?; and second, why is space associated with "being just as a being" (*ens/entis quatenus ens*)? In this section, a more detailed comparison of Newton, More, and Charleton, will help to shed light on these aspects of Newton's spatial ontology. As will be argued, the second question discloses a predominate feature of the spatial ontologies of late seventeenth century English natural philosophy, a

feature that Newton shares with both More and Charleton, whereas the first question is indicative of Newton's general discontent with the substance/accident distinction, and in this manner marks a point of departure from More's ontology towards the line favored by Gassendi-Charleton. The rationale for focusing on these two philosophers, More and Charleton, is that, first, their influence on Newton is well-documented, and second, they represent the two leading positions during Newton's time on the relevance of the substance/accident dichotomy for space (with Charleton sponsoring Gassendi's popular solution).¹⁷

2.4.1 *Extension and Accidents*

If one seeks a rationale for Newton's characterization of space as an attribute or affection, a likely explanation is the metaphysical difficulties associated with classifying space as an accident. In his later, *Enchiridion Metaphysicum* (1671), More offers an ontology that treats space as an internal feature of God that has much in common with the seventeenth century's traditional sense of accident, although he uses the term "attribute", and sometimes "affection", instead of "accident" to describe space's metaphysical status:

The real attribute of some real subject can be found nowhere else except where in the same place there is some real subject under it. And, indeed, extension is the real attribute of a real subject.... Indeed, we cannot not conceive a certain immobile extension pervading everything to have existed from eternity...and really distinct, finally, from mobile matter. Therefore, it is necessary that some real subject be under this extension, since it is a real attribute. (EM 56–57)

More thereby concludes that spatial extension must be the attribute of an incorporeal substance, and, while the details are not explicit, More seems to embrace the notion that attributes inhere in substances in the traditional way that an accident inheres in a substance: "extension indeed is in the real subject" (EM 68).¹⁸ In

¹⁷ See, Westfall (1962), and McGuire (1978a), on the references within Newton's work to More and Charleton. Newton's early notebook, *Quaestiones quaedam Philosophicae*, contains evidence that he read, at the least, both Charleton's *Physiologia*, as well as More's, *The Immortality of the Soul*.

¹⁸ More tends to complicate his hypothesis that space is God's attribute by often referring to space as an incorporeal substance; e.g., in the ensuing section of the *Enchiridion*, he reasons that his theory utilizes "the very same way of demonstration which Descartes applies to proving space to be a substance, although it be false in that he would conclude it to be corporeal" (EM 57). More rejects Descartes' theory of space for many of the very same reasons that Newton provides in *De grav*, for instance, that Descartes cannot account for possibility of a vacuum (which is a conceivable state-of-affairs). An early formulation of this argument appears in *An Antidote against Atheism* (1655): "If after the removal of corporeal matter out of the world, there will be still Space and distance, in which this very matter, while it was there, was also conceived to lye, and this distant Space cannot but be something, and yet not corporeal, because neither impenetrable nor tangible, it must of necessity be a substance Incorporeal, necessarily and eternally existent" (AAA 338). More's penchant for conflating "space as God's attribute" and "space as identical to God's substance" may have prompted Newton's more careful attempts to deny the latter (see below).

contrast, Walter Charleton's popular work, although quite similar to More's views in many ways, parts company with More by declaring that space is neither substance nor accident, since it is "*more general than those two*" (Charleton 1654, 66), an opinion earlier adopted by Gassendi (SWG 384).¹⁹

While rejecting More's conception of space as God's accident, Newton's DQE thesis does resemble More's theory in that all extended things, whether body or spirit, necessitate the infinite spatial extension grounded in God's existence. In *De grav*, Newton repeatedly claims that extension "does not exist as an accident inhering in some subject" (N 22), and this argument also surfaces much later (1719–1720) in a paragraph he intended for the Des Maizeaux edition of the Leibniz-Clarke correspondence:

The Reader is desired to observe, that wherever in the following papers through unavoidable narrowness of language, infinite space or Immensity & endless duration or Eternity, are spoken of as *Qualities* or *Properties* of the substance which is Immense or Eternal, the terms *Quality* & *Property* are not taken in that sense wherein they are vulgarly, by the writers of *Logick* & *Metaphysics* applied to *matter*; but in such a sense as only implies them to be modes of existence in all beings, & unbounded *modes* & consequences of the existence of a substance which is really necessarily & substantially Omnipresent & Eternal; Which existence is neither a substance nor a quality, but the existence of a substance with all its attributes properties & qualities (Koyré and Cohen 1962, 96–97).

