

Introduction

1. Background to the Correspondence

Leibniz's correspondence with Burcher (or Burchard) de Volder (1643-1709) has long been recognized as one of the most fruitful sources for understanding his mature metaphysics. Studies concerned with this area of Leibniz's thought in any detail are usually peppered with quotations from, and references to, these letters.¹ And recently, passages from the correspondence have been subject to particular scrutiny in debates over the precise nature of Leibniz's ontological commitments, and apparent differences in these commitments over time.² The correspondence was mediated throughout by Leibniz's friend, Johann Bernoulli (1667-1748). Bernoulli was responsible for the initiation of the correspondence, but he also acting as a facilitator throughout, providing a sounding board for both Leibniz and De Volder in connection with the disputes that they were having. Whilst there is little that survives of the correspondence between Bernoulli and De Volder, the contemporary correspondence between Leibniz and Bernoulli has been preserved and the present volume includes a generous selection of excerpts. In some cases, they contain interesting discussions between Leibniz and Bernoulli that parallel the Leibniz-De Volder correspondence, and in others they shed important and candid light on the ways in which Leibniz and De Volder are reacting to one another's views. Bernoulli is always keen to see the correspondence progress and one can see his benign, and often catalytic, influence at work throughout on the course of the discussions that he is mediating. Without his presence it seems likely that the communications would have been less frequent and harmonious and the correspondence may well have terminated more quickly.

There is little information on which to base a proper account of the reasons that the correspondence came about. We know from Letters 1 and 3 that Bernoulli spent time with De

Volder in the summer of 1698 and discussed Leibniz's views with him on more than one occasion. This led to a few brief interchanges between Leibniz and Bernoulli that pertained to the contents of these discussions (Letters 2-6) and which culminated in Leibniz attaching a postscript to his letter to Bernoulli of 30 September 1698 (Letter 7) containing a summary of his views on some of the main points that Bernoulli had relayed to him. This was sent to De Volder and he took it as enough of an overture to write a letter to Bernoulli that was clearly intended for Leibniz's eyes (Letter 8). However, some of De Volder's biographical details help us to understand the perspective from which he approached Leibniz and provide some insight into his motivation.³

De Volder is perhaps best known today through the correspondence with Leibniz. In his own time, however, he was an eminent academic, serving as Professor of Philosophy and Mathematics, and ultimately Rector at Leiden University. The esteem in which De Volder was held at the time is underlined by the fact that Christian Huygens (1629-95) – to whom he is reputed to have explained the calculus – entrusted De Volder with the publication of his posthumous writings. He began his academic life with traditional courses of study in philosophy, mathematics, and medicine in Amsterdam and Utrecht and then worked under Francis de le Boë Sylvius (1614-1672) in Leiden, where he received his doctorate in Medicine in 1664. By this time De Volder had moved away from Scholastic Aristotelianism, and he appears to have devoted a good deal of time to the study of Descartes. After gaining his doctorate De Volder practiced medicine in Amsterdam. However, he did not lose his more academic interests in mathematics and philosophy and, in 1670, he was offered a vacant chair in philosophy at Leiden. Here De Volder initially discharged his official duties in a traditional way, teaching the Logic of Franco Burgersdijk (1590-1635), but soon he began to teach Descartes both in public and in private.

Although he had a public reputation for being a Cartesian sympathizer from very

early in his academic career, De Volder's name became indelibly linked with that of Descartes in the mid-1670s. Difficulties arose at Leiden in 1674 when the Aristotelian Gerard de Vries (1648-1705) left the university after disruption of one of his disputations by elements identified as Cartesian sympathizers. De Volder was among a number of professors called to account. Despite the attempts of the Curators of the university to protect the Aristotelian faculty, the harassment appears to have continued, and things came to a head in January 1676 when 21 propositions were prohibited from being taught and discussed in the university. Along with his colleagues Christopher Wittich (1625-87) and Abraham Heidanus (1597-1678), De Volder published a pamphlet condemning this prohibition (Heidanus 1676). The subsequent furor led to the dismissal of the aged Heidanus, who insisted that he had been the sole author. Despite the support that the Curators had shown for the anti-Cartesian elements in the university, the upshot of the condemnation was a weakening of the conservative power base. Indeed, shortly after Heidanus' expulsion, Cartesianism began to be taught openly again and was not subject to further suppression.

De Volder continued to teach Descartes' physics and philosophy after the controversies of the 1676 had died down. Indeed, between 1690 and 1693, De Volder and his students defended the views of Descartes against Huet's Censura Philosophiae Cartesianae (Huet 1689) in a series of disputations, which were published as the Exercitationes Academicae, without De Volder's permission, in 1695. It is notable that even in these largely pro-Cartesian disputations, De Volder observes that Descartes' views "should be followed in general, though by no means completely"(AE.i.3). And De Volder's desire to distance himself from Descartes seems to have become more acute in the years following this. Indeed, in 1698, he reportedly told Bernoulli that he had "long since abandoned the principles of Cartesianism as inadequate and mostly false" (Letter 9), and in the address that he delivered at the end of his term as Rector at Leiden in 1698, Oratio de Rationibus Viribus et Usu in

Scientiis, De Volder refers to “The shining lights of this century” in mathematical physics as “Huygens, Newton, and Leibniz”, with Descartes conspicuously absent (De Volder 1698, 22).

In the Elogé by Jean Le Clerc (1657-1736), written shortly after De Volder’s death, it is suggested that De Volder’s drift away from Descartes was caused by an interest in the practical side of natural philosophy and, in particular, by his encounter with the experimentalism of Newton’s Principia (Newton 1687), a book he had studied thoroughly after its publication in 1687.⁴ Indeed, following Le Clerc, Edward Ruestow contends that toward the end of his life, De Volder became disenchanted with the possibility of a successful combination of metaphysics and experimental physics to such an extent that he had lost any real interest in the former by the beginning of the eighteenth century.⁵

Whilst it involves some speculation, it seems likely that De Volder looked to Leibniz at a time in his life when he had deep reservations about aspects of Cartesianism, but remained hopeful that there was an alternative metaphysics that would provide the proper foundation for natural philosophy. Indeed, as we shall see, familiarity with some of Leibniz’s journal articles, had led De Volder to believe that a proper introduction to Leibniz’s philosophy might help him answer a crucial question, namely how it is that bodies come to have motion. Unfortunately, as we shall also see, this desire was never satisfied. Indeed, as we read the correspondence, it seems plausible to think that De Volder’s encounter with Leibniz may have been the proximal cause of the loss of interest in philosophy that Ruestow describes.⁶

For his part, Leibniz was already reasonably familiar with De Volder and his ideas by 1698. As early as 1691, in a letter to Johann Jacob Spener (A V.iii: 16), Leibniz mentions De Volder’s experimental work. And, more significantly, in a letter to Simon Foucher (1644-1676) from 16 April 1695, he reports having been given and having read a copy of De

Volder's Exercitationes Academicæ. Whilst indicating that he found some of De Volder's claims unconvincing, Leibniz was sufficiently impressed to suggest to Foucher that it might be published with a new edition of Huet and his own critique of Cartesianism.⁷ As he indicates at various points in letters to De Volder and Bernoulli - at least in the early stages of the correspondence - Leibniz's interest in corresponding seems to have stemmed from the belief that he had found a worthy interlocutor and the hope that explaining his views to De Volder and answering questions, would help clarify them in his own mind.

Bernoulli's motivations are probably the least clear. His voluminous correspondence with Leibniz began in 1693, by which time he was already an established mathematician. The content of the correspondence is largely mathematical and contains much of importance for understanding the work of both men. It is also peppered with gossip and there are sustained periods in which the two discuss philosophy and physics. Most important for our purposes are the letters written between 1698 and 1706, some of which accompanied those written by Leibniz for De Volder, and vice versa. As we learn in the Letter 9, Bernoulli regarded De Volder as someone who was ripe for conversion to Leibniz's philosophy. Furthermore, he was confident that if Leibniz could convince De Volder of his views, and also publish a version of his dynamics, they could spread his new philosophy - the badly needed synthesis of traditional and modern - in the lecture halls of Leiden and the rest of Holland. Throughout their correspondence, Bernoulli is largely sympathetic toward Leibniz's views and he might plausibly be regarded as his student. An obvious explanation, therefore, for his involvement is the natural desire of student to propagate the views of their teacher and curry favor in the process.

Despite the initial enthusiasm of Leibniz and De Volder's, the correspondence ultimately left both men frustrated. A number of reasons can be found, but I would contend that Leibniz is more to blame than De Volder. De Volder approaches the issues from the

broadly Cartesian perspective which he already viewed with suspicion. But the essentials of this position remain largely unscathed by the actual arguments that Leibniz gives.⁸ In some ways this is a disappointing conclusion. However, the discussion provides essential background for the reexamination of familiar passages and for more nuanced readings of the views that Leibniz articulates. In addition, it sheds further light on a somewhat neglected question, namely the issue of why Leibniz's philosophy was never as widely accepted as the Cartesianism that he thought he had so thoroughly discredited.

This introduction will consist in the main part of a detailed, though far from exhaustive, analysis of the content of the correspondence that is broadly philosophical in nature, including the somewhat lengthy discussion of the proper measure of motive force. I shall pass over various brief discussions of socio-political issues, which are in any event relatively rare in this particular correspondence. Those new to the material should be aware from the outset that some of the interpretations that I shall offer will appear contentious to other scholars. I shall include references to those with whom I disagree but will, for the most part, take the liberty that a brief introduction affords of noting disagreements rather than arguing at length for my views.

2. Five Phases of Correspondence

There is no neat way in which to divide up the correspondence chronologically. However, for the purposes of discussing the main themes, the composition of the letters in this volume can usefully be considered as having five phases. I shall begin by outlining these and then provide a more detailed analysis of the first phase, namely the initial letters between Leibniz and Bernoulli that predate the Leibniz-De Volder correspondence itself. From then on, I shall proceed thematically. Although, to some extent, the order in which I will treat the main themes will respect the order in which they received serious attention from the

correspondents.

The first phase of the correspondence comprises selections from letters between Leibniz and Bernoulli written during the summer and autumn of 1698 (Letters 1-7). Here we find Bernoulli giving an account of his initial discussions with De Volder along with Leibniz's initial reactions. Whilst Bernoulli's descriptions are brief, many of the issues that he raises recur in the Leibniz-De Volder correspondence proper. And whilst Leibniz offers cursory responses, here again we find germs of much that is to come. This is especially true of Letter 7, which consists of a postscript that seems to have been written for De Volder's eyes.

The second phase of the correspondence begins with Letter 8, the first by De Volder, which dates from 21 November 1698 and ends with Letter 34. Although officially addressed to Bernoulli, De Volder clearly hoped that it would be passed on to Leibniz as an invitation to engage in direct discussion. The content of Letter 8 dictates a good deal of the interaction between the two men until the late spring of 1700. De Volder devotes almost all of this letter to concerns that he has about Leibniz's account of the proper measure of the motive force of bodies and the public debate that had surrounded these issues in the 1690s. Despite De Volder's desire to discuss metaphysical issues – in particular, Leibniz's accounts of the nature of substance and body, and the causes of motion – Leibniz is unwilling to be drawn into detailed consideration of these until he has convinced De Volder that he is right about the physics. De Volder finally concedes in Letter 33 (although, ironically, this was ultimately due to Bernoulli's efforts as are set out in Letter 34). So, although there are some very interesting passages of a more philosophical nature in this phase of the correspondence, there is little sustained dialogue.

With De Volder's concession regarding the measure of motive force in place, the third phase of the correspondence begins. This lasts between April 1700 and October 1702,

comprising Letters 35-47. Here Leibniz and De Volder are largely concerned with the views of the latter. In particular, we find Leibniz attacking De Volder's account of substance and offering arguments against the Cartesian account of body as extended substance that De Volder tentatively embraces. There are also some interesting digressions, most notably a discussion of Leibniz's setting up the German Academy of Sciences in Letters 35-38, and a report by De Volder on the controversy that had surrounded the philosophical views of Johannes Bredenberg in Letter 36. However, I shall not discuss either of these further in the introduction, since their content is largely self-explanatory.

In what I am calling the third phase of the correspondence, it is striking how reticent Leibniz is to set out his own positive views. However, this was to change in October 1702 when De Volder received a copy of Leibniz's Réponse aux Reflexions Contenus dans la Seconde Edition du Dictionnaire Critique de M. Bayle, Article Rorarius, sur le Système de l'Harmonie Préétablie (hereafter referred to as the Réponse). In responding directly to the contents of this article, De Volder precipitated, with Letter 48, the best known, and most discussed, of the correspondence's letters, Letter 50. Indeed, this is one of the most interesting of all of Leibniz's mature metaphysical writings. Although a number of the issues that became the focus of attention at this time were not new to the correspondence, Letter 48 initiated a fourth phase, in which Leibniz became willing to discuss his own views and the reasons that he had for holding them in a far more open way. However, as we shall see, there is much that remains very puzzling to De Volder, arguably for very good reasons.

For the remainder of their correspondence, the two philosophers' attention was turned almost exclusively toward Leibniz's account of the nature of substance and the material world. We continue to find what contemporary scholars have found to be rich and illuminating material when constructing their interpretations of Leibniz's philosophy. But a fifth and final phase of the correspondence begins with Letter 59, which dates from 31 May

1704. This letter, unlike those that begin the previous four phases, does not usher in a change in subject matter. Rather, it represents a change in the tone of the interaction, a change which was ultimately to lead to the demise of the correspondence. For, as Bernoulli reports in his accompanying letter (Letter 60), De Volder had by this time becoming increasingly cynical regarding Leibniz's intentions. To his mind, Leibniz was continuing to fail to provide genuine answers to questions that he had posed repeatedly since the beginning of their interaction some five and a half years before. And, although Leibniz's contributions among the remaining seven letters include some very interesting statements of his views, he seems not to have regained his correspondent's confidence. De Volder contributed only two further letters and in his final effort (Letter 66) we find him devoting only a hundred or so words of a short letter to reiterating the main, and already weary, concerns of his previous letter (Letter 63).

3. The Correspondence's First Phase

The selection of letters in this volume begins with a number of extracts from the letters that were exchanged between Leibniz and Bernoulli in summer and autumn of 1698. In these letters Bernoulli presents Leibniz with accounts of personal discussions that he had with De Volder during time spent visiting Leiden. Although Bernoulli's initial report, in Letter 1, indicates that De Volder was a "great admirer" of Leibniz, Bernoulli adds that De Volder is opposed to Leibniz's views regarding the correct way to calculate the motive force of bodies and that he favors the position Denis Papin (1642- c.1712), who had entered into a public debate with Leibniz over this issue between 1689 and 1691 and in private correspondence thereafter. As I noted above, discussion of arguments concerning the measure of motive force was to dominate the second phase of the correspondence and we shall return to it below. However, Bernoulli also notes that De Volder's support for Papin trades, in part,

on a metaphysical issue. And this precipitates the further discussion that I have labeled phase one, much of which provides important background to the direct interchanges between Leibniz and De Volder that began in December 1698.

Bernoulli indicated that De Volder's siding with Papin was fuelled by the belief that Leibniz's case against Papin relied on a gratuitous assumption, namely that all bodies are elastic. Again, we can leave the details of why this was deemed important until the discussion of phase two. Here I want to turn to the response that Leibniz gives to Bernoulli in Letter 2. Essentially, Leibniz claims that De Volder is in the grip of a common, but incorrect, view of the nature of matter. This view is the one championed by Descartes and his followers, and adopted by Leibniz himself in his early career, according to which there is nothing to the nature of matter than extension and impenetrability.⁹ A correct understanding of the nature of body would allow De Volder to see that every body has in addition an internal force that ensures there is a rebound whenever this is required.

As Bernoulli reports in Letter 3, by the time he received Leibniz's comments he had already made the same point to De Volder in person on Leibniz's behalf. The response that Bernoulli got represents the first version of the central philosophical concerns that De Volder brought to his correspondence with Leibniz. What, De Volder wondered, could this force beyond extension and impenetrability in body be? De Volder's ontology admits only substances and modes, and his default assumption was that Descartes was correct in holding that there are substances of only two kinds – minds and body. Clearly the additional entity could not be another body. But perhaps Leibniz was thinking of force as a modification of matter, or of a mind that is causally connected to body in the appropriate way. The only other option that he could see was for Leibniz to advert to "the long since rejected substantial form of the ancients".

Leibniz's next letter to Bernoulli (Letter 4), in which he indicates explicitly that

Bernoulli should excerpt anything he sees fit and send it to De Volder, addresses this concern directly. Leibniz's explanation of the cause of elasticity is nothing novel. He follows Descartes in explaining the elastic properties of body by appeal to the fact that bodies consist of parts that are in relative motion. However, this does not remove the need for an additional component in the nature of body. For, on both Leibniz's and the Cartesian view, there must be something that explains why the requisite internal motion of parts obtains, and this cannot be found merely in extension and impenetrability. Leibniz briefly considers another option at this point. Perhaps the explanation for the motion of bodies is not intrinsic, with God doing all the work. However, he insists that "it is insufficiently philosophical to appeal to the bare will of God". This rejection of the occasionalist option is central to Leibniz's positive metaphysical views. However, it receives no further elaboration in the correspondence with De Volder. The reason for this is quite simple, namely, as he reveals in several places, De Volder is equally unsympathetic to this kind of explanation of natural phenomena.¹⁰

In this letter to Bernoulli, Leibniz also offers a brief statement of his positive view. He opts for the solution that explains the activity of matter by augmenting the nature of body through the addition of substance. However, Leibniz rejects De Volder's assumption that this must either be extended substance or a Cartesian mind "endowed with thought and understanding", for there are souls, forms, or (in one of the earliest recorded appearances of the term) "monads" that are "inferior". Unfortunately, we have no record of De Volder's reaction to these claims. But Bernoulli speculates on his behalf in Letter 5. Two possible concerns are raised, each of which is voiced by De Volder himself later on and neither of which is dealt with to the latter's satisfaction before the end of the correspondence. First, Bernoulli suggests that De Volder will want a better understanding of what a monad is. The second worry is not articulated very clearly. However, as least part of what troubles Bernoulli arises if Leibniz is taken to hold, as later discussion suggests he does, that bodies are

composed from an infinite number of soul-like, and hence, unextended, monads. For it is hard to see how the combination of entities of this kind would ever produce extension.

Leibniz offers further elaboration of his positive views to Bernoulli in Letter 6. However, he does not respond directly to the concerns that have been raised on De Volder's behalf. The final contribution to the first phase, Letter 7, is the postscript the Leibniz added to his letter to Bernoulli of 30 September. This postscript now exists only as a copy that was retained by Leibniz, suggesting that Bernoulli sent it to De Volder just as Leibniz hoped he would. As well as reiterating his claim that elasticity is explicable without recourse to anything other than the motion of particles, Leibniz says more about the role that he gives to forms and their nature. They are that which grounds the nature of body and force in general, embodying developmental laws and at the same time containing within them "the force and striving to obey them". But, in addition, we find the first mention of what Leibniz calls the law of continuity, which he accords the status of an "inviolable axiom that governs nature", according to which, "in changes there are no leaps".

4. Disputes concerning the Measure of Motive Force

As I noted above, whilst it is possible to provide a letter by letter account of the main features of the first phase, this ceases to be the case as the correspondence between Leibniz and De Volder proper begins. In what follows, I will take a more thematic approach.

Letter 8, the first of the Leibniz-De Volder correspondence proper, is dominated by the question of the correct way to measure the motive force of bodies. Discussion of this issue continued to dominate the correspondence for the first two years or so. Much of what follows in the current section is concerned with the details of a number of thought experiments that Leibniz advanced to support views that are more readily identified today as pertaining to his mathematical physics rather than philosophy. Of course, the distinction was

far less clear-cut in Leibniz's day and there are issues that arise that connect up with matters of ontology. However, readers who are less concerned with Leibniz's physics should be aware that the details are largely irrelevant for understanding the remainder of the correspondence.

Concerns about the proper measure of force were first raised publicly by Leibniz in a paper that is generally referred to as the Brief Demonstration (Leibniz 1686). In doing so, Leibniz ushered in a famous dispute which has come to be known as the vis viva controversy which lasted well into the eighteenth century.¹¹ Leibniz had offered a thought experiment designed to show, pace Descartes and his followers, that motive force (the capacity that a body has to act, or to do work) should not be identified with what the Cartesians called quantity of motion, which they measured by the product of the size and speed of a body. Leibniz assumes both that it takes as much motive force to raise a body of one unit size four units distance as to raise a body of four units size one unit distance, and that a body acquires a motive force on descent that is equal to that required to raise it to the height from which it has descended. Following Galileo's laws of motion, he then reasons to the conclusion that motive force is not properly measured by quantity of motion.¹² Instead Leibniz claims that "force is to be measured by the quantity of the effect that it can produce" (A VI.iv:2029/L 297). In later works, he comes to regard the product of the size of a moving body and the square of its speed as the paradigmatic measure.

Leibniz was attacked by a number of people in the wake of the Brief Demonstration.¹³ De Volder was clearly struck by Leibniz's dispute with Denis Papin and this provides the backdrop to their discussion.¹⁴ In Letter 8 De Volder draws directly on these disagreements as well as providing an independent objection. But in later letters Leibniz introduces two more arguments for his measure of force, including his so-called a priori argument. Ultimately, in Letter 33, De Volder concedes and the issue does not resurface. However,

despite Leibniz's great efforts, it is an argument of Bernoulli's that persuades De Volder to accept Leibniz's position.

