

Leibniz's Ontology of Force

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INTRODUCTION

It is remarkably difficult to describe any aspect of Gottfried Leibniz's metaphysical system in a way that is completely uncontroversial. Interpreters disagree widely, even about the most basic Leibnizian doctrines. One reason for these disagreements is the fact that Leibniz characterizes central elements of his system in multiple different ways, often without telling us how to reconcile these different accounts. Leibniz's descriptions of the most fundamental entities in his ontology are a case in point, and they will be the focus of this paper. Even if we look only at texts from the monadological or mature period—that is, the period starting in the mid-1690s—we find Leibniz portraying the inhabitants of the metaphysical ground floor in at least three different ways. In some places, he describes them as mind-like, immaterial substances that perceive and strive, or possess perceptions and appetitions—analogueous in many ways to Cartesian souls. Elsewhere, he presents them as hylomorphic compounds, each consisting of primary matter and a substantial form. In yet other passages, he characterizes them in terms of primitive and derivative forces.

Are these three accounts merely different ways of describing the same underlying reality? Since Leibniz sometimes uses all three descriptions in the same text,¹ he appears to have thought so. But it is not obvious how exactly this is supposed to work. There is no consensus on how to reconcile Leibniz's different descriptions of the most fundamental entities in his system. Perhaps the most straightforward suggestion is that the first description is the most accurate: simple substances or monads are mind-like, immaterial

¹ See e.g. 'New System of Nature,' G 4:478f./AG 139; ONI 12; letter to Bierling, August 12, 1711, G 7:502.

substances that possess appetitions and perceptions. On that interpretation, Leibniz's ontology is best understood as a quasi-Cartesian substance-mode ontology. Leibniz departs from Cartesianism mainly in claiming that all substances are mind-like and that being mind-like does not require consciousness. If this interpretation is correct, Leibniz's description of monads in terms of primitive and derivative forces can be explained by pointing out that monads possess forces or active powers. In fact, Leibniz appears to hold that possessing active powers is a necessary condition for substancehood.² The centrality of powers in his theory of substance might explain why he sometimes describes monads just in terms of powers, without mentioning that these powers are properties of mind-like substances. Moreover, we might be able to explain Leibniz's use of hylomorphic terminology by pointing to the way in which what he calls the 'law of the series' of a substance mirrors some of the most central functions of substantial forms. Among other things, this law unifies the substance synchronically and diachronically, in addition to specifying the properties and activities that are characteristic of that substance.

This paper aims to throw a wrench into the interpretation just sketched. That wrench is a thorough and systematic examination of the ontology of Leibnizian forces as well as their relationship to monads. I will provide evidence that Leibniz's monadological metaphysics is even more radical than it initially seems: his ontology is best understood not as a substance-mode ontology but as a force ontology.³ At the metaphysical ground floor, we do not find substances that possess force; instead, we just find forces. Indeed, each unified force constitutes what Leibniz calls a 'monad' or 'substance.' This, at the very least, is a strand in Leibniz's mature philosophy—and, I will argue, a prominent strand. In fact, central Leibnizian commitments push him toward a force ontology.

Interpreting Leibniz as a force ontologist also opens the door for a new reconciliation of his three descriptions of the fundamental entities. This new reconciliation is at least as plausible as the reconciliation I briefly outlined earlier. Instead of understanding the three accounts as different ways of describing what are fundamentally substances and their states, my interpretation understands them as different ways of describing the forces that occupy

² See e.g. letter to de Volder, April 3, 1699, LDV 73; ONI 15.

³ Maybe we could even call it 'process ontology,' as Nicholas Rescher does (2007). Yet, I prefer calling it 'force ontology' because Leibniz describes his ontology in terms of forces or powers, instead of processes. In fact, insofar as processes are temporally extended, Leibniz would presumably view processes as grounded in forces and thus less fundamental than forces.

the bottom level of Leibniz's system. In fact, we will see that it makes good sense for Leibniz to describe the fundamental forces in these different ways—not just pragmatically, or to make his ontology seem less radical to his readers, but also philosophically. When he describes the fundamental entities as akin to Cartesian souls or hylomorphic compounds, he is not misdescribing them; rather, he is bringing out crucial features of his force ontology. I will show that for Leibniz, force plays the role of matter and form as well as the role of substances and their states.