In the correspondence with Leibniz, Clarke had suggested that space is a property of God (C.III.3, C.IV.10), and this problematic notion may have prompted Newton, in the above passage, to qualify and correct Clarke's argument so that it does not appear to sanction the view that space inheres in God in the same way that bodily accidents, properties, or qualities inhere in matter, or that space is a merely contingent feature of God.²⁰

On this last point, Carriero notes that, "it is a standard theological position that there are no accidents in God" (1990, 123), yet, a further difficulty with viewing spatial extension as God's accident is that it might encourage the view that God inherits all of the consequences normally associated with extension, e.g., divisibil-

¹⁹Besides Newton's contemporary, Joseph Raphson (see, Koyré 1957, chap. 8), another Cambridge Neoplatonist who held that space is an attribute/accident of God is Ralph Cudworth (see, Grant 1981, 230). However, the Patrizi-Gassendi solution, that space is neither accident nor substance, was quite popular in England: besides Charleton and Barrow, one should add the earlier Neoplatonic philosophies of Warner and Hill (see, Garber et al. 1998, 558–561). For additional assessments of More's spatial theory, see, Boylan (1980), Copenhaver (1980), and, for the theological aspects of Newton's theory, Snobelen (2001).

²⁰That is, an "accident", as the name implies, was often taken to be an unessential feature of a being, but space cannot be unessential given his view that all beings manifest spatial extension. Overall, it is unclear if Newton draws a principled distinction among the terms, "accident", "property", and "quality", but it is highly unlikely. Furthermore, while Newton is careful to designate space an attribute and affection in *De grav*, and not as an accident, the Des Maizeaux draft mentions "attribute" alongside "property" and "quality", as does the 1713 General Scholium (N 91), so it is possible that he may have abandoned his special use of "attribute" at a later date. Indeed, "mode" and "consequence" now seem to take over the special role that he had earlier accorded to "attribute", at least in the Des Maizeaux draft (see also footnotes 4 and 5).

ity, location, three-dimensionality. In the *Enchiridion*, More strives to circumvent this dilemma by ascribing to space some of the same incorporeal features that belong to God, for example, that God and space are both “simple”, i.e., indivisible, such that they lack separable parts (EM 58; see, also, Chap. 6). It is not surprising, therefore, that More ultimately concludes on the basis of these similarities (among God and space) that there are two types of extension, namely, the divisible extension of corporeal matter and the indivisible extension of incorporeal spirit (with infinite spatial extension being an attribute of the latter; EM 118).²¹

2.4.2 *Nullibism and Holenmerism*

More's conclusion that all being is spatially extended is likewise supported by his rejection of two popular hypotheses on the relationship between God and space: first, he rejects the “nullibist” view favored by the Cartesians, that God is not in space; and, second, he rejects “holenmerism” (or “holenmerianism”), a belief common among the Scholastics, that God is whole in every part of space (which thereby guarantees that God is not divisible even if matter and space are divisible; EM 98–148). Given the rejection of these two hypotheses, the inevitable outcome is that incorporeal spirit is extended, a conclusion also adopted by Newton's Neoplatonist contemporary, Joseph Raphson (see, Koyré 1957, chap. 8).

In *De grav*, Newton's position parallels More's anti-nullibism. As first disclosed in §2.2, Newton also reckons that both corporeal and incorporeal beings are extended: after declaring that, “Space is an affection of a being just as a being”, he explains that, “No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist” (N 25). A bit further on, he adds: “If ever space had not existed, God at that time would have been nowhere; and hence he either created space later (where he was not present himself), or else, which is no less repugnant to reason, he created his own ubiquity” (26). As for Gassendi and Charleton, both reject nullibism for similar reasons as More, and thus their natural philosophy may have also been a source for Newton's anti-nullibism: e.g., “no substance can be conceived existent without Place and

²¹ Both More and Charleton believe that space is incorporeal, and this belief is based largely on the idea that the dimensions of space, like spirit, penetrate the dimensions of corporeal substance (EM 123–124; Charleton 1654, 68). Newton's DQE hypothesis nicely captures this aspect of their philosophy, since bodies are just parts of space endowed with material properties—consequently, Newton's reference to the extension (diffusion) of mind throughout infinite space (see §2.4.2) also follows these earlier philosophies by closely associating space with a spiritual entity. Yet, while both More and Charleton incorporate two types of extension, i.e., an incorporeal extension that penetrates corporeal extension, Newton's DQE hypothesis is more parsimonious in that it employs only one, namely, the divine attribute of extension. Indeed, Newton never (to the best of our knowledge) refers to space as “incorporeal” (or “immaterial”), a quite significant fact that is noted by McGuire as well (1978a, 42, n.38).