4. 1. Arguments derived from the dispute with Papin

De Volder begins Letter 8 by observing that his main objection is one that he has found "anticipated by the most distinguished Papin". He does not think that Leibniz has established the truth of the "Cartesian axiom" on which the argument of the Brief Demonstration relies. What De Volder has in mind here is Leibniz's claim that the same amount of force is required to raise a body of unit weight through four units as to raise a body of four units weight through one unit. Following Papin, De Volder objects that it is equally plausible that the force of an ascending body is a function of the number of "gravitational impressions" that it must overcome.¹⁵ De Volder assumes, again with Papin, that gravitational force can be conceptualized in terms of the motive force of particles that push downward on bodies in equal amounts per unit time and with sufficient speed that they act on moving and resting bodies in the same way.¹⁶ Thus, it follows that the measure of the force that a body needs in order to ascend to a given height will be proportional to the number of particles that it overcomes, and hence to the speed of the body during the ascent.¹⁷

Leibniz offers two responses to De Volder in Letter 10. Neither yields particularly fruitful discussion, but they each foreshadow aspects of the subsequent debate over motive force. In the first response, Leibniz challenges De Volder's claim on the grounds that he has not considered the action of the particles of gravity carefully enough. However, De Volder does not engage with this objection and Leibniz lets the matter drop. Doubtless this was due, in part, to the fact that Leibniz was arguing simultaneously on several fronts. However, he also tells Bernoulli that "the way in which gravitational matter acts needs much further investigation than that up till now" (Letter 12). As we shall see later, in his discussions with

De Volder, Leibniz was far more concerned to utilize the argument that he regarded as a priori in nature in the hope that this would allow him to bypass disputes that could only be resolved empirically. In the second response Leibniz claims to demonstrate the Cartesian axiom without any appeal to claims about the actual mechanisms that underlie gravitational action. Leibniz begins his demonstration with the claim that whenever one measures something, one should employ “a perfect repetition of some specific real measure”. As an example, he considers the use of a square of unit length to measure rectangles which are 2 x 8 and 4 x 4 because a unit of measurement is repeated sixteen times in each. He then argues that the Cartesian axiom follows from the adoption of the raising of one pound through one foot as a real measure of force, since the raising of a four pound body to one foot and a one pound body to four feet each consists in the repetition of the real measure four times. De Volder raises an obvious problem in his reply in Letter 14, namely that Leibniz’s adoption of his “real measure” presupposes the very thing that is to be established. Leibniz’s analogy with the non-dynamical situation is not really adequate. Although there is no question whether the area of the unit is a measure of area which is repeated in the rectangles, this is precisely what Leibniz’s opponents deny when it comes to the claim that the repetition of the raising of unit size by unit distance always constitutes a repetition of unit force.

A second reference to the dispute with Papin by De Volder in Letter 8 betrays a simple misunderstanding of Leibniz’s view. The particular argument that is discussed appears in Leibniz’s 1690 article De Causa Gravitatis, which is supposed to show that the Cartesian measure of force is incorrect on the grounds that it would allow the possibility of “perpetual motion”. Leibniz’s choice of expression is a little unfortunate here and leads to some confusion on De Volder’s part. In fact, his claim is that the Cartesian measure allows for situations in which there are effects which are more powerful than their causes, thus violating the law of equivalence of cause and effect which he regards as “an axiom” that everyone will

surely accept (Letter 10). In *De Causa Gravitatis* Leibniz asks that we imagine a system governed by Cartesian laws that consists of two bodies, A weighing four pounds and B weighing one pound. A descends through a height of one by means of an inclined plane. At this stage it has gained a speed of one (since height fallen is proportional to speed squared). It then meets B which is at rest. Assuming that all the force (measured by the product of speed and size) of A is transferred to B in the collision it follows that B comes to have a speed of four. B is now in a position to climb to a height of sixteen on an inclined plane (since again height is proportional to speed squared). Finally, Leibniz claims that we are able to derive an effect which is greater than that with which we started, and hence an increase in force will follow. For if B is allowed to descend to the horizontal, it will be able to raise A to a height of four by use of a lever. Without the interference of any new force, B returns to its original position, while A ends up in a position that is four times as high as its starting point. Consequently, it is in a position that allows it to produce a greater effect than was initially possible, whether that be motion or something else.

Papin accepted the force of the argument in principle, but challenged Leibniz to produce a plausible account of how the force of the bodies could be completely transferred, insisting that, given the Cartesian measure of force, perpetual motion would not arise in the actual world.¹⁸ However, De Volder's response is different. He begins by quoting directly from another of Leibniz's published papers where he denies, "that a body that has three degrees of speed consists of a body of the same size that has one degree of speed three times over, or that it has three times its power on account of this" (Leibniz 1691a, 446 - quoted in Letter 8). De Volder assumes that this is because Leibniz thinks that the faster body has less force and hence, while he accepts that the Cartesians are guilty of the charge of admitting perpetual motion, he suggests that Leibniz's own measure of force will give rise to this as well. As the comment by Bernoulli that appears as footnote B8 in the margin of De Volder's

letter suggests, De Volder is quite confused about Leibniz's view. Although Leibniz denies that a body of size one with three degrees of speed has the same force as three bodies of size one and a speed of one, this is not because he thinks that it has less force, it is because he thinks that it has more. Thus, there is no danger of the reductio emerging given Leibniz's conception of the forces of the bodies. More generally, Leibniz holds that a greater force is present when the same quantity of motion (the product of size and speed) is concentrated in a smaller body than in a larger one.

4. 2. The problem of the balance

De Volder's more novel objection to Leibniz's measure in Letter 8 arises from the consideration of a static rather than a dynamic situation. De Volder observes that it follows from Leibniz's position that there can be bodies with unequal forces in equilibrium on a balance, something which he regards as absurd. De Volder has in mind a situation that Leibniz makes more explicit with an example in his response in Letter 10. If a body A of four pounds is placed on a balance with a body B of one pound such that they are in equilibrium, then the ratios of the distances of A and B to the fulcrum of the balance will be 1:4. But it follows from this that any motion of A will be accompanied by a motion in B which is four times as great. With force understood the Cartesian way, the bodies will be equal in force, and the equilibrium that there is between them is intelligible. Whenever A and B try to move, they acquire equal, but opposite forces, which cancel each other out. But, given Leibniz's measure of force as the product of size and the square of the bodies' speeds, the forces they acquire are not equal. Thus, De Volder cannot see how they could they balance one another.

In Letter 10 Leibniz defends his position by claiming that the kind of force that is operative in this situation is different from that which was under consideration in the Brief Demonstration and accepting that the former is to be measured by the quantity of motion. As

he had done in the Specimen Dynamicum (Leibniz 1695a), a paper with which De Volder was familiar,¹⁹ Leibniz distinguishes dead force [vis mortua] and living force [vis viva]. Dead force is found in situations where there is “a conflict of two things” and the balance counts as one instance of this (Leibniz also mentions collisions). Living force is found where there is “the production of some absolute effect, such as when a weight is raised to a given height, or when a spring is stretched to a certain degree.” In the Specimen Dynamicum, Leibniz clarifies these ideas further by appeal to the notions which reappear in Letter 10. “Conatus” or “nisus” is defined as “speed taken together with direction” (GM.vi.237/AG 120). Furthermore, we are told that this conatus or nisus is of two kinds, “solicitation” and “impetus”. Leibniz illustrates this by reference to a rotating ball which has been released. Leibniz notes that when it is first freed “the conatus for receding from the center [i.e., the solicitation], is infinitely small in comparison with the impetus which it already has from rotation” (ibid.). Indeed, Leibniz claims that the impetus of a body in motion is formed from solicitation by “continuation or repetition” (ibid.).²⁰ With solicitation and impetus distinguished, the difference between dead and living forces can be explained. Just as there is a distinction between the infinitely small tendencies to move in bodies that are beginning their motions and the impetus that is present in bodies that are actually moving, so there is a difference in the forces by which these motions begin (dead forces) and those which are involved in the production of an actual motion (living forces). Furthermore, just as impetus is formed from the repetition of solicitation, so “living force . . . arises from an infinity of continual impressions of dead force” (GM.vi.238/AG 122).

Even with these distinctions in mind it may still not be apparent how Leibniz intends to respond to De Volder’s objection. There is still one crucial ingredient missing, which Leibniz had first mentioned in Letter 7, the “law of gradual transition avoiding all leaps”, or principle of continuity, according to which, “there is never a transition unless it goes through

unassignable or infinitely small increments, and hence through dead forces.” Leibniz insists, though without any explicit justification at this point, that the law applies to cases in which there is interaction between more than one body, either in a direct collision or when they are in opposition on a balance. And with it in place we can see how De Volder’s challenge can be rebuffed. Leibniz observes that where bodies A (weight four pounds) and B (weight one pound) exert effort against one another on a balance they must do this in infinitely small increments. This means that the dead force that produces the conatus in A and B will produce infinitely small descent. As we have seen, Leibniz holds that force is proportional to the product of the size of a body and the height to which the body could raise itself by means of its force. In a situation such as the one that occurs with a body in free descent the force produces acceleration and the height will be proportional to the square of the speed.

However, in the infinitely small period that it takes to produce the initial motion, there is no such acceleration. Thus the force is proportional to the speed that is initially acquired. It is the latter situation that occurs with a balance. Here the two arms of the balance try to move with an initial speed which is directly proportional to the dead force that is exerted. In the case of A and B that are in equilibrium, the distance between them is such that the initial speeds are in a ratio which is inversely proportional to the ratios of their weight. But this is also true of the dead forces of each body.

De Volder’s response, in Letter 14, is concessive. He tells Leibniz that his “difficulty concerning the balance . . . is now solved.” De Volder adds a caveat: “provided that. . . your axiom in changes there are no leaps is demonstrated,” but immediately proceeds to backtrack claiming that it obviously holds where motion is beginning. Here the vacillation reveals his considered position, namely that, whilst he is happy that his particular objection has no force, there can be no “full knowledge” of the more general claims Leibniz has been making unless the principle of continuity is demonstrated. Leibniz does turn to this in his next letter, but this

is connected with De Volder's response to another argument for his measure that Leibniz had introduced in Letter 10.

4. 3. Leibniz's demonstration from oblique collisions

Letter 10 also contains an argument that does not appear in Leibniz's journal articles, although versions can be found in the correspondences with Arnauld and Papin.²¹ According to Leibniz, the argument is supposed to show that his measure "is demonstrated by [the laws of the composition of motions] in a certain way where it might have been feared that a divergence was possible." Leibniz asks that we imagine three identical spheres one of which, R, collides diagonally with the other two, S and T, which are at rest, with a speed that is proportional to the distance covered $\underline{1R_2R}$. Furthermore, the collision occurs in such a way that the centers of the spheres form a right-angled isosceles triangle SRT, where R is at the right angle (see Letter 10, note L1 for a diagrammatic representation).

According to Leibniz, after colliding with S and T at $\underline{2R}$, R will come to rest and S and T will be propelled at right angles with speeds of $\underline{2S_3S}$ ($= \underline{W_2R}$), and $\underline{2T_3T}$ ($= \underline{V_2R}$), which are each equal to $\underline{1R_2R}/\sqrt{2}$. He makes two assumptions explicitly here. The first, which Leibniz claims "is known both from experience and by reason" is that "one body colliding directly with another of the same size gives it all its force and direction, and for its own part comes to rest." The second, which is said to come "from the law of composition" is that S will be struck obliquely by R travelling along $\underline{1R_2R}$ just as if R had traveled directly along $\underline{W_2R}$, and that T will be struck obliquely by R just as if R had traveled along $\underline{V_2R}$. Leibniz takes this example to be in accordance with his own views but at odds with those of the Cartesians. Since R, S and T are all the same size and the speeds of S and T to R are in the ratio $1/\sqrt{2}$, it follows that the $\underline{ms^2}$ for R is equal to the sum of $\underline{ms^2}$ for S and $\underline{ms^2}$ for T. Thus Leibniz's measure of motive force is conserved but the quantity of motion is not.

In Letter 14, De Volder responds by suggesting that Leibniz's argument relies on laws of motion found in the work of Huygens that, as far as he can tell, hold only for elastic bodies.²² It is far from clear to De Volder that the collisions involve a conservation of force. Indeed, he indicates that his preferred hypothesis regarding the nature of elasticity requires a loss of force. On the back of these worries, De Volder offers Leibniz a way to resolve the issue.

[I]f you would like us to agree with you without any scruples, I think that it will be necessary to descend to the notion of substance, and to demonstrate that it is necessarily active from its nature, or certainly that the nature of corporeal substance is such that it is necessary that its forces are always conserved.

What De Volder says here represents an explicit foray into issues concerning the metaphysics of body that will dominate much of the later correspondence and to which we will return. The relevance here is that it offers Leibniz a possible way to support his argument. If he could demonstrate that the force of bodies is always conserved in collision, a Cartesian would have to maintain that ms should always be conserved. Thus, the thought experiment would serve as a counterexample to the Cartesian measure, since ms increases. And, although it would not provide a full-blown defense of Leibniz's positive view, the coincidence between the conservation of force and conservation of ms^2 would cohere in the way he claimed.

Unfortunately, Leibniz did not meet the challenge head on and his response in Letter 17 is somewhat obscure. The idea seems to be that the elasticity of all bodies is required in order that the law of continuity holds, and, hence that all bodies are elastic and obey the collision laws. At the same time, however, Leibniz admits that there are some bodies that are

“not perfectly elastic”, but that force is conserved when they collide because it is taken up by their insensible parts. What is important for the dialectic here is that Leibniz appeals to the law of continuity as a premise in his argument. As we have seen, despite suggesting that Leibniz should demonstrate the law of continuity De Volder is sanguine about its applicability in the case of the balance. But he is worried about its application to collisions.

Leibniz offers two grounds for his belief in the principle of continuity in Letter 17, “experience” and “the principle of order, which makes it the case that the more things are analyzed the more they satisfy the intellect.” His insistence that continuity is more intellectually satisfying clearly warrants further explanation. Unfortunately, Leibniz simply adds, “with leaps . . . the analysis leads us, so to speak, to mysteries”. De Volder is not particularly impressed with either. In Letter 18, Leibniz’s claim that we have empirical knowledge of the axiom is greeted with the obvious objection that we simply do not have experiences that provide information about the behavior of all bodies. Our experience is, of course, confined to the past, and it never reaches to those bodies that are insensible. As for the other justification: De Volder does not really understand what Leibniz means by “the principle of order”, but assumes correctly that he has in mind some kind of architectonic principle that governed God’s creation. It is from here that his most important objection arises. De Volder will not accept an appeal to divine intentions, which “very often has no foundation except our ignorance”. He also challenges Leibniz to explain what is wrong with the idea that two solid bodies of the same size might collide head on with the same speed and bring each other to an immediate halt. In such a case, the values of \underline{ms} and \underline{ms}^2 , and anything that might be plausibly regarded as the force of the two bodies would be reduced to nothing. And yet there is nothing here that fails to satisfy De Volder’s intellect or leads him to mysteries. De Volder doesn’t explain himself further. But it seems likely that he is motivated by exactly the view that Leibniz himself adopted in his youth, and which he reports to

Bernoulli in Letters 2 and 4, namely that with body conceived of as extended substance – the conception that De Volder brings to the correspondence – the motion of bodies in collisions is determined by composition of conatus. But with all this said, De Volder again retreats to a more conciliatory position. Even in the absence of this kind of account, he is willing to entertain Leibniz’s claims about the elasticity of bodies and their obeying the law of continuity as a hypothesis. Nonetheless, he “would like to know something more certain, rather than employing a mere hypothesis”. And if Leibniz is to fully satisfy De Volder he will need to provide a concept of body that entails its elasticity.

Leibniz says little more about this issue in the remaining letters and certainly says nothing that could reasonably be expected to convince De Volder that there is something unintelligible about his collision scenario. However, in the longer version of the letter of 6 July 1699 that was not sent, reproduced as the Supplement to Letter 20, Leibniz does address the issue of the justification of the principle of continuity again. He begins by supposing that De Volder will agree that “not everything possible exists”. Furthermore, he assumes that, once this is admitted, De Volder must also accept that “it follows that some possible things come into existence rather than others not from absolute necessity but from some other reason (namely, of goodness, order, perfection).” For Leibniz, the assumptions that the world was created and that God chose between alternate possibilities necessitate that there were criteria that governed this choice, and in other writings, Leibniz attempts to expand on the meaning of these principles in such a way that it becomes possible to argue for the law of continuity.²³ In the draft letter the issue goes without any real explanation. But this should not be so surprising, and nor perhaps should Leibniz’s decision to excise this material from the actual letter. As we have seen De Volder had made it clear that he would not take arguments seriously which are based on our conception of the divine nature and the motivations for divine action.

However, it is unfortunate that Leibniz kept another comment about continuity from the final version of Letter 20. This concerns the relationship between experience and the justification for the law of continuity. As we saw, De Volder objected to Leibniz's appeal to experience on the grounds that it could never provide warrant for such general claims. In the draft letter, Leibniz comments on the role that he had intended for it as follows: "The agreement of experience with the laws of order provides something like a test and, although it may not have the force of a universal demonstration, it can provide great confirmation nonetheless, and certainly, many things are not known in any other way." Though rather opaque, this is suggestive. Leibniz does not think that his commitment to the law of continuity is merely a hypothesis. Some kind of warrant is conferred by our experience of the material world. Indeed, at least here, Leibniz claims that this is sufficient for knowledge of the principle. Had De Volder been offered this, it might have shed further light on the methodological divide that separated the approaches of the two philosophers regarding the issue of continuity and on the justification of philosophical theses more generally, an issue to which we will return in section 7.

4. 4. Leibniz's a priori argument

Leibniz might have pursued his argument from collisions more forcefully had it not been for the fact that the two men had by this time also become embroiled in a detailed discussion of another of Leibniz's arguments for his preferred measure of force. This argument is one that Leibniz appears to have regarded as more important. As he makes clear in Letter 17, he was very confident that it worked. But the reasons go deeper than this. Leibniz was concerned that all the other arguments under consideration, even the one that eventually converted De Volder, "require special assumptions about such things as weight, elasticity, and oblique collision" (Letter 35). In contrast, as Leibniz notes in the preface to his

Dynamica, this additional proof “proceeds a priori and arises from the bare contemplation of space and time, without assuming gravity or any other hypothesis posterior in nature”

(GM.vi.292/AG 111).

The a priori argument was introduced into the De Volder correspondence not by Leibniz but by Bernoulli. It was one of the excerpts from Leibniz and Bernoulli’s exchange that Bernoulli sent to De Volder along with Letter 10, and it appears in this volume as the Supplement to Letter 11. It was repeated by Leibniz, with some minor differences, in Letter 17 as follows:²⁴

(1) An action bringing about a double effect in two units of time is twice an action bringing about a single effect in a single unit of time. . . .

(2) An action bringing about a single effect in a single unit of time is twice an action bringing about a single effect in twice the time. . .

[Therefore,]

(3) An action bringing about a double effect in two units of time is four times an action bringing about a single effect in the same double amount of time.

Each of the premises and the conclusion are illustrated by a more concrete example:

[1’] The action of covering two leagues in two hours is twice the action of covering one league in one hour. . .

[2’] The action of covering one league in one hour is twice the action of covering one league in two hours. . . .

[Therefore,]

[3’] The action of covering two leagues in two hours is four times the action of covering one league in two hours.

Central to the argument is the notion of an action [actio], which, Leibniz tells De

Volder, “is nothing other than the operation of force over time, i.e., proportional to force multiplied by time” We can therefore see how the conclusion about force is supposed to follow. In 3’ the times are the same and the actions are in the ratio 4:1. So the forces are in the ratio 4:1 as well. But the speeds are in the ratio 2:1, and so the forces are proportional to the squares of the speeds. Leibniz does not run the illustration with actions that are in the ratio of 9:1, 16:1 etc., but he assumes that result will generalize accordingly.

De Volder’s main objection to Leibniz’s argument first appears in the supplement to letter 14. He has no problem with premise (1). The problem is with (2). De Volder thinks that the two actions are equal rather than that the first is twice the second. The subsequent discussion focuses on the example. As De Volder notes in Letter 18, “actions should be compared with one another only with respect to their effects,” and the effects in 2’ are the distances covered, which are identical. Leibniz’s initial response in Letter 20, which is repeated in Letter 21, is incredulity. He points to another “axiom”, which goes directly against De Volder’s position, namely “an action that produces the same thing more quickly is greater”. The axiom is, Leibniz claims, “established by the natural light and by the testimony of the whole of nature” and he asks, “Why am I offering arguments for this claim? Could I hope to produce anything clearer?” However, this does not help resolve the dispute. In Letter 22 De Volder accepts that there is a sense in which a faster motion is greater than a slower one but insists that the actions are equal if the slower one continues until the distances traversed are the same. It is not until Letter 24 that Leibniz really starts to engage with De Volder’s objection. Here matters get rather complex and convoluted and I shall omit much of the detail. Leibniz introduces the distinction between free action and violent action. The latter is action that uses up all the force of the agent and has a real effect; the former is action that involves an exercise of force that leaves the agent just as powerful as before, giving rise to a “modal effect” or “formal effect”, which may be produced endlessly. Free action is what

Leibniz has in mind when he offers the a priori argument and appeals to the axiom. In the example he offers, the modal effect is distance traversed and he suggests that the only way that the action may be measured is by the product of distance traversed and the speed of the traversal. Unfortunately, it is very unclear why Leibniz thinks we should accept this as the correct measure.