The interpretation of Leibniz's mature ontology that I will put forward is quite different from some of the interpretations that are currently most influential in the English-speaking world. For instance, it directly contradicts Daniel Garber's account of how forces figure into Leibniz's monadological metaphysics. This becomes clear in the following passage from Garber's monograph *Leibniz: Body, Substance, Monad*:

the primitive active and passive forces, the form and matter that in the earlier view have a fundamental metaphysical status, are, in the monadological view, understood as features of the perceptions of these monads. ... In this way the notion of force, which seemed to be at the root of Leibniz's metaphysics in the earlier texts ... loses its foundational status: primitive force gets folded into the perceptual life of non-extended perceiving things. (2009: 319)

According to Garber, forces are not fundamental entities in Leibniz's mature ontology; he interprets Leibniz as a straightforward substance-mode ontologist. Several other interpreters appear to agree.⁴ In contrast, some Leibniz scholars take the hylomorphic description to be most accurate.⁵

There are other interpreters who acknowledge that Leibniz's ontology bottoms out in forces; I am not the first person to suggest this. A particularly explicit endorsement of this type of interpretation can be found in Martha Bolton and John Whipple (Bolton 2008: 119f.; Whipple 2010: 393).⁶ Moreover, Robert Adams claims in at least one place that primitive

⁴ See for instance Bertrand Russell, who argues that we must understand Leibnizian substances as the subjects of predicates, or as the substrata in which predicates inhere (1937: 49f.). Similarly, Bobro and Clatterbaugh appear to view primitive force as a property or attribute of monads (1996: 417); see also Hart (1982: 77).

⁵ See e.g. Smith 2002. Interestingly, McDonough proposes a reading on which Leibniz's ontology is a conciliation between Aristotelian hylomorphism and Platonic substance ontology (2013).

⁶ It also appears to be (close to) Rutherford's view (1995: 149ff.) as well as Cover and O'Leary-Hawthorne's (1999: 224), though these three authors are less explicit about it.

forces are the most fundamental items in Leibniz's ontology (1994: 265). Yet, these other scholars who attribute a force ontology to Leibniz mention it only in passing. None of them, as far as I am aware, explore in detail what precisely the fundamentality of forces means for Leibniz's metaphysics or how it fits together with Leibniz's other claims about monads. These are the tasks that I aim to tackle in this paper. My discussion will show that interpreting Leibniz as a force ontologist has far-reaching consequences: it requires us to reevaluate many other aspects of his monadology. For instance, it forces us to reconsider the status of perceptions and appetitions as well as the status of time.

The claim that forces are the sole occupants of the metaphysical ground floor of Leibniz's mature system may strike some readers as a non-starter. Antecedently, one might expect Leibniz to view forces as the *properties* of substances rather than what constitutes substances. In fact, it may seem that Leibniz needs a substratum of some kind—either a bare substratum or something more robust—in order to maintain the unity of substances. Without a substratum, the worry goes, monads would be like heaps or loose bundles of forces—an unacceptable consequence for Leibniz, who is particularly adamant that substancehood requires a robust type of unity. Yet, I will argue that Leibniz does not hold that substances derive their unity from a substratum that is not force-like. Instead, they derive their unity from a primitive—that is, fundamental or foundational—force.

FORCE AND POWER

Without further ado, let us explore Leibniz's discussions of the nature and ontological status of forces. Or, rather, with one further ado: it will help to start with a brief overview of the terminology that Leibniz uses to describe forces. This important task is difficult because—like so often—Leibniz uses many different terms without always making clear whether they are synonymous. He appears to use some of them synonymously in certain places but not in others. And, to make matters even more complicated, Leibniz acknowledges different types of forces. We will need to sort out some of those terminological and classificatory issues before looking more directly into the ontology of Leibnizian forces. In fact, this brings me to an important caveat: forces also play an important role in Leibniz's physics but I will bracket those types of forces as far as possible. Instead, I will concentrate on the status of forces at the most fundamental metaphysical level.