Time” (Charleton 1654, 66). On the other hand, Gassendi accepts holenmerism (“the divine substance is supremely indivisible and whole at any time and any place”; RIV 94); as does (presumably) Charleton (1654, 70).

If Newton clearly articulates his anti-nullibism, his opinions on holenmerism are more difficult to discern, and may comprise one of the more enigmatic elements of his spatial metaphysics. Overall, numerous passages in the *De grav*, as well as some later works, support a close analogy between the extension of material beings and God’s extension. He begins by explaining that “[space and time] are affections or attributes of a being according to which the quantity of any thing’s existence is individuated to the degree that the size of its presence and persistence is specified” (N 25). He then compares the “quantity of existence” among God and created being: “So the quantity of the existence of God is... infinite in relation to the space in which he is present; and the quantity of the existence of a created thing... in relation to the size of its presence, it is as great as the space in which it is present” (25–26). This explanation suggests that God and created beings do not differ as regards extension, contra holenmerism, since the same, as it were, metric—quantity of existence—applies equally to both, but with the important qualification that God possesses an infinite quantity of existence and created beings do not (or need not). Yet, since quantity of existence is an undefined notion in *De grav*, it is difficult to draw a specific conclusion based on this use of terminology.

In the ensuing passage, however, a better case can be made that Newton does side with More’s anti-holenmerism: “lest anyone should for this reason imagine God to be like a body, extended and made of divisible parts, it should be known that spaces themselves are not actually divisible” (26). So, Newton not only *fails* to reject the claim that God is extended, but he also claims, like More, that space is not actually divisible (although space is conceptually divisible; see Holden 2004, on the different forms of divisibility in the Early Modern period). It would seem, therefore, that Newton posits an indivisible space to resolve the controversy concerning God’s potential divisibility (see also, Janiak 2000, 224). Newton then draws an interesting analogy between the extension of both God’s being and a temporal moment: “And just as we understand any moment of duration to be diffused (*diffundi*) throughout all spaces, according to its kind, without any concept of its parts, so it is no more contradictory that *mind* also, according to its kind, can be diffused through space without any concept of its parts” (N 26; emphasis added). That is, just as “a moment of duration is the same... throughout all the heavens” (26), Newton maintains that God, conceived as a mind-like spiritual being, is likewise the same part-less being throughout all space. A similar claim is made in the 1690s manuscript examined previously: “[t]he most perfect idea of God is that he be one substance, simple, indivisible” (TeL 123). Newton’s characterization of God as simple, i.e., without parts, thus matches his own description of space in the same work: “[S]pace itself has no parts which can be separated from one another,... For it is a single being, most simple, and most perfect in its kind” (TeL 117). Like More, Newton characterizes both space and God as simple, single beings (see §2.2.1 and §2.4.1).

In Chap. 6, the indivisibility of space for both More and Newton, as well as the holenmerism issue, will be revealed to have additional far-reaching implications for

various components of their respective theories of space, and it will inform aspects of the alternative conceptual system for analyzing spatial ontologies developed in Chap. 9.²²

2.4.3 *Ens Quatenus Ens*

Having exposed the Neoplatonist undercurrent in *De grav*'s rejection of nullibism and holenmerism, we are finally in a position to grasp the import of his various claims that space is an attribute/affection of "a being just as a being" (*ens quatenus ens*). The purpose of this explanation, in brief, is *not* to offer a unique anti-Neoplatonist proposal on the relationship between space and existents, i.e., that space is a logical or conceptual presupposition associated with any existent, as the strong third-way theorists counsel; rather, Newton's intention, replicating More's earlier maneuver, is to put forward an *ontology* that counters nullibism (that God is nowhere in space) and holenmerism (that God is in complete in every part of space). Or, put differently, Newton's use of *ens quatenus ens* does not amount to a repudiation of Cambridge Neoplatonist hypothesizing about the nature of space: *ens quatenus ens* is, in fact, an instance of such ontological speculation. In addition, Newton's *ens quatenus ens* hypothesis may have been motivated by similar discussions in More's *Enchiridion*, where a metaphysics of "being just as a being" forms that backdrop of More's thought, including his spatial hypotheses: e.g., "the essence of any being insofar as it is a being is constituted of amplitude [extension] and differentia [form], which distinguishes amplitude from amplitude" (EM 9). Overall, the strategy of both More and Newton is to link spatial extension, in some form at least, to all being, even God, rather than to just a sub-class of being (as, for example, in the Cartesian identification of extension with corporeal being).