When De Volder returns to the issue in Letter 27 he remains just as unconvinced. This is hardly surprising. Again there are lots of additional details. But the crux of the matter seems to be the following: Leibniz began by telling De Volder that action is the operation of force over time and proportional to force multiplied by time. As a Cartesian sympathiser, De Volder needs to be convinced that there is a difference between the exercise of a body's force and the speed that it has, given that he takes force to be proportional to speed. And unless this commitment is dislodged, he will be unable to understand why the two actions mentioned in 2' are not equal. The speeds and times compensate one another. In 2' the effect in question is the movement of a body of a given size through a given distance, whereas in 1' the same effect is produced at twice the speed. If, as Leibniz assumes, action is proportional to force multiplied by time, and if, as De Volder assumes, force is proportional to speed and size, then multiplying the time by the force in each case will yield the same quantity, that is, in 1' force is proportional to $(\text{speed} \times \text{time}) = (1 \times t) = t$ and in the second case, it is proportional to $(\frac{1}{2} \times 2t) = t$.

In Letter 29 Leibniz suggests that the problem is that De Volder has neglected the fact that there are "two different analyses of action" available for 2'. Each calculates action by taking the product of an extension and an intension. The extensions are time taken and distance covered respectively, and the intensions are power (force) and speed respectively. But it is hard to see what independent grounds there are for Leibniz's claims. When first introduced the notion of an action seemed to be a technical one, the operation of force over

time measured by the product of the correspondent quantities. Now it is suggested that this was merely one of two ways of measuring something whose nature can be grasped independently. And nothing in all the attendant elaboration that Leibniz offers does anything, as far as I can see, to motivate this. By Letter 33 we find De Volder suggesting, essentially, that the two analyses only arise because Leibniz is assuming that speed is not proportional to force and yet provides a basis for measuring what he now calls free action. But this seems to him to be begging the question. It is unclear whether this impasse would have been permanent had it not been for Bernoulli's intervention.

4.5. De Volder's conversion

Despite all the effort expended by Leibniz up until this point, over the question of the proper measure of force, it is ironic that De Volder became persuaded of the truth of Leibniz's account by an a posteriori argument that was sent to him by Bernoulli on his own initiative, which appears in the Supplement to Letter 34. Bernoulli's example has body of unit size striking a series of springs. Each of the springs absorbs the force of a body of unit size moving at unit speed when struck head on. The system is set up in such a way that the body begins with a speed of two and collides obliquely with each spring such that the component of motion perpendicular to the spring is speed one. De Volder agrees with Bernoulli that the body would collide with four such springs before being brought to a halt. Thus, the force of the body with speed two is taken to be four times the force of a similar body with speed one, rather than two times as the Cartesian measure would dictate. Not content with this, however, De Volder offers Leibniz his own version of the thought experiment, with oblique collisions between inelastic bodies in Letter 33. In this scenario a body A of unit size with speed two collides with four stationary bodies of the same size in succession. Following the Cartesian hypothesis, De Volder imagines that after the first collision both bodies move with a speed of

$\frac{1}{2}$ in the direction perpendicular to the stationary body, conserving the quantity of motion in this direction through the communication of a force of the same magnitude. After four such collisions A, which began with two units of force will still have unit speed (and hence unit force) and yet have communicated a force of $\frac{1}{2}$ four times over, i.e., its entire original force. The result, De Volder observes, is “manifestly absurd” and he concludes “I easily deduced from this that in bodies that are the same . . . power should not be measured by speed alone or action by speed and time alone, and so, that you are right to assume that it is distance covered with a certain speed. Given this, your measure of force follows.”

It is puzzling that De Volder was sold on Bernoulli’s proof. He regarded it as superior to those which Leibniz had in two ways. First, the introduction of springs was taken to obviate the need for assumptions about elasticity and the attendant worries about the law of continuity; second, the thought experiment involved motion in a horizontal plane, thus removing any of the concerns that arose due to the involvement of gravity. However, De Volder’s willingness to accept Bernoulli’s experiment remains puzzling. We are told nothing about the way in which the springs are supposed to consume force and, elsewhere, De Volder shows great concern for the mechanisms involved in its transfer. Furthermore, De Volder goes beyond the conclusion that the Cartesian measure of force is incorrect and embraces Leibniz’s measure as the alternative when the existence of the case of the springs is consistent with Leibniz’s measure. We also see that De Volder was ready to accept Leibniz’s proposal that the free action of moving bodies be measured by the product of speed and distance. But although all the numbers add up, given that distance is the product of speed and time, it remains far from clear that De Volder has reached this conclusion via an independent understanding and acceptance of the a priori argument itself. In Letter 36 De Volder rehearses Leibniz’s reasoning, but this is prefaced by “after I recognized that speed must be distinguished from force, unless I am mistaken, I reasoned in a way that agrees with your

principles". Once it is accepted that force should be measured by the product of the size and square of the speed, it is apparent that the product of force and time is proportional to the product of speed and distance. For the product of speed and distance = $\underline{sd} = \underline{sst} = \underline{ds}^2$, which is proportional to \underline{mts}^2 . But neither man seems to argue in a way that leads directly from an understanding of the notion of action to the conclusion that it should be measured in each of these ways.

Leibniz was clearly pleased that De Volder had accepted his position. In Letter 35, he effuses, "nothing brings me more pleasure than congratulating you on your discovering the truth and accepting my laws for measuring force," and in the covering letter to Bernoulli which accompanied Letter 38 he asks that Bernoulli encourage De Volder to popularize his measure of force at Leiden, and suggests that Bernoulli inform the Marquis de l'Hôpital about the new convert. But it is also clear that he was not truly satisfied with the state of things. After congratulating De Volder in Letter 35, Leibniz continues with the following, which has already been partially quoted above: "these things establish the truth very well and reduce the contrary to absurdity. However, since they require special assumptions such as weight, elasticity, and oblique collision, they do not uncover the sources and causes sufficiently, which can be done only with my measure of action". As we have seen, Leibniz found it very difficult to make serious headway with De Volder when faced with conflicting claims about the empirical questions, such as the nature and operation of gravitational force. Who knew what complications might arise, if De Volder started to think too hard about the way springs work? But although Leibniz presents the a priori argument again in Letter 38, there is nothing that provides any more independent reason for accepting it and it disappears from the correspondence at this point along with all discussion of the measure of force.

Leibniz and De Volder expend a great deal of energy discussing the issue of the correct measure of motive force and it is natural to wonder why it seemed so important.

Clearly the debate between Leibniz and Papin had caught De Volder's attention and he wanted to get to the bottom of the issue, but some earlier presentations of Leibniz's arguments against the Cartesian position suggest another motivation for Leibniz himself. In section 18 of the Discourse on Metaphysics, for example, he appears to claim that he can derive metaphysical conclusions about the nature of matter by establishing his measure, in particular that there is more to force than can be accommodated by the Cartesian conception of body as extended substance.²⁵ Thus, one might think that Leibniz hoped to support his ontological doctrines as a whole in discussing these issues with De Volder. Indeed, in Letter 24, Leibniz describes the measure of force as "the gate through which to pass to true metaphysics" and it is clear that he sees it as an important propedeutic for entry into Leibniz's system, by which "the soul is gradually freed from the false notions of . . . the Cartesians concerning matter and motion and corporeal substance." But even if he did think he had given such an argument earlier in his career, by the time of the De Volder correspondence this is no longer a focus. Indeed, in Letter 4 Leibniz makes it clear that there his own measure of force provides no more motivation for abandoning Cartesianism than any other. He tells Bernoulli, "however we measure the power that is conserved, it follows from the fact that force or action is not lost that there is something in body other than those two things, namely extension and impenetrability." Furthermore, as we shall see in the next section, De Volder makes it clear from very early on in the correspondence that he does not think that the Cartesian account of body is adequate precisely because it does not provide a basis for understanding the motive force of bodies. I have argued elsewhere that Leibniz may have thought he could make metaphysical capital out of his argument against the Cartesian measure of force because there was an unreflective tendency among Cartesians to equate force itself with ms. For such opponents, breaking the equation would free up space for a deeper investigation of the nature of matter, with Leibniz waiting in the wings.²⁶ However,

with De Volder, another, not necessarily competing, explanation may also be in play. Leibniz expresses similar sentiments to those in Letter 24 in the accompanying letter to Bernoulli (Letter 25), but is more candid: “Since the doctrine of the activity of substances is abstracted still further from matter and the senses, I thought that it would be pointless to discuss it until we agree about the easier issue.” Assuming that Leibniz did not think there was ontological capital to be gained, the focus on physics in the early part of the correspondence may have been as much a test of De Volder’s abilities and worth as an interlocutor as anything else.

5. De Volder’s Challenge

Toward the end of Letter 8 De Volder turns the discussion away from the structure of Leibniz’s dynamics to more general issues concerning the metaphysical and epistemological foundations of natural philosophy. Praising Leibniz for his discussion of substance in his 1694 article De Primae Philosophiae Emendatione, et de Notione Substantiae, De Volder adds:

For, if we had an a priori demonstration that every substance is active, I might easily persuade myself that from this most fruitful source of truth follows not only the resolution of my worries but also of those difficulties that have burdened every natural philosopher up until now.

In fact, De Volder mentions no less than eight issues which he hopes might be resolved, if such a demonstration of substantial activity can be provided. The most important of these concerns the following: (1) The nature of the cause of motion in bodies; and (2) what must be ascribed to matter, besides extension.

De Volder’s request for an a priori demonstration of substantial activity can be seen as fixing his main agenda for the entire correspondence. A more precise statement of De

Volder's desideratum appears in Letter 14, namely that Leibniz "descend to the notion of substance, and . . . demonstrate that it is necessarily active from its nature". This request is set against the traditional distinction between a priori demonstration and a posteriori demonstration. A posteriori demonstration proceeds from effect to cause and produces knowledge of the nature of the effect. A priori demonstration proceeds from cause to effect and produces knowledge of why the effect obtains. De Volder is looking for a demonstration of substantial activity grounded in the proper conception of substance that explains why substances are active. In Letter 63 he provides an example of the kind of thing that he would find acceptable:

Suppose I had asked which figure it is that has angles equal to two right angles.

Someone who first gave me the notion of a triangle, i.e., of a figure comprehending three straight lines, and then demonstrated that this property follows from it, would have satisfied me.

De Volder does not provide an account of how one should go about providing the notion of a triangle or the more important notion of substance. However, at the heart of his philosophy was a commitment to the proposition "whatever I clearly and distinctly perceive is true" (EA.i.56). The Exercitationes Academicæ contain a lengthy discussion and defense of this position.²⁷ And, although De Volder believes that the criterion applies primarily to propositions, he explicitly observes that "it can also apply to notions . . . since in common usage such ideas . . . are said to be true or false" (EA.i.57). As evidenced throughout his works, De Volder admits an innate repertoire of ideas and notions which may be uncovered through careful reflection and thereafter provide the categories for proper thinking.²⁸ By 1698 and the correspondence with Leibniz, De Volder was not completely happy with the results

of his adoption of this criterion but the commitment was still intact.²⁹ Thus, I think we should understand his demand for an a priori demonstration of substantial activity as a demand for an account of the clear and distinct notion of substance and a proof that anything that satisfies this notion is active, based on nothing other than this notion and other propositions whose truth is also clearly and distinctly perceived.

It is also important to keep in mind here the relevant background assumptions about the ontology of the created world that De Volder brings to bear on this aspect of the correspondence, though we shall return to his conception of the material world in more detail later. His default position is broadly Cartesian. He takes himself to have independent and mutually exclusive clear and distinct conceptions of thought and extension as substantial natures in virtue of the fact that they can be conceived as kinds of being that can exist independently of any other being. And he conceives of the material world as a single extended substance. The problem is to understand how something merely extended could be the source of its own change, given that extension is intrinsically passive. The hope appears to be that Leibniz's claims to have established that all substances are essentially active can be substantiated and provide the required augmentation of the concept of matter.

5.1. Leibniz's response to De Volder's challenge

De Volder requests an a priori demonstration of the activity of substance or corporeal substance in no less than thirteen of his surviving letters. But although Leibniz asserts the essential activity on a number of occasions, he never once attempts to satisfy De Volder's actual demand.³⁰ We have already encountered one of Leibniz's reasons in Letters 24 and 25. He thought that until the discussion of physics was over there was no point in moving on to more difficult issues. De Volder had not proved himself worthy. But although this may explain Leibniz's initial unwillingness to discuss his reasons for believing that all substances

are naturally active, it does not explain Leibniz's reticence to provide a demonstration after De Volder's conversion and right up until the end of the correspondence.

On a number of occasions, Leibniz suggests that his failure to provide an a priori demonstration is due to the fact that he does not have a demonstration ready to be given. Alluding to De Volder's demands in Letter 21, Leibniz tells Bernoulli "But, even if I had them ready, there would not be the space and time to give proofs of all of this." And in Letters 25 and 30, he claims that he does not have an a priori demonstration because his thoughts on the matter are not developed fully enough. Indeed, in Letter 25, he even goes as far as suggesting that this could not be accomplished without "another kind of writing, one whose form I conceive in my mind rather than have explicitly", which may be an allusion to the universal characteristic that Leibniz had advocated from early in his career.³¹

The suggestion that Leibniz lacks a demonstration is further evidenced by two places in which Leibniz does appear to engage with De Volder's request. In Letter 32 we find:

If, like all the scholastics, we mean by substance that which can act or be acted upon and, moreover, nothing is acted upon unless it also acts, it follows that every substance can act. For, if it is already established that every substance that can act is intrinsically active, it follows that every substance is like this.

The second piece of text is also a marginal addition. It appears on Letter 40, which Leibniz sent on 6 July 1701, "A substance is a complete atom, an intrinsically complete atom, i.e., an atom completing itself. From this it follows that it is a vital atom, i.e., an atom having an entelechy." Each of these, in embryonic form at least, appears to be an a priori argument for the activity of substances. But there are several reasons to think that they do not represent an argument that Leibniz felt comfortable with. To begin with, it seems that neither of them was ever sent to De Volder. The first was certainly confined to a letter to Bernoulli. And although

the second is found on the draft a letter written for De Volder it appears to have been added some time after the fair copy was sent. But the arguments themselves are revealing as well. To begin with neither represents a well-worked out argument at all. At best they are sketches of argumentative strategies. Furthermore, they are quite different and even rely on quite distinct accounts of the notion of substance. Finally, they face the fairly obvious problem that neither of the definitions would have been acceptable to De Volder. Thus, in the present context neither effort conforms to Leibniz's own account of demonstration as "reasoning whose force is evident and by which you could expect the indubitable conviction of your adversaries" (Letter 30).

On the basis of what we have seen so far it may seem as though Leibniz thought a successful defense of his view would require the provision an a priori demonstration of substantial activity and that he was simply evading the issue when writing to De Volder. However, in Letter 30 we find the suggestion of a different attitude. Here Leibniz offers what he calls "a first attempt at a proof," for the claim that all substances are active. A more refined version is presented in Letter 54:

Furthermore, if you agree with me that the system of occasional causes is not worthy of a philosopher, and if you think that the influence of substance on substance (I am speaking about true ones) is inexplicable, I do not see how you could have doubts about the internal tendency to change in things, since we are taught that there are changes in things by our experience of the phenomena, as well as from the inside where the operations of the mind themselves exhibit changes. Therefore, I think that the fact is demonstrated a posteriori.

Here the fact in question is "whether every substance, at least every substance known to us, should be considered active". And, according to Leibniz it "can be established from the

phenomena.” We can set aside the issue of whether the argument itself is any good since it is the methodological issue that concerns us at present. The key point is that although Leibniz recognizes that he has not provided the a priori demonstration that De Volder had requested, he does think he has done enough to demonstrate substantial activity a posteriori. Furthermore, he seems to be suggesting that this is all the proof De Volder should need.

The view that Leibniz expresses here seems to support an interpretation of Leibniz’s method that has been offered in its most developed form by Stuart Brown. Brown has suggested that in works from the 1680s onward, Leibniz came to think of all proof as essentially “assumption relative” and, with the exception of the principle of contradiction, Brown claims that ultimately Leibniz came to reject all “immediate truths” or a priori first principles in metaphysics, and that it followed that Leibniz’s metaphysical views could no longer be justified as immediate truths of reason or by demonstration.³² Instead Brown suggests that Leibniz began to adopt a method, even in metaphysics, which “is much closer to what is nowadays called the hypothetico-deductive method than to that characteristic of Descartes and Spinoza” (Brown 1984, 63). But although there are passages in the correspondence that suggest that Leibniz’s method for attaining knowledge of substantial activity may have close affinities to hypothetico-deductivism, not all of what he says sits so comfortably. According to the hypothetico-deductive method, the hypothesis that is to be supported is offered as a pure conjecture, independent of the phenomena that it is supposed to explain. It then receives confirmation to the extent that it allows us to deduce previous data and to deduce observable predictions which may be verified or refuted. However, verification leads to tentative acceptance at best.

As I mentioned earlier, it seems more likely to me that Leibniz is drawing on a distinction between a posteriori demonstration, or demonstration of the fact [demonstratio quod], and a priori demonstration, or demonstration of the reasoned fact [demonstratio

propter quid], which can be traced back through scholastic philosophy as far as Aristotle's account, in Posterior Analytics I, 13, of the difference between syllogisms that are ἀποδείξεις τοῦ ὅτι from those that are ἀποδείξεις τοῦ διότι. The most important differences between the hypothetico-deductive method and a posteriori demonstration is that the latter starts with the phenomena and is supposed to reveal the cause of the effect, not merely a well-confirmed but revisable hypothesis. The argument we considered above is of just this kind. Leibniz starts with the phenomena – the existence of bodily motion and changes within our minds – and then infers that the bodies and minds are the causes of this change.

We might wonder at this point how Leibniz arrives at the further conclusion that the things in question are substances. Presumably, he is treating substance as a term which designates – in addition to God – something ultimate within the realm of created being that we experience. Thus his conclusion is no stronger than the claim that the things that underlie observed change must have activity intrinsically. Some of these – the minds – will be active because they are substances, whereas others – the bodies – will be active because they are composed of substances in a sense to be considered below. But this distinction is not at issue here.

Given De Volder's rejection of occasionalism, Leibniz has an argument which he takes to be sufficient to establish the fact that the constituents of created reality – both bodily and mental – are intrinsically active. He lacks an a priori demonstration because as yet he has no distinct knowledge of the nature of the existing substances and hence no hope yet of an a priori demonstration, that is, an argument that establishes why they are active. Nonetheless, Leibniz does appear to have provided what he takes to be a compelling argument for the main thesis that interests De Volder, namely the proposition that what De Volder calls corporeal substance, that is, actually existing matter, is naturally active.³³

5.2. De Volder's rejoinder

As we have seen Leibniz does not appear to be interested in trying to provide an a priori demonstration of substantial activity. However, the discussion of the notion of substance is not exhausted by what we have considered so far. Both De Volder and Leibniz say a good deal about their respective conceptions of the category and there is significant critical engagement. I shall discuss each of these conceptions at some length below. Before moving on, it is worth pausing to examine De Volder's response to Leibniz's a posteriori demonstration of substantial activity.

Perhaps unsurprisingly De Volder is unimpressed. In Letter 33 he acknowledges the force of Leibniz's first version of the demonstration from Letter 30, accepting that substances cannot be said to interact and that a natural cause of activity should be sought. But De Volder also observes that, given his antipathy toward occasionalism, he has "never doubted that the truth of [Leibniz's] conclusion is established a posteriori." De Volder's problem is not that he does not believe that substances, and in particular material substance, are naturally active. His difficulty lies in the fact that he does not have any kind of explanation of what it is about substances that accounts for their being active. This is even clearer from the response that De Volder makes in Letter 27 to Leibniz's Letter 24 claim that, "for a proposition to be said to be understood, it is enough that it follow necessarily from things that are understood."

I acknowledge that, "for a proposition to be said to be understood, it is enough that it follow necessarily from things that are understood," if it follows evidently from things understood a priori, but not from things understood a posteriori. Consider the nature of gravity, so that what I mean may be clarified by an example. I understand this as well as possible if I have understood that the descent of bodies necessarily

follows from the universal structure of the world or from the particular structure of our earth. But I do not understand it at all if I infer from the fact that I see bodies descend that some explanation of why this happens, which I call gravity, is required.

It is hard not to be sympathetic. Bernoulli's early letters to Leibniz indicated very clearly that De Volder wanted to know how Leibniz conceived of bodies such that they could be said to have an active force. And in the first letter of the correspondence proper, Letter 8, De Volder explicitly characterizes his first request for an a priori demonstration in this way. We should not be misled by the fact that the term demonstration is used to characterize both De Volder's desideratum and the argument that Leibniz presents. As we have seen, successful prosecution of the latter does not yield the former at all. What De Volder wanted was an articulation of Leibniz's ontology that enabled him to see how Leibniz could maintain that the activity of matter was a natural feature of the actual world. All he got was an argument to the conclusion that whatever underlies the reality, the substance, of any part of matter must be something from which activity follows. But De Volder had already satisfied himself that this kind of demonstration was available.

6. The Debate over De Volder's Account of Substance

As we have seen, despite his best efforts, De Volder did not manage to extract a definition of the notion of substance from Leibniz. However, the demand for an a priori demonstration of substantial activity did provide the opportunity for Leibniz to present a sustained critique of De Volder's views on the matter. Aside from its intrinsic interest and importance for our understanding of the correspondence as a whole, this discussion is worthy of attention since it provides us with information that sheds light on Leibniz's critical stance toward the views of two other philosophers with whom De Volder's view shares features,

namely Descartes and Spinoza.