Among the terms that Leibniz uses most frequently to refer to forces are the French and Latin counterparts of ‘force’ [French: *force*; Latin: *vis*, sometimes *virtus*] and ‘power’ [French: *puissance* or *pouvoir*; Latin: *potentia*], which he often appears to use interchangeably.⁷ Yet, he also employs a number of other terms. Sometimes he refers to forces as ‘entelechies’ or ‘faculties,’ which we will discuss in more detail soon. In a few other passages, he uses the French and Latin cognates of the English word ‘disposition.’ For example, he says in one of the appendices to the *Theodicy* that any action of a soul must come from a disposition for acting [*disposition d’agir*] (COE 20).⁸ In other texts, Leibniz appears to equate dispositions with inclinations. For example, he says in one text that “we always follow the side where there is the greatest inclination or disposition [*le plus d’inclination ou de disposition*]” (‘Conversation about Freedom and Fate,’ Gr 479/SLT 96).⁹ Elsewhere, he seems to identify ‘inclination’ with ‘tendency’ [French: *tendance*; Latin: *tendentia*] and ‘force’.¹⁰ Finally, he sometimes uses the terms ‘habit’ [French: *habitude*], ‘effort’ [French: *effort*], and ‘striving’ [*conatus*].¹¹ There are strong reasons for thinking that Leibniz sometimes uses these terms interchangeably, though he does not always do so. In fact, we will soon see that he appears to refer to primitive forces almost exclusively with the terms ‘entelechy,’ ‘force,’ or ‘power,’ while reserving the other terms for derivative forces.¹²

⁷ In several passages, Leibniz refers to what he usually calls ‘primitive force’ and ‘derivative force’ as ‘primitive power’ and ‘derivative power.’ See especially a letter to de Volder, June 20, 1703, LDV 261f., where he speaks both of primitive or derivative force [*vis*] and of primitive or derivative power [*potentia*]. For a French text that refers to primitive power [*puissance*], see a letter to Jaquelot, March 22, 1703, G 3:458/WF 201. Earlier in the same letter, he uses the term ‘primitive force’ [*force*] (G 3:457/WF 201). For the equivalence between the French terms *vis*, *virtus*, and the French word *force*, see G 4:469/L 433.

⁸ Leibniz says something very similar in NE 110: “There is always a particular disposition to action [*une disposition particuliere à l’action*].” For Latin passages that use the term *dispositio*, see e.g. the short text ‘Mentes ipsae per se dissimiles sunt inter se’ (1689/90?), A 6.4.1639; ‘Table of Definitions,’ C 474; 499. For an additional French example, see LC 5.15.

⁹ Other examples include COE 23; M 36; letter to Nicaise, 1697, G 2:577/W 564.

¹⁰ Note, however, that Leibniz sometimes uses ‘disposition’ and ‘tendency’ slightly differently. See for instance NE 110: “There is always a particular disposition to action [*une disposition particuliere à l’action*]. ... And as well as the disposition there is a tendency towards action [*une tendance à l’action*]—indeed there is an infinity of them in any subject at any given time, and these tendencies are never without some effect” (translation slightly altered). Here, Leibniz appears to reserve the term ‘disposition’ for the overall, all-things-considered tendency of a substance, and the term ‘tendency’ for the individual inclinations of that substance. Yet, he sometimes appears to equate these two terms; see e.g. NE 51. There are also passages in which he uses ‘tendency’ and ‘inclination’ synonymously; see e.g. NE 351.

¹¹ For a usage of ‘habit,’ see NE 86; for ‘effort,’ see NE 169. Passages in which he uses *conatus* include T 87 and Leibniz’s notes on Aloys Temmik’s *Philosophia vera* [after 1706], in Mugnai 1992: 157.