Returning to Newton's well-known quote, that "space is an emanative effect of the first existing being, for if any being whatsoever is posited, space is posited" (N 25), Stein contends that "the second clause tells us precisely what the first clause *means*" (Stein 2002, 269). But, as first argued in §2.2, this explanation hinges on a questionable interpretation of the phrase "first existing being"; likewise, there are numerous precedents in the earlier Cambridge Neoplatonist literature for employing "emanative effect" to signify a unique form of God-based ontological dependency. Given the discussion above, we are now in a better position to grasp that the phrase, "for if any being whatsoever is posited, space is posited", is not intended to explicate the meaning of "emanative effect", but is instead another instance of

²² Some commentators (e.g., Pasnau 2011, 338, n.21; Reid 2007) defend holenmerism as Newton's preferred ontology of space, but this is dubious given the paltry evidence for holenmerism and the powerful evidence in favor of God's actual extension (for other anti-holenmerist interpretations of Newton, see Grant 1981, 253; McGuire and Slowik 2012). As argued above, since Newton, following More, makes a parallel case for the simplicity of both God and space (i.e., as beings without parts), whereas holenmerism is predicated on spatial parthood, it is extraordinarily difficult to ascribe holenmerism to Newton.

Newton's *ens quatenus ens* thesis that space is an attribute/affection of "a being just as a being". Stein's error, in short, is that he conflates two distinct hypotheses, namely, emanative causation and *ens quatenus ens*. Additional evidence for the separation of these hypotheses is contained in Newton's first reference to emanation in *De grav*, where he claims that "[space] is as it were an emanative effect of God and an affection of every kind of being" (N 21, emphasis added). What is important about this passage is that it does not run together the construal of space as an "emanative effect of the first existing being" and space as "an affection of every being" (= "if any being is posited, space is posited") in the manner advocated by Stein—rather, these two hypotheses are clearly distinguished in this quotation, thus raising an obstacle for Stein's attempt to use the latter concept to explain the meaning of the former.

To better grasp the intent of Newton's much-debated claim, it will be useful to quote the broader context of the full paragraph:

Space is an affection of a being just as a being. No being exists or can exist which is not related to space in some way. God is everywhere, created minds are somewhere, and body is in the space that it occupies; and whatever is neither everywhere nor anywhere does not exist. And hence it follows that space is an emanative effect of the first existing being, for if any being whatsoever is posited, space is posited. And the same may be asserted of duration: for certainly both are affections or attributes of a being according to which the quantity of any thing's existence is individuated to the degree that the size of its presence and persistence is specified. So the quantity of the existence of God is eternal in relation to duration, and infinite in relation to the space in which he is present; and the quantity of the existence of a created thing is as great in relation to duration as the duration since the beginning of its existence, and in relation to the size of its presence, it is as great as the space in which it is present. (N 25–26)

The first sentence begins with the exposition of the *ens quatenus ens* hypothesis, and Newton explains, in the second sentence, that extension also pertains to God in some manner ("No being exists"). The third sentence posits an omnipresent God in infinite space, "God is everywhere", and Newton adds that created minds and bodies are located in, and occupy, this same space (and cannot be nowhere)—i.e., minds are "somewhere", and body "is in the space that it occupies", but, since God is "everywhere", these lesser beings must also partake of God's extension. This last point is presented quite explicitly a bit later in the paragraph: "the quantity of the existence of God is...infinite in relation to *the space in which he is present*" (emphasis added).²³ The fourth sentence is Stein's favored quote ("space is an emanative effect"), but it begins with the phrase, "And hence it follows that", which is an important qualification since it relates the subsequent content to the previous three sentences. Put simply, Newton is arguing that, *since* God is omnipresent, and *since* the other beings occupy finite portions of the infinite space brought about by God, "hence it follows that space is an emanative effect of the first existing being, for if any being whatsoever is posited, space is posited". That is, space must be the ema-

²³The infinity of space is presented as akin to an a priori certainty in *De grav*, as McGuire also concludes, "in Newton's view the presence of matter presupposes ontologically the infinitude of spatial extension" (1983, 184). See §2.5 below as well.