Discussion of De Volder's conception of substance begins in October 1700 with Letter 36 and continues until Letter 47 from July 1702. At that point De Volder had received the copy of Leibniz's Réponse and the correspondence turned to the issues raised by Leibniz's positive views as they appear in this essay. After Leibniz provided his a posteriori demonstration of substantial activity in Letter 29, De Volder pressed him again for an a priori demonstration. At this point, Leibniz finally acknowledges that they should try to agree on the correct account of the notion of substance. However, his cooperation in Letter 35 is limited to encouraging De Volder to provide his definition of substance as the first step. For his part, De Volder seems to have been happy that Leibniz was finally showing some interest in demonstrating substantial activity. And he willingly followed Leibniz's suggestion for their joint venture. Once this definition was received, Leibniz subjected it to a number of criticisms and De Volder responded.

In fact, De Volder had already said a good deal about his account of substance in Letter 18, dating from 13 May 1699 and Leibniz had drafted comments. But these do not appear in the final version that he sent on 6 July that is printed as the Supplement to Letter 20. Leibniz simply observes that, since De Volder is unable to see the truth of his axiom that quicker actions are greater, it is not "advisable to immerse [themselves] in more obscure issues – such as those concerning the nature of substance". And, in fact, Leibniz's later willingness to embark on a discussion of this does coincide precisely with De Volder's communication that he has accepted Leibniz's measure of motive force. This is perhaps some indication that Leibniz had genuinely been waiting for chinks in De Volder's Cartesian armor to appear before moving on to metaphysical issues. However, we should perhaps not underestimate the extent to which Bernoulli and De Volder had continued to nag by this stage in the correspondence.

6. 1. De Volder's account of substance

In giving De Volder's account of substance I shall focus on Letter 36, which contains a slightly richer account than Letter 18. De Volder explicitly presupposes that all concepts are either concepts of substances or modes. His account of substance is then introduced in tandem with his account of modes:

If I consider my concepts, I seem to find this difference among them: either the concept represents one thing to me, and I can remove nothing from the representation without the whole thing perishing, or it represents two things to me, one of which I can conceive separately, the other of which I cannot. If the first occurs, I say that the concept is the concept of a thing, i.e., a substance, and I call the object corresponding to it a thing, i.e., a substance. However, if the second occurs, I call those concepts the concepts of modes, and the objects of those concepts I call modes.

Shortly afterward De Volder adds:

This is my notion of substance, which I think agrees very well with the common, albeit more obscure, definitions of substance. It exists through itself, i.e., it needs no subject in which to exist, and it will sustain accidents. And, except for an efficient cause, it will need nothing else in order to exist, which, in brief, is Descartes' view

Initially, De Volder provides an account of substances as things that can be conceived on their own through simple concepts. The significance of what comes afterward isn't entirely clear. On the one hand, De Volder might simply be claiming that his account is extensionally

equivalent to common accounts of created substance. But the way he expresses himself is consistent with an endorsement of this additional characterization.

The expositions in Letters 18 and 36 closely resemble what we find in the Exercitationes. However, in this earlier work, De Volder begins by sanctioning a definition of substance as “a thing subsisting through itself” as opposed to accidents or modes, which “necessarily exist in another thing”. He presents the same “explanation” as an account of the way in which we know that something is a substance or a mode (EA.ii.40-41). This suggests that we are not looking at a single definition which is supposed to express the content of the concept of substance and mode, but different nominal definitions, or definitions that are sufficient for isolating members of the class of substances. If there is any priority here, it is probably given to the account of the mode of being of substances as depending on nothing other than an efficient cause for their existence rather than the explanation of the notion which depends upon the ways in which substances are conceived. The combination of these passages bears, of course, a striking resemblance to the definition of substance from Part 1 of Spinoza’s Ethics, “D3: By substance I understand what is in itself and is conceived through itself, that is, that whose concept does not require the concept of another thing, from which it must be formed” (Gb.ii.45/CWS.ii.408). As we shall see, this was not far from Leibniz’s mind.³⁴

Leibniz raises a number of objections to De Volder’s account of the notion of substance and its relation to his conception of modes. I will focus on the most developed aspects of the critique of the account of substance itself, although this will require some attention to the contrast with modes. Leibniz’s initial concern appears in Letter 38:

I get stuck, however, when you say that “the concept of a substance is that which represents one thing in such a way that nothing can be removed from that

representation.” For you seem to describe it in another way soon after, so that a substance is that which can be conceived separately. This definition does not seem to coincide with the previous one.

It is not entirely clear what Leibniz is worried about here. It might simply be the fact that he was given two distinct definitions where he had been expecting one, or it may be the more serious charge that the two definitions are not coextensive. De Volder defends himself against the latter in Letter 39 but Leibniz does not respond. The important thing is that Leibniz’s subsequent criticisms of De Volder should be divided into two distinct groups based on the distinction he draws here. I shall refer to the first of the two accounts that Leibniz isolates as the conceptual simplicity account and the second as the independent conceivability account.

6.2. Leibniz’s attack on the conceptual simplicity account of substance

Leibniz is dismissive about the conceptual simplicity account in the supplement to Letter 20, but there is no explanation of why. Instead he turns, at some length, to the issue of why he thinks that one of De Volder’s favored candidates for the title substance, extension, fails to satisfy it.³⁵ However, Leibniz does return to the conceptual simplicity account later. One reason for rejecting it is given in Letter 40. This is the thesis familiar from Leibniz’s earlier writings, particularly the period of the Discourse on Metaphysics and correspondence with Arnauld, that the mutual perception of all substances entails that the concept of each substance includes the concept of every other one. But Leibniz does not argue for the view here and De Volder does not ask for clarification. However, there are three arguments which are read most naturally as attacks on the conceptual simplicity account that do engender discussion.

The first is found in Letter 38, where Leibniz observes, “surely for the concept of a

substance we also need attributes.” We find precisely this objection in a much earlier work, namely the critical comments that Leibniz composed on reading Spinoza’s Ethics circa 1678.³⁶ De Volder’s response, in Letter 39, is that the concept of any given substance will indeed require the concept of some attribute, since the substance can in fact be identified with the attribute that constitutes its nature. But he insists that this does not violate his account of the concept of substance in general. It is the concept of something that can be conceived through a simple concept and the attributes in question are conceived in this way. Leibniz does not really take up this issue in his next letter and the subject is dropped. Two more objections can be found in Letter 40. The first turns on the relationship between substances and modes. Leibniz argues that if substances did have simple concepts then, in fact, there could be nothing that fell into the second category. The reasoning is as follows: if substances had simple concepts then they would be things with simple natures. But if this were the case there would be nothing in the nature of particular substances that could give rise to the diversity required for there to be modes, which are changeable determinations of the same persisting substance.

De Volder’s response in Letter 40 is completely concessive, and he adds, “Indeed, this is why I have asked so eagerly for a demonstration that would make it clear that every substance is active by nature”.³⁷ De Volder is more than willing to accept that there is something wrong with the notion of substance that he is putting forward. It is the tension between this consequence of his account of substance, his observation of bodily change, and his unwillingness to accept occasionalism that has led him to the point where he is looking to Leibniz for an alternative. But he does not see why it is his commitment to the simplicity of substantial natures that should be compromised. Indeed, he is more attracted to the idea that it is something about being a substance more generally that is responsible for the existence of modifications. And, in the absence of his own account of this notion, Leibniz has certainly

not shown that this is not the case. Nonetheless this is an odd response for two reasons. First, as we shall see below, De Volder's apparent commitment to the simplicity of substantial natures masks a more nuanced view according to which substances have a plurality of attributes. But, perhaps more importantly, he seems to follow Descartes in holding that there are substances whose nature is thought. And yet Cartesian thinking substances, unlike extended substance, are naturally active. So, to the extent that he is a Cartesian in this respect, De Volder appears to think that the attribute of thought itself cannot give rise to the changes that take place in our mental lives.

The second objection is of quite different kind. It again trades on the idea that something that fell under a simple concept would be simple, but that this leaves De Volder's analysis at odds with the way the term 'substance' is ordinarily used. Leibniz observes that people have generally allowed that substances may have more than one attribute. For example, the Democriteans think of body as a substance with the distinct attributes of extension and resistance. Thus, Leibniz implies that De Volder has not in fact presented an account of the concept of substance at all. We find De Volder less sympathetic this time. He responds in three ways in Letter 41. As one might expect from someone who takes seriously a broadly Cartesian epistemology with a commitment to the notion of clear and distinct perception, De Volder claims that "it is known that people commonly speak of these notions in a very confused way." Thus, he is not at all concerned by the simple observation that his views might deviate from those of others. Second, he claims, "if my definition applies to a simple substance, it certainly includes the general notion of substance, which is necessarily contained in the notion of a simple substance." And, finally, he asks what is wrong with the idea that all substances are simple, given that he regards simplicity as compatible with the possession of multiple attributes.

Leibniz does not reply to the first comment, perhaps because his own conception of

substance is revisionary in significant ways as well. However, he is surely right when he responds to the second point by observing that even were there simple substances in De Volder's sense, this would not imply that the concept of substance in general includes simplicity. De Volder returns to the issue in Letter 45, but here he makes a different point, namely that concept of any determinate kind of substance must contain the concept of substance in general. Here Leibniz would agree, the problem being that he does not yet see a reason to suppose that this general notion would involve having a simple concept. The third comment draws Leibniz into admitting that he himself thinks that "every substance is simple in a certain sense." But the simplicity Leibniz speaks of is quite different. As he points out in Letter 46, to be simple in his sense is to be something that "lacks parts", not something that has one structurally simple attribute. It is the latter that he is concerned about. However, De Volder takes the views to be closer than they might appear. We discover in Letter 45 that he thinks that substances may have more than one attribute, where attributes are those necessary features of the substance that originate from its nature (for example, following Descartes, De Volder seems to hold that impenetrability is an attribute of body although the nature of body is just extension), but that such complexity is due to the fact that substantial natures may be conceived of in more than one way rather than the fact that they are composed of really distinct elements. Thus, his substances also lack parts.

Although Leibniz does not make the point himself – returning instead to the claim that no modes would arise from such substances in Letter 46 – we can see how he might have tied up the loose ends here. De Volder has argued that substances have simple concepts, but wishes to maintain that there is nothing wrong with the claim that all substances are simple, given that from their natures an internal complexity arises. But just as Leibniz worried that things with simple concepts would lack the structure necessary to explain their modifications, and hence would have no modifications, so he would reject the view that such substances

could have multiple attributes. Here Leibniz's objection surely has some force. Even granting the conception of body as extended substance, it is hard to accept that one could justifiably maintain an ontological connection between a nature and the attributes that arise from it whilst also insisting that one's conception of what it is to be something of that nature is primitive and unanalysable.

6. 3. Leibniz's attack on the independent conceivability account of substance

Two objections to the independent conceivability account are found in Letter 38. The first relies on De Volder's account of modes as things that cannot be conceived independently. Leibniz observes that De Volder's view seems compatible with the existence of things A and B that can be conceived independently of each other and a third thing C that can only be conceived when both A and B are conceived. The problem here is that this would allow for the possibility of a mode that was a mode of two substances at the same time. Though Leibniz does not say so explicitly here, he regards this as impossible. Clearly the crucial, if suppressed, premise of this argument is the claim that no mode can inhere in more than one substance. We find this expressed elsewhere in Leibniz's mature philosophy.³⁸ And we should perhaps not be surprised that he did not provide this reasoning to De Volder, for the doctrine was firmly rooted in Scholasticism.³⁹ But, in any event, De Volder does nothing to challenge the claim in his response in Letter 39. Instead, he responds by denying that we can conceive of a set of entities that are dependent in the way Leibniz requires. Leibniz grants that there are two things that can be conceived independently and hence are to be regarded as distinct substances. Assuming this, De Volder observes that A and B must either be substances with distinct natures or substances of the same nature. But in either case they are things that can be conceived independently. Thus, if there is a third thing C which cannot be conceived independently of A or B, C will ultimately be A or B conceived in some particular

way, namely as modified at a given time. De Volder does allow a sense in which there might be things that can be conceived in such a way that they require conceiving of two distinct substances - he gives the example of the spherical shape of two distinct bodies. But such conception is only possible if one does not conceive of some particular spherical body. And then one would not have really have been conceiving of two substances, but rather of the fact that the genus sphere involves the nature to which the two bodies belong.

Leibniz returns to this issue in Letter 40, although he switches from talk of a thing C that cannot be conceived independently of substances A and B to talk of a thing “which needs both of them for its concept.” Nonetheless, the point emerges in the context of the discussion of the independent conceivability account and the interesting issues can still be brought out if we treat it in this way. It is worth quoting the passage in full:

I admit that if A and B are two substances of the kind that you define, i.e., most simple ones, then they cannot have a common predicate. However, it does not necessarily follow from this that there cannot be some third thing C, which needs both of them for its concept. For we see that, just as relations result from many absolute things, so also qualities and actions result from many substances. And, just as a relation is not composed of as many relations as there are things that are related, so other modes depending on many things are not resolvable into many modes

Here, I take it, Leibniz concedes that if there are two substances with simple natures then nothing that can be predicated of one individually can be predicated of the other individually. But he seems happy with something whose conception requires each of them. There might be modes that are like relations in being unitary but which result from many things. Leibniz does not say what kinds of qualities or actions he has in mind and in Letter 48 De Volder tries to

deflect the objection by coming up with one of his own in which two bodies collide with another that is stationary and cause it to move. He argues that this is a case in which there is a mode which satisfies his definition and which results from many things, namely the motion of the body that was originally stationary that results from the motions of those colliding with it. Unfortunately, Leibniz does not respond to De Volder at this point and the possibility of further discussion was another casualty of the introduction of Leibniz's Réponse in 1702.

However, it is not clear that De Volder's example really addresses the worry that Leibniz has been trying to raise. Leibniz's lack of examples is unhelpful, but he does not appear to be thinking of qualities of particular individuals that have multiple causes. Indeed, although he is prepared to speak of modes, it is notable that in an earlier version of the paragraph from Letter 40 he conceded that with two substances of the kind envisioned "there cannot be a mode that needs both." Perhaps what he is thinking of are those things that are expressed using relational predicates such as being a body that is to the left of Leibniz. De Volder would not have accepted that such things counted as modes and would doubtless have insisted that such expressions did not refer to genuine entities. But it would have still left open the important question of how De Volder's ontology was supposed to account for the existence of true relational predication involving changeable features of substances.

However, such an approach might not have served Leibniz's own ends. After all he was at this point looking for a criticism of De Volder's account of substance and the objection that we are now considering is one that Leibniz would have had to face himself. For, as is well-known, although Leibniz's conception of substance is quite different from that of De Volder, he is equally willing to claim that there is nothing in the world except individual substances and their modifications.

The second objection that Leibniz raises in Letter 38 is a more fundamental one:

[E]xcept for the first substance nothing can be conceived through itself, or so I believe. But I think that you acknowledge that this is not the only substance, or rather, that people have understood the word substance in such a way that there are many substances in the universe.

Clearly the real issue here is the implication of substance monism. However, it is articulated ad hominem. De Volder is charged with implying that there is only one substance whilst accepting that there is more than one. But then Leibniz retreats a little, claiming, much as he did when criticizing the conceptual simplicity account, that it would leave De Volder with a concept of substance that does not accord with common use of that term.

De Volder does not need Leibniz to convince him that there would be a problem if his conception of substance led to monism. He explicitly rejects the doctrine as “most absurd” in Letter 54. Thus he does not engage with the suggestion that his term would not be coextensive with the term as it is commonly used. I will return to this issue later. The argument from independent conceivability to monism is simple. De Volder captures it neatly in Letter 39: “you object that nothing except the first substance can be conceived through itself, since everything else obviously has a cause.” For this argument to have any force we must assume that to conceive of something that has a cause requires that one conceive of the cause as well, or at least the restricted claim that to conceive of a substance requires that one conceive of its cause, namely God. And immediately after stating the objection, De Volder adds, “I think that conceiving of the existence of a substance necessarily requires a cause, but not conceiving of the essence, which alone is the issue here.” In Letter 40 we find Leibniz in a slightly concessive mood. But, although he recognizes that one need not conceive of the actual cause of thing in order to conceive of it he maintains that “the concept of a possible cause is required to conceive of its essence.” The truth of Leibniz’s claim is far from obvious.

He tries to bolster the point with an objection that he imagines De Volder will make – that the same thing could have many causes and hence cannot depend on the conception of any of them to be conceived; and an accompanying reply – that this will only hold with incomplete notions. However, the main point remains untouched, namely De Volder's plausible claim that to conceive of something is simply to conceive of what that thing would be like were it to exist.

The final word on this issue is De Volder's in Letter 41. Here he takes a somewhat different approach.

Concerning what you say about the cause of a substance, I would think that if the essence of a substance cannot be conceived without its possible cause, then no such essence is ever conceived. It seems to me that I do indeed conceive of the possible causes of modes, but not of substances. This is why we commonly say they are created, i.e., that they have a cause by which they are produced, but who knows how.

Here De Volder sidesteps most of what Leibniz has said, and claims that we cannot have conceptions of substances which include their cause. Substances, unlike modes come into being through the direct creation of God. Thus, although we know that substances all have the same cause, the way in which substances are caused is completely beyond our comprehension. So, if Leibniz insists that substances cannot be conceived without their causes, possible or actual, then he is precluding any conception of created substances at all. Leibniz did not respond to De Volder's appeal to the inscrutability of divine activity. It seems unlikely this was an implicit concession. Leibniz's conception of all substances, possible and actual, as finite imitations of the divine essence does suggest that a proper conception of what it is to be a substance would require a conception of that which it imitates. However, it is easy

to see why Leibniz did not try to defend such a view in the context of this discussion, given De Volder's reluctance to regard any positive theses regarding the relation between God and creation as explanatory.

The debate over De Volder's account of substance is a frustrating one. Leibniz appears to succeed in showing that there are internal tensions between the conceptual simplicity account of substance and some of what De Volder wishes to say about the substances that he admits into his ontology. It does seem to be adequate as a nominal definition of those things. However, Leibniz's responses to the independent conceivability account are less convincing. The second fails outright and the first objection succeeds only to the extent that it highlights De Volder's failure to provide an account of relations. As I have suggested, Leibniz may have held that there is a fundamental sense in which a perfect conception of all finite things requires conceiving of them as imitations of their cause, the divine nature. Indeed, given other of his epistemic commitments, he may well have thought that all substances conceived of each other confusedly in precisely this way. But his actual arguments do not speak against De Volder's somewhat intuitive view that it is necessary and sufficient for being a substance or fundamental bearer of properties that one can be conceived of independently of everything else.

7. The Debate over Extended Substance

We have seen that Leibniz's failure to provide an a priori proof of substantial activity prevented a satisfactory resolution of the issue of whether matter is naturally active from De Volder's perspective. However, his resistance was also fuelled by a lingering attraction to the Cartesian thesis that the material world is an entirely passive substance, whose nature is wholly constituted by the attribute of extension. Thus, although it was clear from early on in the correspondence that De Volder was looking for an account of the material world that

involved explanatory resources beyond mere extension, the Cartesian view is frequently under discussion and draws a number of reactions from Leibniz. We can usefully divide his attempts to disabuse De Volder of his commitment to the view into three: 1) Leibniz claims that an argument for extended substance that still has a grip on De Volder does not work, even granting the account of substance that De Volder offers; 2) Leibniz argues that there is something incoherent in the notion of a merely extended entity; and 3), drawing on ideas he had developed over many years, Leibniz uses empirical arguments to show that the actual material world is not a merely extended thing. Unfortunately, the discussion of these issues is complicated by further disagreement about the notion of extension itself. To be more precise, Leibniz has two distinct notions of extension, whereas De Volder has only one.

7.1. Leibniz and De Volder on extension

As I have noted, the conception of extension that De Volder brings to the correspondence is broadly that of Descartes. First, and foremost, it is that which grounds the eternal truths of (Euclidean) geometry. But it is also the nature of created bodies, which are entities that have this geometrical structure. In Letter 14 De Volder presents a very brief, argument for the claim that extension is a substance in this sense: “You seem to me to deny that extension is a substance, when, nevertheless, that, if anything, is conceived through itself.”⁴⁰ It will be helpful to express this argument, more formally:

- (1) Anything that is conceived through itself is a substance.
- (2) Extension is conceived through itself.

Therefore,

- (3) Extension is a substance.