¹² Even ‘force’ and ‘power’ are not always used synonymously; see NE 169.

To understand the terminology better, it helps to look at Leibniz's classification of forces. Luckily, that also happens to be a good starting point for an exploration of their nature and ontological status. One of the most useful passages stems from the *New Essays*. Because I will be referring back to this passage several times, let us give it a name: 'the classification passage.' Even though Leibniz does not always stick to the terminology he introduces in the classification passage, the typology of powers he provides there appears to be implicit in many other central texts. The passage starts with a general definition of 'power,' followed by the first in a series of distinctions:

If 'power' [*puissance*] corresponds to the Latin *potentia*, it is contrasted with 'act,' and the transition from power into act is 'change.' ... Power in general, then, can be described as the possibility of change. But since change—or the actualization of that possibility—is action in one subject and passion in another, there will be two powers, one active and one passive. The active power can be called 'faculty' [*faculté*], and perhaps the passive one might be called 'capacity' or 'receptivity' [*capacité ou réceptivité*]. (NE 169)

Leibniz tells us here that in the most general sense, something possesses a power just in case it is possible for the thing to change in certain ways. Moreover, powers can be either active or passive because change requires an agent and a patient.¹³ For example, a mosquito has the active power of biting while human beings have the passive power of being bitten. Leibniz proposes to call active powers 'faculties' and passive powers 'capacities.'

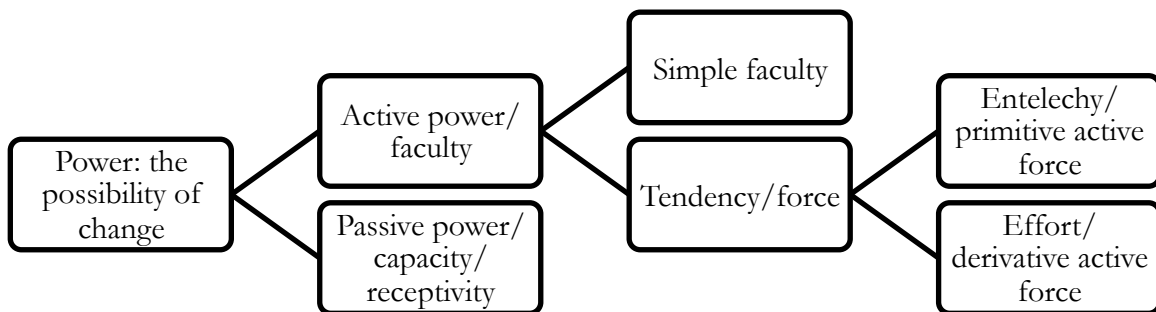
Thus far, what Leibniz says about powers should be acceptable to mainstream Scholastic philosophers and, in fact, to many mechanists.¹⁴ Yet, the classification passage continues as follows:

It is true that active power is sometimes understood in a fuller sense, in which it comprises not just a simple faculty [*simple faculté*] but also a *tendency* [*tendance*]; and that is how I take it in my theorizing about *dynamics*. One could reserve the word 'force' [*Force*] for that. And force is either 'entelechy' or 'effort' [*Entelechie ou Effort*], for although Aristotle takes 'entelechy' so generally that it comprises all action and all effort, it seems to me more suitable to apply it to *primitive acting forces* [*Forces agissantes primitives*], and 'effort' to *derivative* ones. (NE 169; translation altered)

¹³ This is a common assumption in Scholastic philosophy; see Des Chene 1996: 46ff.

¹⁴ In particular, this is very similar to John Locke's description of powers (*Essay*, II.xxi.2), with which Leibniz is engaging in the *New Essays*.