native effect of an infinite, omnipresent being (“the first existing being”) because all being manifests extension in some fashion (“for if any being whatsoever is posited, space is posited” = “Space is an affection of a being just as a being”), and thus the remaining (finite) beings *require* an omnipresent being to ground the existence of the infinite space in which they reside; likewise for time, as disclosed in the two remaining sentences of the paragraph. Here, it is important to recall an identical line of reasoning in More’s *Enchiridion*, where an infinitely extended “first Being”, God, “receives all others” (EM 59; see §2.2), as well as Newton’s assertion, in his 1690s work, *TeL*, that God contains “all other substances in Him as their underlying principle and place” (*TeL* 123). To conclude, space is not, as Stein contends, a necessary consequence of the existence of any being, rather, the entailment goes in the other direction: the actual existence of any being necessarily presupposes an infinite, immutable space, and only God can secure that precondition.²⁴

2.5 Newton’s Spatial Theory and Substance/Property Ontologies

Thus far, we have examined Newton’s spatial ontology largely from the perspective of a non-substantivalist, strong third-way standpoint, in particular, Stein’s (2002) conception. As revealed in previous sections, the abundant Neoplatonist elements in Newton’s spatial theory (emanative causation, the primacy of incorporeal being over corporeal being, etc.) raise insurmountable obstacles for any strong brand of third-way interpretation, but in this section we will focus on how the substance/property (or substance/accident) dichotomy factors into Newton’s theory, and how this dichotomy, in turn, effects a potential substantivalist or third-way classification more generally.

To recap our earlier discussion, although Newton denies that space is an accident and that space “inheres” in God (see §2.2), this does not change the fact that space is, so to speak, God’s predicate—and there is nothing in *De grav*, or in any of Newton’s other works, for that matter, that would suggest that any lesser being can play the role of space’s subject (besides the hypothetical Neoplatonist world soul). Indeed, this more limited subject-predicate relationship between God and space remains an undeniably pervasive feature of Newton’s natural philosophy, as we

²⁴As noted in footnote 13, a strong third-way interpretation, similar to Stein (2002), is also adopted by Janiak, although he strives to distance his reading from some aspects of Stein’s interpretation (2008, 155–163). Janiak, however, follows Stein in running together “being as being” and emanative causation, which are two distinct hypotheses, as argued above. After claiming that “the affection thesis entails the claim that space is an ‘emanative effect’ of the first existing being” (142), Janiak concludes that “space emanates from whatever entity is the first to exist” (146), thereby sanctioning a major aspect of Stein’s strong third-way case (since space is no longer dependent on God). Yet, as we have seen, Newton’s *De grav* links the emanation of space to a higher, infinite incorporeal/spiritual being alone, and thus the claim that space would emanate from any type of being is simply unsupportable.

have seen. But what does this relationship between God and space—namely, that space is God's attribute, without any sense of inherence—imply for his overall spatial theory? Is the relationship between God and space, moreover, analogous to a logical or conceptual association, as Stein's version of a strong third-way reading supports, or is this relationship quite similar to the notion of inherence, and thus provides little support for the strong third-way interpretation?

Newton's endorsement of the infinity of space helps to shed light on these questions. Although we cannot imagine the infinity of space, he claims that "we can understand it" (N 23), and he mentions a rough geometric proof involving the intersection of two lines that slowly approach a parallel configuration: "therefore there is always such an actual point where the produced [lines] would meet, although it may be imagined to fall outside the limits of the physical universe", or, as he also puts it, "the line traced by all these points will be real, though it extends beyond all distance" (23). Despite human limitations, "God at least understands that there are no limits, not merely indefinitely but certainly and positively, and because although we negatively imagine [extension] to transcend all limits, yet we positively and most certainly understand that it does so" (24–25). Consequently, our examination of Newton's *ens quatenus ens* hypothesis gains an important qualification, namely, if anything is posited, *infinite* space is posited, a point first revealed in §2.4.3.