The first premise in this argument is simply a reiteration of the concept of substance that we have already considered at length, and, as far as I can tell, De Volder does not argue

explicitly for the second premise. One might wonder why De Volder argues that extension itself is a substance, rather than that there is a substance whose nature is extension. Although I do not know of anywhere that this is said explicitly, I take it that De Volder, like Descartes, regards the nature of a substance and the substance itself as merely conceptually distinct and thus that the two claims are equivalent.⁴¹ With this in mind, we should note that the argument is not intended to establish the claim that there exists some extended substance, but merely that such a substance is possible. However, De Volder clearly believes that it provides the starting point for establishing the stronger claim. This is clearer in the Exercitationes Academicæ, where De Volder offers the same argument and accompanies it with an a posteriori argument which is supposed to show that the bodies that we sense are extended substance.⁴²

Although it is clear that De Volder follows Descartes in thinking that the material world is extended substance, important questions remain. In particular, we might wonder about his conception of the relationship between extended substance and individual bodies, an issue on which Descartes' own view is far from clear. De Volder never presents a definitive statement on this. However, in Letter 52 he suggests to Leibniz that "this whole corporeal universe may perhaps be just one substance" and, whilst it is not asserted dogmatically, this serves as his default position throughout the correspondence.⁴³ Assuming that the material world is a single extended substance, De Volder is clearly obliged to give some explanation of the nature of individual bodies, which we find in Letter 22: "I do not admit a substantial distinction between the parts of extension, but only a modal one. In this I think I am like most, though not all, of those who ascribe all the variety in bodies to motion alone". De Volder does not elaborate. However, I take it that he has in mind something like the view that can be attributed to Descartes on the basis of section 23 of the second part of the Principles of Philosophy, according to which "all the variety in matter . . . depends on

motion” (AT VII.1, 52-53/CSM.i.232). On a strong reading of this passage, the very existence of individual bodies is a consequence of different parts of matter moving relative to one another in stable configurations, although there are other places in Descartes writings that suggest that individual bodies are distinct substances.⁴⁴

Two further aspects of De Volder’s conception of extended substance are worth noting. In his response to Huet’s critique of Descartes’ views on the material world, De Volder argues that there is no real distinction between a body being “extended or hav[ing] parts that are distinct from parts” (EA.ii.55) and that these are just two different ways of speaking of the same thing. He goes on to make it clear that he does not mean that parts that are “really separated and from one another by division and divided” but rather that to be extended is to have “parts . . . that could be divided” (ibid.). But this does not mean that he holds that this should appear in the definition of body. Rather, “the concept of extension is clearly prior, since the former [i.e., being divisible into parts] is based on the latter [i.e., extension]” (EA.ii.56). De Volder’s claim is that, since divisibility is a power, it cannot be the nature of body: “This possibility of being divided is a consequence of something, which is in the body itself and which is the foundation of this power, since all bodies can be divided.” The alternative, De Volder thinks, is that we regard the power for being divided as unfounded. But this would be to resort to “merely logical notion, which is nothing in the thing itself” (ibid.). Similar considerations fuel De Volder’s conception of the relation between extension and impenetrability. Again it is a necessary feature of extended things but is not a constituent of their nature.⁴⁵

7.2. Leibniz’s criticisms of De Volder’s argument for extended substance

If we are to understand the various ways in which Leibniz attacks De Volder’s account of the material world we must begin with a brief account of his own notion of

extension. In fact, there are really two. At various points Leibniz speaks of “mathematical extension”, and “mathematical body”.⁴⁶ As the terminology suggests, Leibniz, like De Volder, recognizes a kind of extension that is the ground for the truths of geometry. The clearest elaboration that the notion receives is in the Réponse:

I hold that time, extension, and motion, and in general all forms of continuity as dealt with in mathematics, are only ideal things, that is to say just like numbers they express possibilities. . . . But, to speak more accurately, extension is the order of possible coexistences This encapsulating of both the possible and the existent produces a uniform continuum, which is indifferent to all division. (G.iv.568/WF 122)

This passage brings out two features of mathematical extension that are significant: First, mathematical extension involves continuity, which is supposed to entail indifference or indeterminacy with respect to division. Leibniz does not argue for this in the correspondence or Réponse. However, he seems to have settled on this aspect of his conception of mathematical extension as far back as the 1670s;⁴⁷ second, he provides information concerning its ontological status. It is said to be ideal, by which Leibniz means its reality is solely as an object of thought.

Nonetheless, Leibniz speaks of extended things, extended matter, and of bodies being extended.⁴⁸ I will refer to the notion of extension that is invoked in these contexts as actual extension. Leibniz characterizes it in the following way in Letter 61.

[E]xtension is an abstraction from that which is extended And it expresses nothing other than a certain . . . simultaneous diffusion or repetition of the same nature, i.e., what amounts to the same, a multitude of things of the same nature,

existing together with some order among them.⁴⁹

It will be necessary to unpack this explanation further when we consider Leibniz's own account of the nature of the material world. However, the quotation itself should suffice for now. Most important in the current context is the fact that the world contains things that are extended and their being extended consists in the fact that they are similar in nature and repeated. The term extension as it is used here refers to the concept of repeated existence, which is arrived at through abstraction from experiences of extended things.⁵⁰

We are now in a position to examine the first of Leibniz's criticisms of De Volder's account of the material world, namely his claim that the argument for extended substance does not work. De Volder's first premise is subject to a number of criticisms, which I have discussed in the previous section. But when considering De Volder's commitment to extended substance, Leibniz focuses his attention to premise (2). Leibniz's attack is complicated by his two readings of De Volder's account of substance. Effectively, we shall need to consider two distinct versions of premise (2) and Leibniz's reasons for rejecting each of them. However, understanding Leibniz's critique is also made more complex because of the different notions of extension that are invoked by each of the correspondents. When De Volder claims that extension is something that is conceived through itself, he invokes a notion of extension which is closest to Leibniz's mathematical extension. However, De Volder thinks that his notion of extension is the notion of the object of geometry and of the structure of the material world.

Given all this, the most reasonable way for Leibniz to attack De Volder's argument for extended substance would surely have been to do one of the following: (a) Show why De Volder's conception of extension could not satisfy premise (2) of his argument; or (b) begin with a discussion of the concept of extension in which De Volder's confusions were exposed

and then show that neither of his own conceptions of extension could satisfy premise (2) either. Unfortunately, Leibniz took neither of these courses. Instead, he attacks premise (2) using his own concept of actual extension, which De Volder does not accept. More precisely, he presents two distinct attacks, one against the premise as construed on the conceptual simplicity account of substance and then another with the premise construed on the independent conceivability account.

Leibniz argues that the concept of extension is not conceptually simple in Letter 17, observing that it is “a resolvable and relative notion. For it is resolved into plurality, continuity, and coexistence, i.e., the existence of parts at one and the same time.”⁵¹ It is notable here that Leibniz is using the notion of continuity in a way that differs from that which he invokes in characterizing mathematical extension. For here a plurality is said to be continuous and which consists of a fully determinate set of parts. It will, therefore, be useful to distinguish mathematical continuity and actual continuity on these grounds.

De Volder’s response in Letter 18 is predictable, “I do not think that it is resolved into plurality. The continuity of extension is extension itself Moreover, existence adds nothing to the nature of existing things, and so coexistence does not either.” Given his tentative endorsement of the brand of Cartesianism that has a single extended substance conception of the material world, there is no need for De Volder to admit plurality. Extended substance does admit the possibility of a plurality of bodies. But this is not the same as extension being the extension of a plurality in Leibniz’s sense. It is not the extension of many things whose existence is independent of one another. De Volder makes more of a case for his exclusion of the concepts of continuity and coexistence. He excludes coexistence, or the simultaneous existence of parts, on the grounds that, like existence, it adds nothing to the natures of existing things. De Volder follows the tradition of regarding the essence or nature of a thing and its existence as distinct. Since the concept of extension is taken to represent a

substantial nature, and natures are distinct from their existence or coexistence, there is simply no room for concepts like the concept of existence or coexistence to enter into it. De Volder claims that the concept of continuity is not a distinct constituent of the concept of extension because the continuity is just extension itself conceived in another way, a point which he generalizes in Letter 41 to all things “between which there is a necessary and reciprocal connection.” Here we find a general reply to the issue of conceptual complexity which echoes our earlier consideration of Leibniz’s claim that attributes destroy the simplicity of the concepts of substances. It follows from the nature of extension that extended things are necessarily continuous and that extended things can always be conceived of as continuous, but this does not mean that a proper conception of extension includes the concept of continuity.

Leibniz grasps De Volder’s position, but regards it as inadequate. In Letter 42 he retorts: “You concede that existence and continuity, which make up the notion of extension, differ formally. I do not claim anything else. But that whose notion is composed of different formal concepts is not primitive.” For Leibniz, the distinctions within our concept of actual extension are formal distinctions and must capture some kind of structure within extension itself. Thus the concept of extension must be complex if it is to capture that structure. As with the more general point about attributes, Leibniz must surely be correct here. And to the extent that Descartes himself can be charged with assuming that the concept of extension is simple, he falls as well. For Descartes happily allows that bodies have properties such as impenetrability and divisibility. Furthermore, although I noted earlier that there were problems with the strategy that Leibniz employed in order to attack De Volder’s position, given that he relies on his own conception of actual extension, this particular argument works just as well as it would if Leibniz had appealed to De Volder’s own notion of extension, or indeed his own notion of mathematical extension. For both men agree that extension and

continuity are reciprocal predicates and this is sufficient for Leibniz's claim that the concept of extension is not genuinely simple.

Leibniz also criticizes De Volder's argument for extended substance on the grounds that actual extension is not independently conceivable. Again, for Leibniz, the relevant notion is actual extension. In Letter 17, he observes:

I do not think that there is a substance constituted from extension alone, since the concept of extension is incomplete [it] no more completes a substance than multitude or number, where there must be something numbered, repeated, and continued.

If actual extension were a substantial nature, it would have to be the case that it could be conceived of as existing on its own. But actual extension can only be truly predicated of a plurality of things. And to think of it as existing requires that one think of the things that are repeated.

For Leibniz this is something true of all properties, other than those that constitute the infinitely complex and unique natures of individual monads. However, the situation is compounded with actual extension. For the property in question is relational. Thus, there is a more fundamental sense in which extension cannot constitute a substantial nature. To the extent that is acceptable to talk as if extension is concrete, as Leibniz sometimes does, it includes implicit reference to more than one thing. And despite the various disagreements that Leibniz and De Volder have, they both accept that substances as individuals.

De Volder does not address the issue of the incompleteness of Leibniz's actual extension at this point. Instead he takes issue with the objection that the concept of actual extension fails to satisfy his conceptual simplicity account of substance. However, Letter 41

indicates the response he might have given.

You say that for there to be extension there must be many things whose coexistence is continuous. This holds me back. I would not so readily say that they are many things, since, on the definition just given, there is a necessary and reciprocal connection between these things (if you wish to speak of them as things). For whatever plurality you suppose here, it is certain that part A of the extension cannot be conceived and cannot exist without part B, and vice versa.

As we shall see later, De Volder misunderstands Leibniz here. He assumes that the many things are themselves bodies. Given this, he has a response. On his view, the multiplicity that is found in the material world is one that emerges from a whole through the relative motion of its parts. But, prior to this motion, the parts are only potentially distinct. Furthermore, we can see here that De Volder regards the individuation, and conception, of any given part of matter as essentially dependent on its relation to all the others. Thus, to conceive of extension is to conceive of a single thing whose existence is independent of all other substances. It may also be to conceive of a plurality of bodies, but these will only be modes. Whilst De Volder does not argue for this, nor has Leibniz established the claim that if extension is to be a feature of the actual world it will always be predicated of an actual plurality that must be conceived if it is conceived. Thus far Leibniz's analysis appears to be nothing but a bald assertion which stands against another contrary bald assertion. However, this is not the end of the story. It seems to me that the reason that Leibniz does not provide the argument De Volder might have wanted is that he has a more direct argument to the conclusion that mathematical extension could not constitute the nature of anything actual. Furthermore, this trades on features of mathematical extension common to his own understanding of this notion

and De Volder's cruder understanding. Thus, the critique of De Volder's argument for extended substance that turns on Leibniz's insistence that premise (2) is false, is eclipsed by what is ultimately a more important disagreement. Here the issue is whether a merely extended thing is even possible, or more precisely, whether there is incoherence in the very notion.

7.3. Leibniz on why there could not be anything that was merely extended

We have seen that De Volder views the material world as a single substance whose nature is exhausted by extension. Given that Leibniz has two concepts of extension it seems that the view is open to two distinct interpretations - namely the view that there is substance whose nature is exhausted by mathematical extension or that there is a substance whose nature is exhausted by actual extension. It should not, however, be too surprising to find Leibniz attacking only the first, given De Volder's talk of "mathematical body". But, for all that, we do not find a direct argument to the conclusion that there could not be a mathematically extended substance in the correspondence. One explanation for this is the fact that so much of the discussion of extended substance is taken over by Leibniz trying to undermine the argument in favor of the position which has gripped De Volder. But it also seems to be due to an oversight on Leibniz's part. At the point in the correspondence where the possibility of merely mathematically extended things arises, Leibniz probably reads too much into a remark that De Volder makes. In Letters 50 and 53 Leibniz reveals to De Volder that he takes unity to be an essential characteristic of all substances. And in Letter 54, De Volder observes: "For, if by true things you just mean bodies that are truly one and indivisible, I see nothing absurd in the fact that things that are really like those you call bodies are not found."

It seems likely that Leibniz took this statement to contain an implicit acceptance of

the force of an argument that he famously offered Arnauld. Although it is never presented to De Volder, the thrust of this argument is simple: since merely extended substances would be divisible into parts they would not in fact possess the unity required to be substantial.⁵² But, whatever the explanation, Leibniz thought that the real disagreement with De Volder concerned the reality of mathematical bodies construed as aggregates of other mathematical bodies rather than as individual substances. Leibniz's argument is again quite simple. A Leibnizian aggregate exists when a number of distinct things are conceived as one by some created mind.⁵³ But, as we have seen, according to Leibniz, mathematical body (i.e., something whose nature is exhausted by mathematical extension) does not actually have distinct parts. Indeed, it can only be broken into parts by a mental operation. Thus, a mathematically extended thing is not even a candidate for obtaining its reality as a being through aggregation. De Volder's response to the attack on the reality of mathematical body is clear in Letter 63:

I admit . . . that indivisible unities are not to be found in a mathematical body. But at the same time, I would add that I still get stuck over whether or not this unity is found in an infinite mass of extension, if, in fact, the parts that we conceive of as different in this mass seem not to be distinguished in reality, since no part can be either assumed or conceived of unless all of them are assumed and conceived of.⁵⁴

Here, De Volder agrees a mathematically extended thing cannot be said to contain indivisible unities, and tacitly agrees that mathematical bodies could not be aggregates. But, at the same time, he does not see why there could not be actual mathematical body. After all, why could there not be a single infinite extended substance?⁵⁵ In Letter 65 Leibniz replies by reiterating his conception of continuity and the unity of real things, but he says nothing to impugn the

possible existence of an infinitely extended unity. Instead he moves quickly from simply stating his position on the impossibility of mathematically extended things to other arguments which trade on empirical claims about the need for real divisions in matter. But, again, even if these are successful, they do not show that there is anything incoherent in the Cartesian conception of extended substance that De Volder defends. The most they can show is that the actual world does not contain such a substance. As we shall see, the correspondence with De Volder contains other arguments which are supposed to show that De Volder himself has not given reasons for thinking that the nature of the actual material world is not exhausted by mathematical extension. However, the success or failure of these arguments clearly does not impinge on the question of the possibility of a merely extended substance. The argument that Leibniz presents is question begging at best. De Volder is quite willing to accept the convertibility of unity and being. But he is not worried by Leibniz's argument because he does not accept that extended things are divisible into real parts. Leibniz never responded to this position head on.

8. Leibniz's Empirical Arguments against a Merely Extended Material World

The third of Leibniz's strategies for attacking De Volder's conception of material reality is the one just mentioned. It comprises a number of arguments that are supposed to show that extension alone is insufficient to account for the features of the actual material world as known to us through experience. This strategy is by no means new to the De Volder correspondence. Indeed, on occasion, Leibniz explicitly recycles old material.⁵⁶ As far back as 1669, in a letter to Thomasius, Leibniz was prepared to assert that "bodies must not be assumed to possess any properties the cause of which cannot be derived from their essence" (A II.i: 23/L 101-02). And closer to our time, in a letter to the editor of the Journal des Savants, from 1691, Leibniz is even more explicit: "If the essence of body consisted in

extension, this extension ought to be sufficient on its own to account for all the properties of the body" (G.iv.464/PWL 42). Leibniz does nothing to explain the justification for this principle in his correspondence with De Volder. But it is one that appears to be equally acceptable to both men. As we have already seen, De Volder himself adheres to a methodology and set of principles which lead him to demand a demonstration of the activity of bodies from their nature in order that he be satisfied that they are truly active. To the extent that he is persuaded by the view that the nature of body is exhausted by extension this provides the only resources to which he can appeal. However, it should not come as any great surprise to see that De Volder is not entirely troubled by some of the arguments that Leibniz offers, given that he was moved to correspond with Leibniz in part because he hoped to find a way to supplant what he already regarded as an inadequate ontology.

An interesting feature of all of the arguments that we shall consider, in light of previous discussion, is Leibniz's lack of attention to the notion of extension. Unsurprisingly, neither of Leibniz's own conceptions of extension is explicitly in play. For, as we have seen, he thinks that they could not constitute the nature of actual things. Instead he seems to rely on what he characterizes in Letter 2 as "the common notion of matter," which is the notion of something that possesses "nothing other than extension and . . . impenetrability." But even here we must be careful. This is not, I think, the concept of something that is actually extended in the Leibnizian sense, namely something that consists of a diffusion of impenetrability. Rather, it is intended, *per impossibile*, to convey the idea of a simple attribute that is, as he puts it in Letter 20, "sought in pure geometry" and from which impenetrability necessarily follows.⁵⁷

8.1. The argument from the laws governing collisions

Leibniz's first objection emerges in the initial discussions that he and Bernoulli had

about Bernoulli's meetings with De Volder. As we saw above, in Letter 1, Bernoulli reports that De Volder is concerned that some of Leibniz's criticisms of Papin depend on a gratuitous assumption that all bodies are elastic. The details of this worry are not important here. However, they precipitated the observation, in Letter 2, that it would follow from the conception of body as merely extended and impenetrable that "from their nature, two bodies of equal size and equal speeds should not rebound after a direct collision, but should bring each other to a halt instead."⁵⁸ Leibniz provides a more elaborate account of the worry in Letter 17. Here he reveals that the key assumption is that extended impenetrable matter would be "intrinsically indifferent to motion and rest" and thus that the only factors that can be relevant in the resolution of collisions are the relative velocities of the bodies involved. So not only do we have the promise of two bodies bringing each other to rest, an even more surprising consequence is that any body, however small, could move another body at rest, however big, by colliding with it.⁵⁹ Leibniz indicates a number of problems with these scenarios. In Letter 4, Leibniz describes the first as "entirely foreign to experience and even to reason," and in Letter 17, he tells us that, "such a world would be pure chaos" and can be ruled out by "experience and the principle of order."

As we have seen in the context of the discussion of the proper measure of force, De Volder does not think that there is anything to Leibniz's worry that the collisions described would violate a principle of order and be contrary to reason. However, he does not invoke such considerations here since he does not accept that a merely extended thing would behave as Leibniz suggests. Thus, in Letter 18, he observes, "The very nature of cause and effect, which maintain a certain fixed proportion between one another, seems to be inconsistent with this state of affairs." Here De Volder appears to suggest that our understanding of what it is for something to be a cause is sufficient to conclude that there could not be such situations. And, although he does not say this explicitly, the "fixed proportion" to which he is alluding is

surely the quantity of motion that would not be conserved. Leibniz responds in Letter 20 by agreeing that the second of the two situations “is inconsistent with the laws of power, i.e., of cause and effect.” But he insists that it is not inconsistent with the Cartesian notion of body:

[I]f we accept the common notion of matter, we must also accept that in a collision a body receives a conatus, which the other body strives to give to itself, when it strives to go forward. And thus, we must accept that the body is carried along by a conatus composed of its conatus and the conatus given to it. For nothing prevents this, since all conatus are compatible with each other.

De Volder’s reply in Letter 22 is not particularly helpful. He accepts that each body has “a conatus for persisting in its state”, but simply reasserts his belief that “more of a cause is required to move a larger body than a smaller one” without connecting it up to Leibniz’s remarks. Leibniz tries one more time, in Letter 24, to make his point, insisting, “when you say that more of a cause or force is required for a larger than for a smaller body to be moved at a given speed, you already tacitly presuppose that body resists motion.” But the issue is not taken up any further by De Volder and the fundamental division between the correspondents on this issue remains unexplored.

Appearances notwithstanding, De Volder accepts that something other than extension and impenetrability must be invoked in order to explain the distributions of motion that occur when actual bodies collide. However, he appeals to a general law concerning the relation of cause and effect in order to fill in the gap. In doing so, De Volder deviates from Leibniz’s principle that all the features of bodies should be explained by appeal to their natures.

Furthermore, he does so without offering a further explanation of why it is that the material world obeys this principle. While there are clearly options open to someone who wishes to

defend such a view, it is surprising to find De Volder so sanguine, given his more general concerns about occasionalism and his failure to find a naturalistic account of bodily motion within the Cartesian conception of matter. One can, at least in this case, understand Leibniz's apparent frustration.

8.2. The argument from activity and motion

The second of Leibniz's arguments emerges for the first time in Letter 17:

[A]ccidental or changeable active forces, and motions themselves, are certain modifications of some substantial thing. But forces and actions cannot be modifications of a merely passive thing, such as matter is.

Things are a little condensed here and it may be helpful to flesh out the argument a little more formally as follows:

- (1) The material world contains changing active forces which manifest themselves in motion.
- (2) Changing active forces are modifications that are active.
- (3) Any modification that is active cannot be a modification of something that is merely passive.
- (4) Matter is merely passive.

Therefore,

- (5) the material world does not consist of matter alone.

Leibniz is not just offering this as a criticism of the Cartesian or common view of matter as extended impenetrable substance. In light of the considerations about collisions that we have

just seen, Leibniz argues that matter must also have a distinct property that he calls inertia, which is the cause of the resistance to being moved that bodies offer. And it is extended, impenetrable, inert matter that is being presented as merely passive. But, obviously, if this kind of matter is merely passive, the same would be true of Cartesian matter. And, given that De Volder does not recognize the existence of Leibniz's inertia, the Cartesian conception provides the common ground on which discussion rests.