In this portion of the passage, things get quite a bit more complicated and controversial. Leibniz is introducing a distinction between a simple faculty and something stronger or fuller, which he proposes to call ‘force’ or ‘tendency.’ And even though Leibniz does not say it here, it becomes clear in other texts that the latter is the kind of power in which he is most interested. In fact, as we will see later, he says in a few passages that simple faculties are not genuine powers at all. Force, in turn, can be either primitive or derivative, according to the passage; he calls primitive acting forces ‘entelechy’ and derivative acting forces ‘effort.’ The diagram below captures the distinctions that Leibniz draws in the classification passage. In the remainder of the paper, I will work my way through this typology of powers from left to right, exploring the types of powers distinguished by Leibniz as well as their ontological status.



PASSIVE POWER

Let us start with passive power and its relation to active power. First, we should note something that goes beyond the classification passage: Leibniz distinguishes between primitive and derivative passive powers, just as he distinguishes between primitive and derivative active powers. This becomes clear, for instance, in ‘Specimen of Dynamics’: “passive force is ... twofold, either primitive or derivative” (GM 6:236/AG 119). The text then goes on to equate the distinction between these two types of passive power with the Scholastic distinction between primary (or prime) matter and secondary matter: “the primitive force of being acted upon or of resisting constitutes that which is called primary matter in the schools, if correctly interpreted. ... As a result, the derivative force of being acted upon later shows itself to different degrees in secondary matter” (GM 6:236f./AG 119f.; emphasis removed).

We will examine primitive passive powers first and then turn to derivative passive powers. This examination is crucial for the purposes of this paper, for two related reasons: (i) it is the first piece of evidence that Leibniz endorses a force ontology, and (ii) it reveals some important reasons for Leibniz's repeated use of hylomorphic terminology. What, then, is primitive passive power? The fact that Leibniz identifies it with Scholastic primary matter in 'Specimen of Dynamics' is helpful. In the tradition to which Leibniz appears to be referring, primary matter is that which, when combined with a substantial form, composes a substance. Thus, Leibniz is borrowing hylomorphic terminology here. Of course, we must not assume that he is straightforwardly endorsing hylomorphism in this passage. Instead, he might merely be drawing an analogy between his conception of primitive passive power and the Scholastic conception of primary matter. The fact that he equates passive power with primary matter "if correctly interpreted" already suggests that he may not embrace the traditional understanding of primary matter wholesale.

Several passages reveal that Leibniz's primitive passive power is analogous to some Scholastic conceptions of primary matter in at least two crucial ways: (i) it is the passive constituent of substances, and (ii) it does not possess any actuality independently of the active constituent of substances.¹⁵ In some texts, Leibniz adds a third characteristic that primitive passive power shares with Scholastic primary matter: (iii) it is that which makes the substance a material thing with physical properties, such as impenetrability and resistance.¹⁶ We will see later that once we dig deeper into (ii), the similarity is not extremely profound. Leibniz understands primitive passive power as lacking actuality in a more radical sense than his Scholastic predecessors. The same applies to (i) and (iii): Leibniz's understanding of the passive constituent of substances and the status of material things departs in fundamental ways from traditional versions of hylomorphism. Nevertheless, these analogies can help explain why Leibniz so often describes his ontology in hylomorphic terminology; they do point to genuine (albeit imperfect) similarities.

¹⁵ The second point is not true on all Scholastic theories of primary matter, but it is true on some. See Antognazza 2014: 171ff.

¹⁶ This third point is an analogy with only some hylomorphic theories. While some hylomorphists hold that only material substances possess primary matter, others hold that even immaterial substances possess primary matter. For a helpful discussion, see Spade (2008).