Newton's God-grounded reification of an infinite Euclidean space has important implications for understanding the role of the substance/property distinction in his spatial ontology. Despite rejecting the notion of inherence, Newton's "space is an attribute of *ens quatenus ens*" hypothesis nonetheless entails that the domain of space is closely tied or restricted to God's domain; in other words, space is infinite *because* God is infinite, an hypothesis that is stated clearly in several later works, such as in the 1713 edition of the *Principia*: "[h]e endures forever, and is everywhere present; and by existing always and everywhere, he constitutes duration and space" (N 91); and *De grav*: "space is eternal in duration and immutable in nature because it is the emanative effect of an eternal and immutable being" (N 26). This "congruence", as we may call it, between the ontological domains of both God and space is also relevant to his quantity of existence concept examined earlier, where he claims that "the quantity of the existence of God is eternal in relation to duration, and infinite in relation to the space in which he is present" (25–26) Therefore, notwithstanding his repudiation of the substance/property dichotomy, Newton presumes a metaphysics of space that closely mimics that dichotomy, save for the notion of inherence. Not only does Newton require an entity to ground the existence of space, but the domain or extent of the former determines the domain of the latter: specifically, space can only be infinite if the entity that provides the foundation for space is infinite (i.e., omnipresent), and, as revealed above, the infinity of space is tantamount to a certain (a priori?) truth on Newton's scheme. This interpretation of Newton's spatial theory is partially confirmed in a passage from the 1690s TeL manuscript where Newton denies the possibility "that a dwarf-god should fill only a tiny part of infinite space with this visible world created by him" (TeL 123). In other words, God must be infinite to ground the existence of his (necessarily) infinite space. Applying these lessons to the quantity of existence quotation above (N

25), it would thus seem to follow that a being's spatial attribute must match, or be congruent with, its quantity of existence.

Newton's tacit utilization of a sort of surrogate substance/property concept may not at first appear to be a setback for a non-substantivalist interpretation of his spatial theory; yet, if the non-substantivalist's interpretation additionally strives to depict Newton's theory as comparable to the Stein-DiSalle definitional version of a third-way ontology of space discussed previously (§2.1), then Newton's latent form of substance/property metaphysics does indeed constitute a serious problem. The definitional approach to space favored by Stein and DiSalle departs from a standard substance/property approach by admitting the existence of spatial structures that transcend the actual relations among the world's actual inhabitants. For example, third-way theories of this sort are consistent with a hypothetical island universe wherein the structure of space is infinite Euclidean despite a finite material distribution. A definitional third-way theory can meaningfully entertain, for example, whether space possesses a flat (infinite, unbounded) Euclidean structure, or a spherical (finite, unbounded) non-Euclidean structure, since the structure of space, whether finite or infinite, can be obtained through our experience of the behavior of a finite number of objects or entities, and perhaps only one. That is, the definitional wing of the third-way approach does not confine the domain of spatial structures so as to precisely match the domain of actually existing things—on the definitional approach to space, the inertial structure manifest in Newton's rotating bucket or spinning globes thought experiments, via the non-inertial force effects of rotation, is sufficient to reveal the inertial structure of the whole of space, whether space is finite or infinite. A similar possibility confronts other ontological interpretations, such as the modal variant of sophisticated relationism. Given the existence of a body, many modal relationists would declare that the mere *possibility* of that body's motion throughout the universe is enough to classify the space as, say, infinite Euclidean or spherical non-Euclidean, since the potential return of the moving body (from the opposite direction that it departed) is enough to rule out the flat Euclidean case in favor of a non-Euclidean structure. Substantivalists, strict eliminative relationists, and super-eliminative relationists will, of course, spurn these definitional third-way and sophisticated relationist ontologies, since they accept the substance/property dichotomy: for a substantivalist, space is a substance and so the domain of space coincides with that substance; and, for a strict non-modal eliminative relationist, the behavior of a few finite bodies in a local region cannot determine the structure of an infinite space (i.e., these bodies only reveal the structure of the part of space they occupy, hence the domain of spatial structures coincides, or is reduced to, the domain of these bodies and their interrelationships). But, as revealed in our investigation, Newton would likely concur in their disparagement of these kinds of spatial ontologies, for he advocates a surrogate form of the substance/property dichotomy. Like the substantivalists and strict relationists, Newton's spatial ontology necessitates a congruence between the domain of actual existing entities, either corporeal or incorporeal, and the domain of the attribute space. In the larger scheme of the ontological classification of spatial ontologies, consequently, Newton's rebuff of the notion of inherence does not appreciably effect the classification of his own

theory, which runs counter to the third-way definitional hypotheses of space or sophisticated modal relationism.²⁵