Variants of this argument recur throughout the correspondence and it receives a number of responses. De Volder's initial repost, in Letter 18, is to accept that there are active forces and that they cannot be modifications of something passive, but to insist "there will be no such thing if it is indeed demonstrated that every substance is active." There is a tacit acceptance here that extension is passive. At this point De Volder is looking for Leibniz to demonstrate the activity of substances in general; assuming that the species extended substance will inherit its active force from its substantiality rather than its extension. As we know, however, Leibniz was not willing to offer such a demonstration and, whether for this reason or not, he drops the line of response. The argument is alluded to again by Leibniz in Letter 40, but it is not until Letter 52 that dialogue begins again, when De Volder observes:

[Y]ou deny that derivative forces could be present in bodies on their own. But if we take it that a corporeal mass has a certain kind of motive force built in, to be deduced from size and speed, we will certainly have the same phenomena as now.

I take it that by "bodies", De Volder means entities whose nature is exhausted by extension. His point seems to be that we can utilize Leibniz's measure of force to account for the changes of bodies simply by appeal to features that are modifications of extension. This is not to deny that there must be something that explains the fact that such modifications arise. But

as we have seen, De Volder seems to think that his correspondent's account of substance will do that. If we are looking to understand why extended things change in the way they do, surely we need advert to nothing other than speed and size, even if the quantity that does the explanatory work is not just the simple product of our numerical representations of two.

De Volder's challenge precipitates the clearest statement of Leibniz's worry, in Letter 53:

[Y]ou admit derivative forces like I do, and in this way you hope to be able to save the differences in the phenomena. But then you should have addressed my other argument, that derivative, i.e., accidental, forces are mere modifications, and that that which is active cannot be a modification of that which is passive, since in modification there is only a variation of limits. And so modes only limit things and do not increase them, and, therefore, they cannot contain an absolute perfection that is not in the thing to be modified

What Leibniz neglects to say here is that De Volder does not seem to understand properly the relationship between the measure of derivative force and the force itself. Although the force can be quantified on the basis of measures of modifications of extension (that is, motions), for Leibniz the force itself is what produces motion. We never get a very clear account of how De Volder understands the issue. But in Letter 55 he claims to have found Leibniz's claims obscure and maintains that derivative force is something that "results from size and speed." However, in Letter 59, he describes force as "something inhering in a substance," and wonders, correctly, whether Leibniz may be speaking of such a foundation when he speaks of primitive force, as opposed to derivative force. However, he still claims to have no understanding of what such a primitive force would be like.

In Letter 61, Leibniz seizes on this as a point of departure for his longest exposition of the issues. He articulates the crucial point as follows:

Unless there is something in us that is primitive and active, there cannot be derivative forces and actions in us, because everything accidental, i.e., mutable, must be a modification of something essential, i.e., perpetual. Nor can it involve anything more positive than that which it modifies, since every modification is only a limitation – figure a limitation of that which is changed, derivative force a limitation of that which causes change.

De Volder concedes this point in Letter 63, observing that Leibniz has “brought forward a reason for this claim . . . at last.” But it is a pyrrhic victory for Leibniz. For what De Volder has conceded is that the argument works for the mental realm. It does not help him with the issue of why Leibniz thinks that bodies have primitive forces. Leibniz might have been able to capitalize on the fact that De Volder had accepted the basic form of his argument.

However, this letter also includes the realization on De Volder’s part that Leibniz has been assuming that there is nothing to bodies over and above force and that the force in question is really just the same as the principle that accounts for mental activity. Being told that the primitive force from which bodily forces and extension arise is like the nature of the mind did nothing to assuage De Volder’s sense that the primitive force of bodies was unintelligible to him. We will return below to the account that Leibniz offers, where the reader may well find herself having much sympathy with De Volder’s position.

These final stages of the discussion of Leibniz’s argument occur at the very end of the correspondence and there is no clear resolution. However, we can see that De Volder does not accept the force of the challenge as it pertains to the issue of whether the material world

consists merely of extended things. He brings to the correspondence a skepticism about the possibility of accounting for bodily phenomena by appeal to the notion of extension alone, but nothing that Leibniz says persuades him that bodies have some additional essential feature. As we have seen, his initial hope that Leibniz would provide an account of the nature of substance sufficient for demonstrating that all extended substances are naturally active remains frustrated to the end. But without an intelligible positive account of the nature of bodies that could provide such a demonstration, he remains unconvinced that bodily change must be understood in terms of modification of some active nature.

8.3. The argument from the individuation of bodies

To the extent that De Volder claims that the material world is an extended substance, he embraces the view that bodies result from modifications of extension. In Letter 50 Leibniz claims that modes of extended substance are not sufficient to ground a numerical distinction between individual bodies. He considers the possibility of two distinct bodies A and B, which have the same size, shape and motion. He then offers the following dilemma: Either A and B will not in fact be distinct individuals as originally assumed, or they will have to be distinct without having any differences which are intrinsic to them. The problem with the first horn of the dilemma is not explained any further. Leibniz may take it as evident from experience that there are distinct bodies such as A and B or think that the Cartesians themselves are committed to, or at least ought to be committed to, such a possibility. In either event, it is clear that he thinks it is an unacceptable consequence. Leibniz does not think De Volder should embrace the second horn of the dilemma either. He continues: “Things that differ must differ in some way, i.e., have a specifiable difference in them, and it is surprising that people have not employed this most evident axiom.” For Leibniz is axiomatically true that there must be some difference between any two things that are distinct that is intrinsic.⁶⁰

An obvious response for a Cartesian at this point would be to accept that there can be numerical difference without qualitative difference. One way to do this would be to individuate bodies by the primitively distinct portions of matter that constitute them.

However, in Letter 52, De Volder takes another track:

[I]t is true that a reason can be given why body A occupies this place rather than that. But, this is not derived from the intrinsic nature of the body A itself, as much as from the system of the whole universe. It follows from this that, at any given time, body A occupies this place and body B occupies that place. Indeed, all the places that those bodies will each occupy in the future follow from this as well.

De Volder's solution is to claim that bodies are individuated by spatio-temporal location. And, whilst there is no distinction for him between space and time and the enduring material universe, he appears to think that the relative position of portions of matter will suffice to provide an appropriate framework.

Unfortunately, Leibniz does not respond to this by explaining why he thinks that the "system of the whole universe" cannot ground the difference between bodies. One obvious reason that Leibniz might object to such a thesis is that it appears to be an attempt to individuate bodies on the basis of external relations, a category that he does not admit into his ontology. But the issue of the need for intrinsic differences among bodies receives no further elaboration in the correspondence. Instead, in Letter 54, he reminds De Volder that he had added a "demonstration . . . from the phenomena" that shows that the diversity among corporeal phenomena demands a "principle of distinction in corporeal things", a direct reference to the argument to which we shall turn now. It should be noted in advance, that De Volder does not engage with this argument at all and so there is little of dialectical interest

here. However, it is well-known and some of the things that Leibniz says in the correspondence help illuminate its nature.

8.4. The heterogeneity argument

In Letter 40, after mentioning the arguments that question the capacity of the Cartesian view of body as merely extended to account for the activity of bodies and their individuation, Leibniz observes: “I have demonstrated elsewhere (in my reply to Mr. Sturm published in the Acta Eruditorum) that unless matter is heterogeneous (which happens through entelechies), no variety of phenomena can arise, and equivalent things would always be substituted for one another.”

Here Leibniz refers to an argument, which I shall refer to as the heterogeneity argument. It appears in his paper De Ipsa Natura (Leibniz 1698) which was a response to some of the views of Johann Christopher Sturm. Although this paper is primarily an attack on Sturm’s occasionalism – a position with which De Volder was, as we have seen, unsympathetic – section thirteen contains an argument which is aimed at anyone who thinks that “portions of matter agree in every way” (G.iv.513/AG 164) and for whom “motion is only the successive existence of the moving thing in different places” (G.iv.513/AG 163). The basic insight that fuels this argument is simple. Given the two commitments just mentioned, commitments that would have been accepted by Sturm and many other late seventeenth century Cartesians, at each and every moment, the material world will be qualitatively homogeneous. Even motion, which was supposed by Descartes to be the source of all other qualities in matter, will not introduce any differences. However, it is not entirely clear why Leibniz regards this as is a problem.⁶¹ The key to making sense of what Leibniz is saying, I suggest, is in his claim that there would be no variety of phenomena. Leibniz’s point is that the Cartesian account of body does not allow us to explain why the material appears as

it does in our representations. As he says in De Ipsa Natura, “[E]verything would be just as if no change or division had ever occurred in bodies, and we would never be able to give a reason for the different appearances that we sense” (G.iv.513/AG 164). This suggests that there is a sense in which a proper conception of the world ought to provide a reason for the qualitative diversity that we perceive it to have.

I think the most natural way to understand Leibniz’s idea here is to focus on his understanding of the intentional content of sensory perceptions. For most seventeenth century philosophers, the intentionality of our perceptual states seem to have been conceived, at least in part, on a model of representation which involves a relation of resemblance between our sensations and at least some of their objects. Locke is, of course, taken as the classic exponent of such a view, with his distinction between the ideas of primary and secondary qualities,⁶² but we also find a commitment to a resemblance between the ideas of primary qualities and their causes in Descartes.⁶³ It is against this shared background that I think the claims of the heterogeneity argument must be understood. More precisely we should attend to a natural corollary of this view, namely, that any state which is a perceptual state ought to at least partially resemble its causes, and vice versa. Or to put it another way, there ought to be an intelligible relation of resemblance between any perceptual state and the state of the world which caused it. For even if it is allowed that there is a kind of bodily diversity in the Cartesian world, namely a primitive distinction between the parts into which matter can be divided, it does not seem to be the kind of diversity that could ground the resemblance relationship that Leibniz demands, either at the level of primary or secondary qualities. Whereas our perceptions of the physical world are full of intrinsic differences at any given moment, the material world of the Cartesian is devoid of anything but qualitatively identical parts.

9. Leibniz's Account of the Material World

On reading the De Volder correspondence, it is immediately apparent that some aspects of Leibniz's account of the nature of body undergo important changes. The later letters have often been seen as paradigm instances in which Leibniz commits himself to an austere fundamental ontology that includes nothing other than mind-like monads and their intrinsic quasi-psychological states. The earlier letters are markedly different. For one thing, discussion of Leibniz's positive ontological views is very limited and, and for another, where we do find statements of it, there is little explicit suggestion of the austere monadological metaphysics. I do not intend to try to provide a decisive account of the issues here, but I think that this should not lead us to think that Leibniz changed his mind about the nature of the material world between 1698 and 1706. Readers should be aware that this claim will not seem satisfactory to some commentators. Indeed, it has been suggested that the correspondence can be regarded as spanning a period in Leibniz's metaphysics that includes a transition from an earlier quasi-Aristotelian realism about body to a monadological idealism.⁶⁴

Prima facie support for the continuity in Leibniz's views can be found in his response to De Volder's genuine surprise, in Letter 63, that in Letter 61 Leibniz seemed to "do away with bodies altogether, in as much as you place them only in appearances," and that he had "substitute[d] forces alone for things; and not even corporeal forces, but 'perception and appetite'." Leibniz's response, in Letter 64, was that, on careful examination, De Volder should be able to see "the same things were already adequately introduced in previous letters". Of course, this isn't decisive. Leibniz might only have meant the letters dating after his change of heart. But it is hard to see what there would have been to gain from refusing to admit this, and it would almost certainly have been essential for removing De Volder's confusion. My inclination, therefore, is to regard this statement as evidence that Leibniz had

been intending to articulate the same position all along and I shall assume this in the interpretation that I offer.⁶⁵ Whilst there are lots of difficulties that arise in trying to make sense of what that position is, I think they are intrinsic to the task Leibniz had set himself, namely to make sense of the fact that both the world of ordinary experience and, in a more sophisticated sense, the world of seventeenth century physics, seem to consist of individual things that have size, shape, and motion, given his commitment to an austere monadological ontology. Thus, the account of material reality that I will ascribe to Leibniz is a version of the commonly (but not universally) held view that, for Leibniz, bodies are collections of mind-like entities, which he will call simple substances, or monads, and that their properties are determined by the properties of these more fundamental entities. But I will also attempt to do justice to another thesis that is clearly present in the correspondence, namely the claim that bodies and their properties are phenomena, or appearances.

9.1. The articulation of Leibniz's views in the early parts of the correspondence

I want to begin by looking at the earlier parts of the correspondence. As already noted, one striking thing is that Leibniz gives De Volder relatively little information at this point. We have already discussed two reasons for the absence of this attention: on the one hand, Leibniz clearly wishes to focus first on disagreements over the measure of motive force before entering into any discussion of these more philosophical issues; second when the correspondents do turn to ontology, it is De Volder's account of substance and body that is the initial target for discussion. It is only after sending De Volder his Réponse in 1702 that Leibniz is drawn into serious debate over his own views. Indeed, even then, it seems that where Leibniz does offer his views, this is mainly in response to direct questions.

Furthermore, I think it is clear that the dialectical context is such that he articulates his views in such a way that they are likely to make sense, and seem acceptable, from a Cartesian

perspective. This kind of approach is common in Leibniz's writings and has often been noticed. For example in the New System of 1695 (Leibniz 1695b) and the journal articles that followed its publication, Leibniz speaks as if he regards the human body as a substance that is distinct from the soul, when it is clear from other writings that his ontology is not dualistic in this way.

Leibniz's response to Bernoulli's initial reports of his discussions with De Volder, in Letter 2, concerns matter and its elastic force. In this context the term matter is simply used to refer to the stuff that the material world and individual bodies are made of, the stuff that De Volder conceives of as a single corporeal substance, whose nature is exhausted by mathematical extension and which has impenetrability as an essential feature. But for all that Leibniz's matter is both extended and impenetrable, it differs significantly from its Cartesian counterpart, for as we have already seen, it also has a motive force and the power to resist motion that is impressed on it. Elsewhere, such as in Letter 6 to Bernoulli, Leibniz distinguishes between what he calls "secondary matter, i.e., mass [massa]" and "Matter itself, intrinsically, i.e., bulk [moles], which you can call primary matter". The first of these is what Leibniz initially called matter and the second is "something incomplete". The distinction is possible because matter in the first sense, which is sometimes called secondary matter, includes the principle of activity that accounts for the motion of bodies. Ignoring this, one is left conceiving of the stuff that is moved, the impenetrable resisting aspect of bodies that the Cartesian conception comes closer to capturing. This primary matter is incomplete in the sense that it cannot exist independently. It is merely an abstract way of considering secondary matter. This distinction is present in the letters to De Volder proper. Thus, in Letter 17 matter is described as "merely passive" as opposed to "secondary matter" or "the complete body", which is the thing to which force and motions are properly attributed, and in Letter 40 primary matter is said to be "matter separated from all activity". But, in Letters 20, 24, and 37

it is ignored and Leibniz clearly intends secondary matter where the term matter appears unqualified.

Nothing in Leibniz's conception of matter that I have mentioned so far suggests anything other than what De Volder seems to have assumed before entering into the correspondence, namely that Leibnizian bodies are either like Cartesian ones augmented by some additional constituent, or that Leibniz holds that merely extended substances, in fact, have active forces. But there are hints that things are not quite as straightforward as early as Letter 17, which was written in May 1699. Here Leibniz provides an account of what it is for matter and bodies to be extended that is at odds with De Volder's position and that seems to commit him to the view that the extension and unity of individual bodies are essentially mind-dependent. Finally, he goes some way toward indicating that the reality of matter is reducible to monads and their relations.

The key here is that Leibniz takes what I earlier called actual extension to be a relative notion that is predicable of coexisting pluralities that are continuous. Whilst he does not explain the last of these notions here, whiteness is said to be continued in milk and resistance in matter. The fact that Leibniz conceives of extension as relational is of far-reaching ontological significance in ways that would not have been apparent to De Volder. It is impossible on this conception for there to be a genuine individual that is extended. Actual extension belongs only to pluralities. But, furthermore, Leibniz's conception of relations more generally, entails that there can only be extension where a plurality of things is taken to be continuous – a notion to which we shall return below - with each other by some mind. The intrinsic grounds for this continuity that belong to the individuals in the plurality are all that exist independently. Furthermore, it follows from this that every material thing is in fact a plurality. Thus, bodies are not merely divisible, but actually consist of infinitely many distinct things.

Although the notion of continuity remains unexplained at this point, Leibniz does provide some insight into the nature of the plurality that grounds the reality of extended matter. “Our thinking” he says “is completed and terminated more in the notion of dynamism”, which he explicates as “an attribute from which change follows whose subject is substance itself.” Later he makes it clear that this attribute has both an active and a passive aspect (something that is reinforced in Letter 43, where the nature that is continued in matter is said to be “dynamism, from which there is action and passion”), and claims that the nature of the resistance and active force in secondary matter can be “located in” this. The view emerging here is that wherever there is extended matter there are many dynamic things or substances that ground the continuity of resistance and motive force that also belongs to matter. But that is not all that Leibniz says. For he makes it clear that the aspect of dynamism that grounds the activity of matter should be regarded as “primitive entelechy”, which is “something analogous to the soul.” Nothing further, however, is said about the passive aspect at this point.

One additional point must be noted about Leibniz’s early comments on matter. On several occasions, Leibniz speaks of matter as having parts. The most explicit statement of this view appears in Letter 17, where De Volder is told that “each and every part of matter is, in turn, actually subdivided into parts”, that this is due to “the internal motion of [its] parts”, and that the parts are “divided by souls and entelechies.” In Letter 20, he speaks of animate bodies as “having parts, each of which is separately animated”, and in Letter 24, of a “substantial distinction among the parts of matter”. There is little to connect these comments up with the more general account of extended things as constituted from infinitely many dynamic substances. However, an analogy is suggested as follows: “Everyone else who puts a rational soul in man that is something substantial and lacking in extension recognizes this as well, though, certainly, they do not admit such a mind in all the parts of matter.” Here I take

it that Leibniz is suggesting that parts of matter are individuated in something like the way that Cartesians would individuate human bodies. But, of course, the analogy is limited.

Leibniz does not think of bodies as substances and, as he notes, he admits such a relationship throughout matter and allows that some of the animating principles are less psychologically developed than Cartesian minds.

Leibniz's presentation of his positive views on the nature of body prior to the introduction of the Réponse in 1702 is suggestive but far from complete. It also leaves us with few resources for giving an account of how it is that the natural activity of bodies should be understood. As should be clear from the foregoing, two additional components of this view need to be fleshed out further, namely what it is for a coexisting plurality to be continuous, and how Leibniz understands the aspect of the dynamic principle that grounds the activity and resistance of matter. However, before doing this, we need to consider two important components of Leibniz's view that are discussed fully only in the later stages of the correspondence. These are the claims that bodies are aggregates of simple substances and that they and their properties are phenomena.

9.2. Bodies as aggregates of simple substances

In Letter 55, Leibniz presents the following argument intended as a clarification of reasoning that he had expressed more obscurely in Letter 53:

First, that which can be divided into many is aggregated, i.e., constituted, from many. Second, things that are aggregated from many are not one thing except from a mind, and they have no reality except that which is borrowed, i.e., that is from the things from which they are aggregated. Therefore, third, things that can be divided into parts

have no reality, unless there are things in them that cannot be divided into parts.

Indeed, they have no reality other than that which is from the unities that are in them.

It is clear from the context that the things that can be divided into many here are portions of secondary matter, or bodies. Leibniz begins by observing that the divisibility of things into many entails that they are aggregates of many things as well. Next, he observes that the unity of aggregates is really just a mental unity. As I mentioned above, Leibniz's aggregates are mind-dependent in the sense that their composition depends essentially on the activity of created minds.⁶⁶ Such minds have the things aggregated, or aggregata, as objects of singular representations. In addition they represent relations obtaining between the aggregata which they treat as grounds for conceptualizing them as a unified composite entity. The examples that Leibniz typically offers, such as a flock of sheep, have readily identifiable aggregata and it is often possible to specify the basis for their unity. However, it is clear that he allows for aggregation to take place at an unconscious level.

The fact that bodies are aggregates thus tells us something about what it is for them to count as unified individuals, to which we will return later. For now I want to focus on the conclusion that Leibniz draws from this argument regarding the things from which bodies are aggregated. First he tells us that bodies borrow their "reality" from the things that are "in them", the aggregata. And, secondly, that this entails that they are ultimately aggregated from, and have in them, things that are indivisible, or "unities". Leibniz's use of the term, reality here invites further elaboration. It must be used in a restricted way if the only reality that aggregates have is the reality that they borrow, or derive, from the aggregata. Given the account of aggregates offered it seems unavoidable to think that the reality of aggregates is in part derived from the thing that does the aggregating. But this additional sense can't be relevant for Leibniz here. Aggregates are real in the sense under consideration only in virtue

of having aggregata that are themselves real. It is here that the second part of Leibniz's argument comes in. The aggregata can be real if they themselves are aggregates that have borrowed reality. But, Leibniz insists, this must come to an end. Ultimately the reality of any given aggregate must be derived from some aggregate with aggregata that are unities, that is, things whose unity is intrinsic, which are not themselves the product of aggregation and, hence, as he puts it in Letter 55, things that "cannot be divided into parts".

Leibniz's rejection of an infinite regress of reality borrowing is not argued for in Letter 53 or 55. In Letter 61 he adds that reality "ultimately must be proper to some subject". However, it is not clear that this takes us much further. The claim seems to be a brute, though clearly challengeable, ontological intuition for Leibniz. It is possible that there is another dimension to the issue, however. Aggregation is essentially the bringing things together in thought and treating them as one. If aggregation is a completable process, as Leibniz surely thinks it is, perhaps we must also acknowledge that it has a starting point and that somewhere in the process there must be something that is given to the aggregating mind through a singular representation that is not itself the result of a process of aggregation. Whatever the reasoning, it is clear that Leibniz thinks that to be an aggregate is to be something that has unities as its ultimate aggregata. This allows us to move relatively quickly to a restatement of Leibniz's views on aggregation that connect them even more directly to the topics under discussion in the correspondence. For, as Leibniz observes explicitly in Letters 64 and 65 to be a unity is to be "a simple substance", or what he also terms a monad in Letters 50 and 53. Thus we learn that bodies are aggregates of simple, indivisible substances, or monads.⁶⁷

The claim that substances are unities is echoed in other places. In the marginal comment L1 to Letter 40, Leibniz states, "A substance is a complete atom". However, neither here nor anywhere else in the correspondence is there a justification for this claim. In Letter 50 Leibniz asserts that unity and being are convertible, but again this is just an assertion. In

Letter 55 De Volder challenges Leibniz on precisely this issue. Referring back to the claim in Letter 50, he observes, “I did not understand what the argument was there”. But the provocation is unsuccessful and the desired argument never appears. I think this reaches to the heart of a methodological impasse that arises between the two correspondents. It is implausible to claim that the intension of the terms unity and substance are the same. Indeed, I do not think it is any part of Leibniz’s view that they are. But nor does Leibniz offer a way of establishing a conceptual link of a different kind. We might speculate more about why this is the case. We have seen that De Volder himself has a concept of substance (perhaps two conceptions) that Leibniz rejects. But without common ground of this kind, it is hard to see where Leibniz could hope to begin dialectically. Furthermore, there is the apparent specter of Cartesianism lurking. For De Volder appears to accept that there is a kind of substance, body, that is divisible.

It is unfortunate that De Volder does not really engage with Leibniz’s claim that the divisibility of individual bodies entails that they exist as a result of a process of aggregation of things that are ontologically prior to this process. He responds to the argument from Letter 53 above with the counter assertion that he sees nothing wrong with the idea that bodies are always divisible and, as we see in Letter 60, this is a claim that Leibniz is equally happy to accept and which does not draw his attention at this point. But this masks an important, if perplexing, part of Leibniz’s doctrine that bodies are aggregates of substances. De Volder assumes that bodies will always be divided into other bodies, which is again something that Leibniz accepts. But Leibniz does not accept a further thesis that seems to be implicit in De Volder’s understanding of aggregation, namely that the division of a body will ultimately result in the decomposition of an aggregate into aggregata. Leibniz holds that bodies are divisible and in virtue of this that they have a reality that is derived and due to the aggregation of indivisible things. He doesn’t hold that one could expect to reach those

indivisible things through a process of dividing them into smaller and smaller distinct bodies. It is hard to blame De Volder for making the assumptions he does here. For Leibniz had left out key elements of his view. In particular, he had not told De Volder how it is that simple substances are aggregated to give rise to extended bodies. Furthermore, even before the beginning of the correspondence, in Letter 5, Bernoulli indicated the De Volder suspected another key component of Leibniz's views on substance, namely that his monads were unextended entities that had close affinities with the souls and substantial forms. We will investigate how it could be that Leibniz maintained both that bodies are extended and that they are aggregates of soul-like and indivisible substances. At the same time, we will examine how this account of body is supposed to provide an explanation of bodily motion. All of this will require that we try to make sense of what it is for bodies to be phenomena. Before doing this it will be important to consider what Leibniz tells De Volder about the monads themselves. However, it is worth noting something else first.

As we have seen, Leibniz holds that bodies are aggregates of monads. In Letter 55 he puts this in a slightly different way, observing "A monad alone is a substance; a body is substances, not a substance." Claims such as this have led one recent commentator to argue, mistakenly in my view, that Leibniz has two distinct conceptions of aggregation, one similar to that outlined above, the other relying on simple mereology.⁶⁸ Although potentially misleading, this locution is a natural one. Aggregation is a constitution relation, albeit one that depends on the constituting activity of finite minds. As such one should expect an is of constitution when Leibniz speaks of the relation between the aggregate and aggregata. The aggregate is the things aggregated insofar as they are perceived to stand in certain relations and conceived of as one thing in virtue of this. A stamp collection is just the stamps that constitute the collection in something like this way. It remains puzzling that Leibniz insists that the relation between bodies and their ultimate constituents is analogous to that between

stamps and stamp collections. However, given that he does think this, it is natural that he should on occasion tell people that bodies are substances or monads.

9.3. Bodies as phenomena

I want to turn now to another central component in Leibniz's account of bodies. In Letter 55, Leibniz tells De Volder, "Bodies, which are commonly taken for substances, are nothing but real phenomena, and are no more substances than perihelia or rainbows." In Letter 61, Leibniz also speaks of "matter" which he equates with "extended mass" (i.e., secondary matter to use the terminology of the early correspondence) in the same way. Leibniz often uses the term phenomenon much as it is used in ordinary speech today, namely to refer to things that we experience, especially those which are liable to scientific investigation. Elsewhere, it is clearly a theoretically loaded term. But for all its importance, I do not know of anywhere that Leibniz explains his use of the term and I want to suggest that we should best approach the notion of etymologically. Phenomenon is a participle derived from the Greek verb φαίνεσθαι, and means "something that appears". In light of this we can begin to see why bodies would count as phenomena.

Notice first that in several places in Letters 50 and 64, Leibniz tells De Volder that aggregates are phenomena. On the account of aggregation and phenomena that I have given, this makes sense. Aggregates come into existence when monads are unified on the basis of singular representations and relations between the aggregata thus represented. I take it that in the most fundamental sense of the term phenomenon, aggregates are phenomena because they essentially involve singular representations of the aggregata. On the account I am developing there are phenomena that are not aggregates, namely the veridical singular representations that ground aggregation. However, Leibniz does not focus on these since the phenomena that he is interested in are the aggregates that he identifies with bodies. And there

is, of course, more to an aggregate than a plurality of veridical singular representations, namely the aggregation-dependent unity that is not a feature of the aggregata in themselves. The flock of sheep is a plurality of sheep appearing individually with an added touch of unity, and similarly with any aggregate of monads. But, of course, things do not seem to be this way with the aggregates of which we are conscious. The flock seems to be a composite entity that is as mind-independent as the sheep composing it. In the experience we project the unity back into the world, much as the traditional interpretation of Hume has it that the necessary connections we take there to be among causes and effects are really projections of the expectations that arise and are satisfied by the structure of our sequences of perceptions. Being aggregates of monads, conscious experiences of bodies are a complex mix of veridical phenomena and projected unity. Bodies are, as Leibniz explicitly says in Letters 53 and 55, “quasi-substances”.

The appearing of monads as bodies is thus impure and potentially misleading. If we take an experience of a body to be an experience of something that has mind-independent unity we are mistaken. Indeed, as Leibniz frequently points out, everyone admits this who recognizes that bodies are indefinitely divisible. More often than not, it seems that when Leibniz uses the term phenomenon he is drawing attention to the kind of projection that occurs in our conscious experiences that involve the aggregations of monads that we refer to as bodies. But it is not merely the unity that we bring to these experiences that Leibniz regards as a projection. All of the qualities that we ordinarily attribute to bodies are of this kind, that is, having sizes, shapes, motions, motive forces and resistance. All that is really appearing when we have such experiences are pluralities of monads whose natures are exhaustively characterized in terms of perception and appetite. Their unification in thought, however, leads to our having experiences that we take to be of entities that are susceptible to geometric and dynamical description.

The view that I am ascribing to Leibniz has affinities with a common interpretation that there is a Leibnizian body when “a certain collection or group of monads appears to us as an extended mass” (Jolley 1986, 47).⁶⁹ But there is more built into the conception of bodies as aggregates than this. In order for there to be an aggregate there must be a way in which each of the aggregata appears individually and some basis for grouping the aggregate in those ways of appearing. Unfortunately, Leibniz says very little in the correspondence with De Volder that gives us any indication of how this might go. However, there is a passage in Letter 50 that is clearly relevant. I will return to this below, after we have examined Leibniz’s account of the monads that are aggregated in this way.

9.4. Monads, or simple substances

In Letter 50 Leibniz presents the most comprehensive statement of his views on substance that is to be found in the De Volder correspondence. This well-known passage, which I shall refer to as the five-fold scheme, will form the basis of our discussion:

I therefore distinguish: (1) the primitive entelechy, i.e., the soul; (2) matter, namely, primary matter, i.e., primitive passive power; (3) the monad completed by these two things; (4) the mass, i.e., the secondary matter, i.e., the organic machine, for which innumerable subordinate monads come together; and (5) the animal, i.e., the corporeal substance, which the monad dominating in the machine makes one.

We shall be concerned with (4) and (5) later. For now I want to concentrate on the account of monads that is presented in (1)-(3). We have seen that Leibniz’s monads do not have any parts. However, as the passage above indicates this does not mean that they have no internal complexity. Each monad is “completed by” a “primitive entelechy,” or “soul”, and “primary

matter” or “primitive passive power”.

Leibniz uses the term entelechia and its Greek root εντελεχεια throughout the correspondence. On some occasions, including the passage above, the prefix primitive accompanies the word,⁷⁰ but often it does not.⁷¹ Since Leibniz nowhere contrasts primitive entelechies with entelechies of a non-primitive kind, I shall ignore the prefix from here onward. As Leibniz himself notes in the contemporary unpublished paper, which is referred to by Ariew and Garber as On Body and Force against the Cartesians, the term entelechy derives from Aristotle.⁷² But while Aristotle is clearly a major influence on Leibniz’s thinking here, I think we are better served by concentrating on the meaning of the term as it is articulated in the De Volder correspondence, rather than probing the etymology of the term. Leibniz also uses a number of distinct expressions in ways that suggest that they are interchangeable with entelechy. As well as soul, we find “primitive active power” (Letter 50), “active force” (Supplement 2 to Letter 67), “force”, “form” and “activity” (all in Letter 29).⁷⁴ Earlier in the correspondence, in Letter 17, Leibniz observes that “no other notion of power or force should be sought than that it is an attribute from which change follows whose subject is substance itself.” This strongly echoes the account of ‘active force’, found in Leibniz’s 1694 publication De Prima Philosophiae Emendatione, et de Notione Substantiae:

Active force differs from the bare power which is commonly learned in the Schools, for the active power of the Scholastics, or faculty, is nothing but an immediate possibility of acting, which still needs an external excitation and even, as it were, a stimulus, to be transferred into action. But active force includes a certain act or εντελεχεια and so is midway between the faculty of acting and action itself, and involves a conatus. And in this way it brings itself into operation, and needs no help (G.iv.469/L 433).⁷⁵

For Leibniz, force or power, or if he is being more explicit, active force, needs to be contrasted with the notion of force which he attributes to the Scholastics.⁷⁴ For, whereas the latter is a “possibility for acting” that requires external stimulation, active force is an attribute that “brings itself into action”, since it involves a “conatus” that will produce “operation” unless prevented.⁷⁶ As Leibniz puts it in Letter 64, “primitive forces can be nothing other than the internal strivings of simple substances.”

Leibniz’s understanding of entelechy in terms of active force provides only half of the story. In (1) from the five-fold scheme we are also told that the primitive entelechy is “the soul”. This gives us an important window onto Leibniz’s understanding of what the operations of the entelechy are, or what simple substances strive to do. The identification of entelechies and souls also occurs earlier in the correspondence. In response to De Volder’s claim, in Letter 23, that he had no understanding of Leibniz’s active principle, Leibniz replied in Letter 24: “Unless I am mistaken, you certainly understand something when the Cartesians speak of the human soul, and, as far as I am concerned, this does not differ in kind from other entelechies”. This claim has to be taken with care, since Cartesian souls are substances, whereas Leibniz presents entelechies as one of two components of monads in the five-fold scheme. But it is an expression of an important part of Leibniz’s view, namely that the mind and its attributes provide us with a model for making sense of what simple substances are. Leibniz is most explicit about this in the last two years of the correspondence. Thus, in Letter 61 of 30 June 1704, he tells De Volder “this principle of action is most intelligible, because there something in it analogous to that which is in us, namely perception and appetite”, with essentially the same claim recurring in Letters 64 and 67.⁷⁷

Unfortunately, Leibniz provides no definition of either the term perception or the term appetite in the correspondence. However, I see no reason to think there is any significant

deviation from the well-known accounts provided in the Monadology, where “perception” is “the passing state which involves and represents a multitude in the unity or in the simple substance” (G.vi.608-09/AG 214) and “appetition” is “the action of the internal principle which brings about change the passage from one perception to another” (G.vi.609/AG 215). The analogy is surely with our understanding of our mental lives as sequences of representations driven by volitions. But the analogy has to be quite loose, since it is supposed to hold for monads that lack awareness, those that have awareness but no self-awareness, and fully conscious rational minds. Furthermore, Leibniz reveals in Letter 25 his commitment to the thesis that monads perceive everything else, past, present, and future. From the perspective of Leibniz’s discussion of the nature of body it is also important that Leibniz talks, in Letter 61, of “the principle of action and passion,” as being “modified through derivative forces or what is momentary in action.” However the notion of appetite is to be understood, this suggests that it can be equated with the notion of derivative force and that appetites can be regarded as modifications of simple substances that bring about the changes in their representations.

Before moving on, it is worth mentioning one further thing that Leibniz says about entelechies. This occurs first in Letter 17, where he observes that the nature of primitive entelechy “consists in a certain perpetual law of the same series of changes, which it runs through unhindered.”⁷⁸ Leibniz’s inspiration here is clearly mathematical. As he observes: “The situation is as it is with laws of series or the natures of curves, where the entire progression is fully contained in the very beginning.” But suggestive and striking as it is, it is not clear how helpful the analogy really is. In order to apply to the sequence of states of a substance, the law of the series would have to take a somewhat different form. In particular, it would need to be rich enough to determine the perceptual and appetitive state of a given substance throughout its existence, given the initial state. There are also significant

disanalogies. As De Volder points out in Letter 54, laws of series encapsulate atemporal structures rather than determining successive states. And there is no clear sense in which they can be thought to produce their determinate values in the way that entelechies are supposed to produce the modifications of simple substances. In the end, it seems that the analogy expresses little more than Leibniz's commitment to the idea that substances have principles of activity which, if fully understood, would allow one to determine the nature of the states they produce.

9.5. Primitive passive power, or primary matter

In the five-fold scheme, Leibniz characterizes the second component in the monad as “primary matter, i.e., primitive passive power”. As we have seen, the discussion of primary matter occurs early in the correspondence, in Letters 6, 16, and 17. In those places, it is clear that it is the resisting aspect of extended bodies, namely their impenetrability and the inertia which must be overcome if they are to be moved by another. Leibniz states explicitly in Letter 50 that “monads are not extended”, thus it is hard to see how he could be using primary matter in the same sense when referring to that which completes a monad along with its entelechy. This is confirmed by Leibniz's response in Letter 52, to De Volder's puzzlement over what Leibniz means when he speaks of “a passive power in a substance”.

You think that the resistance in a substance can bring about nothing other than the fact that the substance opposes its own active power. But this should not seem absurd to you, since in quasi-substances, i.e., bodies, it is also the case that the bulk restricts the speed that another tries to impress. Certainly there must be a principle of limitation in limited things, just as there must be a principle of action in acting things.

The “limited things” in question here are created simple substances, the “principle of limitation”, the primary matter or primitive passive power from the five-fold scheme, and the “principle of action”, entelechy. We can see that primary matter is what gives rise to the limitation in created simple substances and entelechies are what are limited. Furthermore, this is contrasted explicitly with the bulk, or primary matter, of bodies.

In the passage above, Leibniz says nothing about the way in which the entelechy is limited by the primitive passive force. And clearly the analogy with interaction between distinct bodies it is not terribly helpful. Unfortunately, there really isn’t anything in the correspondence proper to help us out at this point. However, in the supplement to Letter 67, which appears not to have been sent to De Volder, we find: “There is an active force and a passive force in every perceiver; the active in the transition to the more perfect, the passive in the opposite.” There is nothing else in the correspondence that speaks about the limitation or imperfection in created simple substances. However, in numerous other places throughout his mature writings Leibniz speaks of perceptions as being more or less distinct or confused.⁷⁹ Thus, whilst a lot more could be said here, it is plausible to think that the intra-substantial resistance that Leibniz has in mind is a limiting of the capacity of a monad to make transitions to more distinct representations as it moves through its sequence of perceptions.

In the five-fold scheme Leibniz speaks of the monad as “completed by” its entelechy and primitive passive force. This suggests that the nature of monads is exhausted by these two constituents. We have now seen something of how this completion is to be understood. For all this, the account above leaves many questions unresolved. To begin with, monads are above all indivisible unities, and so there is a prima facie tension between this and the existence of monadic constituents. Furthermore, the relation of completion has been explicated in such a way that it invites one to think of active and passive forces as distinct entities that interact with one another in the production of limited perceptual states. Both of

these apparent problems can be addressed, I think, by attending again to Letter 43, in which Leibniz speaks of dynamism as the nature that is extended in bodies. Similarly in On Body and Force, from 1702, we find the same Greek expression equated with the unqualified notion “power” or “the innate principle of change and persistence” (G.iv.394/AG 251). In both cases, rather than positing two distinct sources, Leibniz appears to emphasize the unity of the principle of change. If there is really a single principle of activity and passivity, then it seems that the incompleteness that Leibniz ascribes to entelechies without primitive passive force is conceptual. Each is identical in re, and separable only in thought, although this need not imply that there is nothing in the substances themselves to justify this separation. Ontologically puzzling as this kind of view might be, it is, of course, commonplace in the history of metaphysics. We need only think of traditional views of the divine attributes as distinct but in no way compromising the unity of the divine essence.

The account of the nature of monads and their activity that I have given here is of indivisible unities whose natures consist of a dynamic principle from which a succession of perceptions, or limited representational states, arise. Furthermore, I have suggested that the principle can be legitimately conceived as having active and resisting aspects, with the latter providing the grounds for the limitations in the states produced. One thing is noticeably absent here, namely the role of appetite. Despite telling us that this is the companion to perception in simple substances, Leibniz says little about appetite in the correspondence. As we have already seen, it is described in the Monadology as “the action of the internal principle” that brings about the succession of perceptions. This suggests that appetite is what arises from the interaction of the active and passive principles insofar as they are productive. In other words, appetite is the momentary dynamism grounded in the enduring dynamic nature of monads. In section 79 of the Monadology, Leibniz links appetite with final causes, and, hence with the more anthropocentric notion of desire.⁸⁰ The implication

here is that the action of the dynamic principle is driven by a representation of the way the world will, or at least, ought to be. It is well known that Leibniz thinks that monadic representation extends to all future states of the universe, in addition to the present and past. And when discussing the analogy with laws of series in Letter 53, Leibniz does claim that “the entire progression [of substantial states] is fully contained in the very beginning.” However, nowhere in the correspondence does Leibniz explore how this connects with the activity of substances in any detail. Indeed, responding to De Volder’s request to be shown how substantial activity arises from the entelechy that Leibniz had mentioned in Letter 17, Leibniz observed, in Letter 20, “The next consideration – how change comes about – is causal, and perhaps here there are things that escape the intellect.”

9.6. Embodied monads

So far we have examined Leibniz’s claim that bodies are aggregates of monads and his conception of the nature of monads. It is plain that this cannot be all there is to Leibniz’s account of body if it is to look at all plausible. On the face of it, Leibniz is claiming that things such as tables and chairs are nothing more than collections of other things whose only intrinsic features are states with representative and appetitive aspects. How, on this view, are we to make sense of our conception of bodies as things that have sizes, shapes and colors, make sounds, smell, and move around? Whilst I think the correspondence only takes us so far in answering this question, it does provide some resources.

To begin with we can draw further on the account of aggregation. As noted above, in order for there to be an aggregate each of the aggregata must be represented by the aggregator. It is in virtue of being represented that the aggregata enter into the aggregate as constituents. Leibniz says very little in the correspondence with De Volder that gives us any indication of how this takes place. However, a passage from Letter 50 is suggestive of an

approach. Here Leibniz tells De Volder:

[E]ven if monads are not extended, they nonetheless have a certain kind of situation in extension, i.e., they have a certain ordered relation of coexistence to other things, namely through the machine over which they preside. . . . Extended things involve intrinsically many things endowed with situation. But things that are simple, even if they do not have extension, must, nonetheless, have a situation in extension, although it may not be possible to designate it precisely.

Albeit contingently, there is for every monad what Leibniz often calls an organic body, a body that they animate in the way that the soul of a human being might be thought to control its body on either the Aristotelian or even, as we saw earlier in an excerpt from Letter 24, the Cartesian model. Furthermore, as we see in the passage above, through this body monads can be said to stand in relations to one another. If this could be tied up with the cognitive relations that individual monads bare to each other, it might provide the basis for their aggregation. There is at least some reason to believe that this is what Leibniz has in mind. But I will only offer a brief sketch, since the correspondence does little more than hint at such a position.