For these reasons, Newton's ontology of space is consistent with the ontological dependence version of the property theory of space, P(O-dep), surveyed in Chap. 1, since his theory fits a subclass of non-standard approaches that mimic a substance/accident metaphysics. A property theory of space is not substantivalism, moreover, and thus the following interpretation proposed by Pooley is not justifiable: after citing the passage from *De grav*, where Newton states that the motion of bodies "be referred to some motionless being such as...space in so far as it is truly distinct from bodies" (N 20–21), Pooley draws the conclusion from Newton's use of the term "being" in this case that it "involves a variety of substantivalism" (2013, 526; see, also, Earman 1989, 11, which draws the same conclusion). Given Newton's claim, discussed above, that space "approaches more nearly to the nature of substance" (N 22), Pooley reasons that, "of the three categories—substance, accident, or nothing—Newton states that space is closest in nature to substance" (2013, 526). Yet, as we have seen, Newton denies that space is an accident (property) *of body*, "since we can clearly conceive extension existing without any subject, as when we imagine spaces outside the world or places empty of any body whatsoever" (N 22). That is, space is closer to the nature of substance if we confine our attention to the material or bodily level of ontology alone, since space is independent of body—but, as argued above, space is much closer to a property of God if his overall ontology is examined. Despite his qualms about the concept of inherence and a variety of associated theological concerns (the contingency of accidents vis-à-vis God, divisibility, etc.), the evidence of the texts overwhelmingly supports the dependent nature of space in accordance with a God-based P(O-dep) conception, a position nicely encapsulated in a passage that we have often quoted above: space "is not a substance...because it is not absolute in itself, but is as it were an emanative effect of God" (21).

One might strive to reclaim a substantivalist interpretation by appealing to the metaphysics of emergence or supervenience, a tactic that would equate Newton's

²⁵There are a class of third-way theories that do not significantly part from the substance/accident dichotomy in certain contexts, however, such as the sophisticated relationist interpretation of general relativistic spacetimes in the work of, e.g., Dorato (2000) or Dieks (2001a). As will be explained in later chapters, if the metric field is conceived in the manner of a physical field, it thus follows trivially that the domain of spacetime, i.e., metric field, is congruent with the domain of physical fields (and thus the substance/property distinction can be claimed to have been upheld via their congruent domains). Could Newton's theory obtain a third-way classification by association with these modern third-way conceptions? Unfortunately, if Newton's theory were to acquire a third-way designation by this means, then the plethora of earlier theories that also posit a God-infused space, from Plotinus to More, would also obtain this same third-way label, as would any theory that links the domain of material phenomena with the domain of spatial extension (like Descartes')—and this, of course, would trivialize the third-way classification since nearly all spatial hypotheses would now count as third-way. In short, the theories of Dorato, Dieks, et al. are merely consistent with the substance/property distinction, but it is not a necessary requirement. For Newton, the congruence of God and space, i.e., his surrogate substance/property dichotomy, is indeed a necessary component of his natural philosophy.

“space as emanative effect” with space as a type of emergent or supervenient entity. Although Part II and III will concern these issues in detail, the difficulty with this potential substantivalist strategy is that, if forced to choose from the standard dichotomy in a modern setting (and thus leaving aside the property theory and Newton's God-infused world), then the emergence of space from a deeper level of ontology seems much more amenable to a relationist interpretation than a substantivalist one. Suppose, for example, that a theory's base entity is either a material object or a physical field: given this base ontology, it would be natural to infer that the emergent or supervenient entity is also material/physical, whereas it would be quite odd to categorize that entity as entirely different in kind, i.e., as a unique non-material spatiotemporal thing alone. An instance of this reasoning can be found in Norton's critique of Brown's interpretation of the spacetime structure of special relativity. After reciting Brown's claim that these types of spacetime structures are “a codification of certain key aspects of the behavior of particles and fields” (Brown 2005, 100), Norton labels this a “spacetime supervenes on matter” view, and classifies it “as a form of relationism” (2008, 822). As will be argued in later chapters, however, an emergent or supervenient conception of space resembles neither substantivalism nor relationism, but does qualify as a property theory of space.

2.6 Conclusion

Notwithstanding the rhetoric from the definitional wing of the third-way approach to spatial ontology, there is not much in Newton's treatment of spatial ontology that stands out as unique or groundbreaking, and what is original can be seen as a natural extension of, or variation on, the work of his older contemporaries. As revealed above, Newton's *ens quatenus ens* doctrine and his view that space emanates from God were almost certainly derived from More's earlier application of these concepts; likewise, the belief that space does not conform to the traditional substance-property dichotomy was common among many of Newton's predecessors and contemporaries, such as Charleton. If forced to make a choice, the chief novelty would probably lie in Newton's combination of these spatial themes, namely, the pairing of More's idea of a spatially extended God (contra nullibism and holenmerism) with the Gassendi-Charleton rejection of the substance/property scheme for space. Yet, given his refutation of the corporeal/incorporeal divide (as it pertains to both substances and properties), and given his deeply rooted suspicion of substance ontologies in general, it is not surprising that Newton resorts to an alternative approach that eschews altogether the substance/property dichotomy for spatial extension.²⁶ Nevertheless, other components of the Gassendi-Charleton philosophy run counter

²⁶It is unclear to what degree Newton's rejection of an incorporeal/corporeal distinction in *De grav* extends to his later published works. In Query 29 to *The Opticks*, Newton does describe God as “a being incorporeal” (N 130), and, in the correspondence with Leibniz, Clarke likewise deems God an “incorporeal substance” (C.IV.8). Yet, in both *De grav* (N 33) and the General Scholium of the

to Newton's outlook. For instance, Newton's rejection of a corporeal/incorporeal distinction may also explain his apparent reluctance to embrace their holoenermism, since that view implies a sharp distinction between corporeal and incorporeal extension, and thus tacitly reintroduces the type of a mind-body division that he reckons offers "a path to atheism" (N 31). Yet, like both More and Charleton (among many others), Newton is similarly compelled to associate space with incorporeal existents, despite his reluctance to employ the incorporeal label: i.e., since space must be the affection of a being, there is only one being, God, that can secure the infinity, indivisibility, etc., of space.

Of course, Newton's skepticism regarding substance could be interpreted as supporting Stein's minimal claim (2002, 281) that Newton advanced the debate on spatial ontology in a more modern, third-way direction. But, as should be readily apparent by now, the basis for Newton's forward-looking, skeptical treatment of substance is deeply rooted in his Neoplatonic metaphysics. Newton's primary criticism of the Cartesians and Scholastics, as disclosed above, stems largely from his belief that their ideas of substance entail a troubling dualism of mind and body, as well as from a general worry "that atheists [may] arise ascribing to corporeal substance that which solely belongs to the divine" (N 32). In essence, it would appear to be specifically Neoplatonist concerns, related to the overlap of the Western conception of God and the mind/body problem in particular, that prompt Newton's unique approach to spatial ontology, and not any sort metaphysically-deflationary, strong third-way insight into the nature of space.

The foregoing analysis does not contest the merits of the weak third-way interpretation, however. The concept of absolute space espoused in the *Principia*, in particular, the 1687 edition with its notable absence of ontological speculation concerning God and substance, is an undeniable breakthrough—but it is a breakthrough for physics, and not metaphysics. That is, the virtues of the *Principia*'s notion of absolute space are methodological and epistemological, and not ontological, although it would take the shrewd assessment of an Euler or Kant to fully appreciate this point. Accordingly, since the weak third-way reading allows both the definitional conception of space and time required for his physics *and* the type of Neoplatonist ontology of space founded on God that we have detailed above, it constitutes a more convincing interpretation of Newton's spatial hypotheses. The weak third-way reading, in conjunction with P(O-dep), also accounts for Newton's endorsement of absolute position and absolute velocity. Although a more thorough discussion will be postponed until Chap. 6, Newton repeatedly refers to "the immobility of space" (N 25), or, as he famously declares in the *Principia*, "absolute space, of its own nature without reference to anything external, always remains homogeneous and immovable" (64). Unlike More, Gassendi, and the vast majority of other seventeenth century natural philosophers before him, Newton is reluctant to use the terms "immobile" or "motionless" with respect to God, but it is clear that he derives the immutability of space from the immutability of God, and, of course,

1713 *Principia* (91), Newton expresses skepticism regarding the concept of God's substance, but not his attributes; and, as observed in footnote 21, Newton never refers to space as incorporeal.

motion is a form of change: "space is eternal in duration and immutable in nature because it is the emanative effect of an eternal and immutable being" (26). Hence, it is the P(O-dep) conception that best accounts for some of the distinctive, if problematic, features of Newton's metaphysics and physics: specifically, since space functions much like a property of God, Newton apparently concludes that the immobility (immutability) of the latter grounds the immobility of the former, and thus the material world can assume any number of different positions and velocities with respect to immobile absolute space, even if those different positions and velocities cannot be detected since they preserve their relative configurations.



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