Before we begin to see how this might go an important point must be considered. I am proposing that we are to rely on the fact that monads have organic bodies in order to explain how monads are aggregated to form matter and the bodies that are made up of matter. But, given the way that I have explicated the notion of aggregation, the only way to avoid this is to assume that the notion of organic body is in fact equivocal. On the one hand organic bodies will be aggregates of monads, on the other they will be aspects of the representational states of monads. It has to be admitted that there is nothing in the De Volder correspondence that explicitly supports the attribution of such an equivocation. Thus, it is admitted here, at least in

part, for the sake of charity.⁸¹

In order to understand how organic bodies could be aspects of the intrinsic states of monads, I want to consider the representations that we ourselves have. In particular, I want to draw attention to the fact that it is a basic, pre-conceptual, feature of our cognitive lives that we are conscious – at least some of the time – of the presence of other human beings, embodied agents that stand in egocentric spatio-temporal and causal relations to our own embodied selves. For many people it also seems that there are non-human animals of this kind as well. If we embed these considerations within the austere ontology that Leibniz adopted at this time, we can express it as the claim that we find ourselves in the presence of monads that control portions of a world that surrounds us, some nearer and some further away, but all inhabitants of this same world. Furthermore, it seems to us that the same individuals reappear over time and that there is a common phenomenology of embodiedness that attends the reappearance of each individual, even if they do not seem to be exactly similar. Recognizing that each of Leibniz’s monads is an individual substance whose existence is dependent on nothing other than God it follows that these appearances must be features of the states of the individuals that have them and that they could exist even were they mere appearances rather than appearings. Despite his unwillingness to argue against such a skeptical hypothesis, Leibniz gives no indication that we should seriously entertain it. Mistakes aside, Leibniz appears to think that we are representing what we seem to represent when we have such conscious episodes. Indeed, Leibniz seems to imply just this in the New Essays when he says that “men [are] phenomena to each other” (NE 374).

I have been suggesting that, for Leibniz, monads appear individually as situated in imprecisely specifiable regions of an egocentric space in virtue of an apparent locus of animation. They are thus, phenomena, in the original sense, namely “things that appear”. If this is conceded, I think we can also see how they have relations that could ground

aggregation into entities that would also be phenomena in a derivative sense. For they would be represented as embodied agents occupying regions of the same egocentric space.

Furthermore, some of them would occupy regions “next to” each other in this space in a way that might lead one to aggregate them together to construct something that encompassed larger regions than before and that could be conceived of as a single inanimate body. So far I have been concentrating on the fact that we, as sophisticated monads, have singular representations of other monads as embodied agents related to ourselves within an egocentric world. Given the richness of Leibniz’s ontology of monads and their representative capacities, we can be confident that, to the extent that the foregoing is plausible, Leibniz would extend it in an analogous way to appearances of other monads that do not make themselves consciously apparent. Indeed, one might imagine that this is the way that human monads represent the vast majority of others. Indeed, given his commitment to a thoroughgoing principle of uniformity, we can be confident of more than this, namely that our sensory experiences are saturated with animation, even where we are not conscious of this fact.⁸²

This account of bodies as aggregates of monads leaves many unanswered questions. There is, of course, nothing that speaks to the issue of how it is that monads might be aggregated to form bodies that fall under different sortal concepts. At best, we have an explanation of how basic material individuals are constituted. Presumably, other cognitive operations would be required in order to construct a world containing objects of common sense discourse. But there is certainly nothing in the correspondence that takes us any further with this. Furthermore, whilst our experiences are saturated with appearances of monads with spatio-temporal contiguous bodies, not all of the groupings that an individual aggregator treats as individuals stand up to intrasubjective or intersubjective scrutiny. We need only think of various situations in which we decide on reflection that what seemed to be a single

material thing viewed from a distance was really a plurality, or where we concede to others that their conception of the material world that we are experiencing is more accurate than our own. And, of course, there is the further issue of the difference between aggregates that are regarded as constituents of dreams rather than the real world.

Unfortunately, there is again little in the correspondence to address these issues and what we do find appears very late. In Letter 60 Bernoulli passed on De Volder's complaint that he still understood very little of the positive position that Leibniz had been offering. This precipitated an account of the main features in Letter 61, including the claim that "matter and motion are not so much substances or things as the phenomena of perceivers, the reality of which is located in the harmony of perceivers with themselves (at different times) and with other perceivers", a thesis that is repeated in Letter 62 and Supplement 1 to Letter 67. As Robert Adams has pointed out the most detailed discussion of the reality of phenomena can be found in a piece that dates from the early-mid 1680s, De Modo Distinguendi Phaenomena Realia ab Imaginariis (A VI.iv: 1498-1504/L 363-66).⁸³ Whilst I have generally resisted drawing on work external to the correspondence in any detail, if the discussion is to proceed any further at this point, doing so here seems unavoidable.

In this earlier essay, Leibniz offers a number of criteria by which real phenomena can be distinguished from others. I will take the liberty of assuming Leibniz's classification of aggregates as phenomena in the correspondence in Letters 50 as licensing a parallel treatment of the reality of bodies. Leibniz claims that the intrinsic marks of a real phenomenon are its being vivid, complex, and harmonious.⁸⁴ But, as Adams notes, it is harmony that plays the key role in other accounts, including the one from Letter 61. In De Modo Distinguendi, we learn that "a phenomenon will be harmonious when it consists of several phenomena for which a reason can be given from each other or from some sufficiently simple common hypothesis" (A VI.iv: 1501/L 364). But Leibniz also offers the following criterion for the

reality of a phenomenon:

[I]f it keeps the custom of other phenomena that have occurred to us frequently, so that the parts of the phenomena have the same position, order, and outcome that similar phenomena have had. . . . Likewise if a reason for this [phenomenon] can be given from those that precede, or if they all fit the same hypothesis as a common reason. The strongest evidence, however, is surely agreement with the whole series of life, especially if most other [people] affirm that the same thing agrees with their phenomena too. . . . But the most powerful evidence of the reality of phenomena, which even suffices by itself, is success in predicting future phenomena from past and present ones, whether that prediction is founded on reason or a hypothesis that has succeeded thus far, or on a custom that has been complied with thus far. (A VI.iv: 1501-1502/L 364)

These ideas deserve to be explored in much greater detail. But what I want to extract for present purposes is that Leibniz appears to ground the reality of phenomena, and hence aggregates, in their predictive power. To go back to an example I offered earlier, my aggregation of the appearances as a single thing in the distance will be correct, and hence the entity I constitute real, just in case it provides the means for predicting future phenomena. It is unclear from this earlier account just what role is supposed to be played by intersubjective considerations. However, in the passage from Letter 61, it seems as though harmony with the phenomena of other perceivers is a prerequisite. Adams draws the further inference that there will be a single explanatory scheme and set of real phenomena that is grounded in “the story that would be told, or approximated, by a preferred physical science” (1994a, 257). And there is a passage from a supplementary study written in conjunction with Leibniz’s

correspondence with Des Bosses in which he toys with the idea of God's phenomena that reflect such a single best explanation.⁸⁵ But, if this is what Leibniz intended, he faces at least two obstacles. On the account I have given, and defended at length elsewhere, aggregates are produced by finite minds and tied essentially to the inadequacy of their representations. So it is unclear whether there really can be divine phenomena. And, like any reductive ontology, the account would jeopardize the reality of the material objects of everyday experience, such as tables and chairs. If Leibniz intends something that is to do justice to more complex aggregates as these it must build on the, yet to be given, account of how we aggregate monads so that they give rise to bodies of particular sorts.

9.7. Bodies and their qualities

So far I have offered an account of what it is for bodies to be both aggregates and phenomena. What has been lacking up to this point, however, is an explanation of how it is that Leibniz uses this to answer De Volder's primary question, namely how it is that bodies are naturally active. Furthermore, although I have said something about the way in which the aggregation of monads to form bodies takes place, the relation between this and Leibniz's ultimate account of the reality remains incomplete. Indeed, we have yet to see how Leibniz wishes to explain what it is for bodies to possess the feature that De Volder thought of as constituting their very nature, extension. As we have seen, Leibniz conceives of extension in two distinct ways, there is mathematical extension, whose reality is merely ideal, and actual extension, which is a feature of pluralities that coexist. Both involve continuity. But, again, this has two distinct senses. Actual extension and actual continuity are the things relevant when it comes to considering the question of what it is for bodies to be extended. Leibniz ties this in with other features of his account of body in Letter 20. Here he observes, that "extension is nothing but an attribute of an aggregate resulting from many substances."

Extension arises where a plurality of monads, the dynamic entities that are said in Letters 17 and 46 to ground the reality of (secondary) matter, are conceived as a single thing in virtue of the fact that they stand in the relation of being actually continuous with one another.⁸⁶

Thus, the picture that emerges so far is that mind-dependent collections of substances which are continuous with one another have the attribute of extension. And these collections are the things that we call bodies. On occasion, Leibniz expresses this by referring to bodies as extended things. But his official position seems to be slightly different. As the analysis of actual extension entails, and as Leibniz states explicitly in Letter 61, it is really the nature of the substances that is extended insofar as it is found in a plurality of things that stand in relation of being continuous with one another. In fact, this equivocation is not so puzzling. We are quite happy, for example, to speak of a deck of cards being spread out across a table when it is perhaps more accurate to say that it is the cards themselves are spread out. While this analysis takes us further, the key notion of ‘continuity’ remains unexplained. As we have seen, Leibniz does not think that any actual thing can be continuous in the way that the objects of geometry are. In Letter 61, Leibniz explicates the relevant sense of continuity as “diffusion or repetition”. And, in response to the confusion that De Volder expressed in Letter 63, this is further glossed in Letter 64 as “nothing other than a continuation in which the part is similar to the whole, as we conceive of whiteness diffused in milk, and the same direction everywhere in a straight line, and equal curvature in the circumference of a circle.” But, of course, these analogies are at best of limited help. After all, circles and straight lines are examples of ideal entities that are continuous in the mathematical sense. Indeed, in the next sentence Leibniz makes the following admission:

But in fact, my unities, i.e., simple substances, are not diffused (as we commonly conceive of the flowing of a point), nor do they constitute a homogeneous whole, for

the homogeneity of matter is produced only by an abstraction of the mind, when they are considered as only passive and, therefore, as incomplete.

Leibniz appears to be saying here that it is not really the case that the dynamic nature of monads is continued throughout bodies, but rather their primitive passive power alone. Furthermore, since this aspect of the monadic nature is not distinct from the entelechy in re, the continuity emerges only through partial consideration of an aggregate of monads. How might this fit with the earlier sketch I offered of the aggregation of monads? There I spoke of the appearance of monads as embodied agents in an egocentric space and, whilst there is no real textual evidence in the correspondence for extending this picture further, I suggest that we think of the embodiment that is found in the representation as an appearance of the passivity of the monad. The apparent body is that which the animating principle must seem to overpower in order to be active. And to the extent that this seems plausible, we can further regard the indistinguishable embodiment that saturates our manifold of perceptual representations comprising a given aggregate at any given time as a diffusion or continuation of the passivity or resistance of monads. The suggestion then, is that a monad that is embodied in this basic sense is not itself extended, but that the apprehension of many such substances and the unification of them in thought are sufficient for an extended thing.

Despite its being the primary motivation for De Volder's interest in Leibniz's philosophy, the explanation of how motion naturally arises receives little attention from Leibniz himself. This can I think be understood partly as a function of the extent to which the conversation between the two became dominated by Leibniz's critique of De Volder's position, and partly as a function of Leibniz's unwillingness to provide an a priori proof of the kind that De Volder sought. But I cannot help but think that Leibniz really didn't have a worked out view to offer. Although there are many uses of the term motion in the

correspondence, there is very little that makes Leibniz's understanding of the notion clear, let alone his understanding of how it arises in the aggregates of monads with which bodies are ultimately identified. What little we do discover, evidenced most clearly in Letters 36 and 40, seems to be predicated on a common understanding of motion as the translation, or change in relative position, of bodies. But unlike De Volder, Leibniz insists that "The concept of motion does not involve just body and change, but also the reason and determination of change." Indeed, in Letter 61, he goes a step further and equates motion with "action and passion". But there is no argument for this view and nothing that constitutes a direct attempt to persuade De Volder that motion could not just be translation. As we have seen, the heterogeneity argument is mentioned on occasion. And this argument is supposed to work as a critique of those who think of motion as nothing other than change in relative position of portions of merely extended substance. But Leibniz does not really provide De Volder with the argument, let alone an explanation of how this might lead one to the view that bodily motion is "action and passion".

My sense is that Leibniz really did not have a story to tell about how his monadological ontology grounds attributions of motion that form part of an intersubjectively binding conception of material reality. He had arguments that were supposed to show that only true unities ultimately exist, a conception of true unity that he took to imply both that these unities were quasi-psychological in nature and autonomous causes of their own changes. He also had, at least as I have presented his views, a sketch of how the composite extended entities of the common sense and natural scientific conceptions of bodily reality are grounded in the aggregation of such entities. One might think that Leibniz would have wanted to utilize something analogous to the explanation of the extendedness of bodies when it came to their motion and its causes. For just as extension was said to be an abstract representation of the passivity of the monads aggregated to form bodies, one might think he

would claim that bodily activity would be explicable in terms of the way in which the activity of monads is represented in their appearances as embodied agents. Indeed, I suspect that this is the basic picture that Leibniz has in mind. But if there is a plausible interpretation to be given that attributes a view like this to him it can only be on the basis of a great deal of additional material that lies elsewhere in the corpus. At best we get hints of this in the correspondence itself.

I do not wish to suggest that I have exhausted what could be said about Leibniz's positive pronouncements on the nature of bodies and their qualities. But, unlike my discussion of other parts of the correspondence, any attempt to synthesize these into a more developed account would again require much more than the correspondence itself gives us. The core components that are articulated by Leibniz are a commitment to a monadological ontology and to the claim that bodies and their properties are representation-dependent constructions from these entities and their properties. These commitments emerge most clearly in the letters that post-date Leibniz's sending of the Réponse, but they seem to me to be found in embryonic form throughout the correspondence.

In Letter 60, Bernoulli quotes from a letter that he himself had received from a somewhat despondent De Volder:

Everything comes down to this: that instead of a demonstration of the activity of substance from its nature, I receive his terminology of entelechies, unities, and primitive force that contains all change intrinsically. However, I understand nothing of this, except in so far as I have some understanding of derivative force, i.e., quantity and speed. The sole reason that I wanted so badly to know that every substance is active from its nature was that I discovered something about the cause of action that I

did not fully understand, but this does not seem to have become better known through the notion of an entelechy.

These comments predate some of the elements that I have used in constructing my account of Leibniz's views. However, even with this additional material it is hard not to have some sympathy with De Volder.

9.8. Corporeal substance and corporeal substances

It would be remiss of me to finish my discussion of Leibniz's positive views without considering the topic of corporeal substance. Much has been written in recent Anglophone literature regarding the question of whether Leibniz was committed or not to substances other than monads. It is clear that the topic was pressing in the years that immediately followed the correspondence with De Volder. As is well known, it is one of the most prominent issues discussed in correspondence between Leibniz and Des Bosses, which began in 1706. For here Leibniz develops his infamous doctrine of the substantial bond [vinculum substantiale] as a way of addressing the question of whether there is a union between mind and body that is essential for the existence of embodied human beings over and above the regulated correspondence.

The issue of the union of mind and body is not discussed directly with De Volder. We find an allusion to it in Letter 67, where Leibniz mentions an article by René Joseph de Tournemine (Tournemine 1703) that had challenged Leibniz's theory as inadequate to account for mind-body union. But not only is this letter the last of the correspondence – hence provoking no further discussion – the mind-body union is dismissed summarily as follows: “It is not a phenomenon and there is no notion of, or acquaintance with, it. Thus I could not have intended to explain it.” It is clear that Leibniz was not completely satisfied

with his own answer and Look and Rutherford eloquently explain the intricate connections between the claims that Leibniz makes here and his discussions of corporeal substance in subsequent years.⁸⁷ However, I think it does signal a truth about the way in which he approaches the ontological significance of the apparent existence of embodied agents. In short, I think that the text of the correspondence presents an ontological commitment to nothing other than monads and their aggregates, some of which are to be regarded as the metaphysical correlates of the way that particular monads appear to us. Before turning to the positive characterization of corporeal substance, it is important to note that Leibniz rarely speaks of corporeal substance or corporeal substances in the correspondence at all. Furthermore, where he does it is more frequently used, for example in Letters 24, 43, 61, and 64, to refer to the substantial ground of the material world. Indeed, for the most part the expression is generally invoked when Leibniz is discussing the Cartesian claim that body is corporeal substance. But this is not to say that it is completely absent. And its appearance in the five-fold scheme from Letter 50 is one of the passages that is most often cited in secondary literature discussions of the notion.

Let us start with the five-fold scheme, which it is worth quoting again in full along with the earlier part of the paragraph in which it appears:

If you take a mass to be an aggregate containing many substances, you can, nonetheless, conceive of one substance that is preeminent in it, if indeed that mass constitutes an organic body animated by its primary entelechy. For the rest, in the monad, i.e., the complete simple substance, I do not unite anything with the entelechy except a primitive passive force, which is related to the whole mass of the organic body. Indeed, the remaining subordinate monads placed in the organs do not make up a part of the organic body, although they are immediately required for it, and they

come together with the primary monad for the organic corporeal substance, i.e., the animal or plant. I therefore distinguish: (1) the primitive entelechy, i.e., the soul; (2) matter, namely, primary matter, i.e., primitive passive power; (3) the monad completed by these two things; (4) the mass, i.e., the secondary matter, i.e., the organic machine, for which innumerable subordinate monads come together; and (5) the animal, i.e., the corporeal substance, which the monad dominating in the machine makes one.

It is uncontroversial here that a corporeal substance is an animate machine. Furthermore, the beginning of the paragraph suggests that the corporeal substance referred to in the third sentence is a special kind of body – an organic body – one of whose aggregata is a “preeminent” or “primary” monad. And, although the notion of preeminence is not explained, (5) in the five-fold scheme seems to imply that it is primary in virtue of standing in a relation of “dominance” over innumerable others, which are said in turn, in (4), to be “subordinate”. This reading is further supported by the version of this paragraph from the earlier draft (Letter 50, note L7), which – though somewhat hard to interpret in places – contains a commitment to the view that corporeal substances are constituted from a primary monad and subordinate ones. The suggestion that corporeal substances are merely special aggregates receives further support from the next paragraph which includes the claim that “simple things alone are true things, the rest are only beings through aggregation.” For it is hard to take the simple things to be anything other than the monads that come together as bodies.

But if this is the correct reading it is clearly in tension with things that Leibniz says elsewhere. Perhaps most significantly, in Letter 53, Leibniz responds to De Volder by insisting that “aggregates must be excluded before everything else” when one is concerned with “what we understand by the word substance.” Here it seems that Leibniz regards the

categories of substance and aggregate are mutually exclusive. But if we look earlier in Letter 53, we see that the substance-aggregate bifurcation occurs in a context where Leibniz is discussing “what are truly called substances (i.e., the monads, i.e., the perfect substantial unities from which everything else necessarily results)”. This agrees well with what we find in Letter 55, where it is said that monads are “truly one” in the sense that they “cannot be divided into many” and soon after that those things which can be divided into many are aggregates.⁸⁸

Possibly then, corporeal substances are substances in something other than the true sense, in virtue of the fact that they are divisible into the many monads from which they are constituted. But, if this is the case, we are left wondering what it is that should lead us to think of them as substantial. Letter 50 contains a suggestive passage in this regard, “both the soul and the machine animated by it, and the animal itself, are as indestructible as the universe itself. Because of this, such a machine cannot be put together by some mechanism any more than it can be destroyed.” Setting aside the details of why this is the case, here Leibniz reveals that the aggregate of soul and the other monads that constitute the organic machine are indestructible. Leibniz makes it clear later in the same letter that domination and subordination are not thought of as relations that hold essentially between a given monad and any other over time. However, he does think that no monad is ever without an organic body. Thus, there is a sense in which the dominant monad forms a unity with others over time. Furthermore, this unity is grounded in a domination relation that, at any given time, leads the aggregate of dominant and subordinate monads to act as one. To see this, we need only remember that the subordinate monads are those that are aggregated together to form an organic machine. Whilst this notion goes unexplained in the correspondence, it is clear that Leibniz regards such aggregates as bodies that do the bidding of particular monads, like the bodies that we identify as our own and which we take to be broadly speaking under our

control. Given Leibniz's denial that there is genuine interaction between substances, the notion of control here is somewhat metaphorical. But the monads behave in such a way that they satisfy the conditions for aggregation into a body that appears to be so controlled.

If corporeal substances are construed in this way, there is another sense in which they are more like substances than other aggregates. Consider a flock of sheep. While the notion of a flock may be understood in various different ways, typically what make a plurality of sheep a flock are the relations that they stand in to something that is not itself included in the flock – perhaps the field in which they are all located, or the farmer who bought them all. In contrast, a corporeal substance is aggregated on the basis of relations that hold between subordinate monads and the dominant monad all of which are the aggregata. Thus, there is a principle of unity that is internal to the substance itself, even if the unity is not a simple one. As Look and Rutherford point out, it is far from clear that this conception of corporeal substance is one that Leibniz found wholly satisfactory at all points in his philosophical life. However, it seems to me the most plausible way to understand the view that he presents to De Volder. Corporeal substances are aggregates, but ones that possess a kind of intrinsic unity that warrants the title substance in a loose and popular sense.

It is natural at this point to wonder how this conception of corporeal substance might fit in with the account of monadic embodiment that I developed earlier in sketching Leibniz's views on monadic aggregation. Here it is important to note that embodied monads are not to be identified with corporeal substances. They are the preconceptual appearances that ground all aggregation of monads. But they are clearly intimately connected. Indeed, it seems that every embodied monad is both the appearance of the dominant monad of some corporeal substance and the appearance of all the subordinate monads. Whilst much more would be needed to flesh out these connections, I do not see any reason to think that there is a

contradiction here, provided we allow the equivocation with regard to Leibniz's use of the expression organic machine on which my account of bodily aggregation drew.