To see that Leibniz views primitive passive power as the passive constituent of substances and as that which gives the substance physical properties, the following letter to Isaac Jaquelot is helpful:

In all corporeal substances I recognize two primitive powers, namely entelechy or primitive active power, which is the soul in animals and mind in man, and which in general is the substantial form of the ancients; and also prime matter, or primitive passive power, which produces resistance. So properly speaking it is the entelechy which acts, and matter which is acted on [*patit*]; but one without the other is not a complete substance. (March 22, 1703, G 3:458/WF 201, translation altered)¹⁷

Leibniz says here that primitive passive power and primitive active power together constitute a complete substance. Primitive passive power alone is not a substance. Moreover, their relationship is that of patient and agent. Finally, primitive passive power brings about resistance in the corporeal substance. The connection between primitive power and physical properties, like resistance, is interesting and important, but I cannot say much more about it in this paper.¹⁸ The same is true for the relation between primary matter and secondary matter. All we need to know for my purposes here is that (a) Leibniz associates passivity in monads with the possession of a body, or with matter¹⁹ and (b) he wants to either ground the properties of bodies in forces at the metaphysical level or even equate them.²⁰ My focus will be on that fundamental metaphysical level, which we can explore for the most part without taking a stance on the status of bodies, secondary matter, physical forces, and what

¹⁷ Similar passages occur in ‘On Body and Force,’ G 4:395/AG 252; ONI 11; a letter to Des Bosses, March 11, 1706, LDB 35; and a letter to de Volder, June 20, 1703, LDV 261 and 265. For the connection between primitive passive force and resistance, see Leibniz’s earlier remarks in that letter to de Volder: “you ask for a necessary connection between matter (i.e., resistance) and active force. ... [T]he cause of the connection is the fact that every substance is active and every finite substance is passive, and passivity is connected to resistance” (LDV 257).

¹⁸ For a helpful recent discussion of this issue, see McDonough 2016.

¹⁹ See e.g. a letter to Rudolph Christian Wagner: “God alone is a substance truly separated from matter, since he is *actus purus*, endowed with no passive power, which, wherever it is, constitutes matter” (June 4, 1710, G 7:530/W 506).

²⁰ One helpful passage is from the draft of a letter to de Volder: “the primitive or derivative force that is conceived of in extension and bulk is not a thing outside perceivers but a phenomenon. ... That which results from the passions of the perceivers ... gives rise to the apparition of bulk, i.e., of the passive force of bodies. ... [Y]ou will easily see from this that material substances are not destroyed but conserved, provided that they are sought in dynamism, ... i.e., in the active and passive force of perceivers, not outside of them” (January 1706, LDV 337f.). See also an earlier letter to de Volder: “matter is real to the extent that there is a reason in the simple substance for the passivity that is observed in the phenomena” (January 1705, LDV 321).

Leibniz sometimes calls ‘corporeal substances.’²¹ Fully examining the relation between the metaphysical and the physical level would take us too far afield.

Before examining the ontological status of primitive passive power and its relation to active power in more depth, it is worth pausing to note an implication of what we have seen so far. By identifying primary matter with primitive passive power and substantial forms with primitive active power, Leibniz appears to be endorsing an ontology in which forces or powers are the most fundamental entities. Substances consist of passive and active powers, and nothing else. This is the first indication that Leibniz’s ontology is a force ontology: at the metaphysical ground floor, we find only forces. In many ways, this is a radical move. Yet, it can be seen as a natural extension of traditional versions of hylomorphism. After all, some Scholastics describe primary matter as pure potentiality—that is, as passive power.²² Moreover, we will see later that it makes at least some sense to understand Scholastic substantial forms as active powers for particular kinds of activities. In this respect, Leibniz’s ontology is simply hylomorphism with a twist—though the twist arguably takes Leibniz outside of the realm of hylomorphism.

Despite the similarities between primitive passive power and Scholastic primary matter that we noted earlier, there is one way in which they appear to be quite different. It seems that Leibniz, unlike many Scholastics, does not view primitive passive power as the ultimate substratum of change or the fundamental subject of inherence.²³ Instead, it appears to be a mere privation or limitation of primitive active force.²⁴ Let us call this ‘the limitation reading.’ If the limitation reading is correct, Leibniz is departing quite radically from hylomorphism: substances ultimately possess not two constituents, but only one. This means that his mature ontology is not genuinely hylomorphic.

²¹ In fact, even commentators who resist idealist readings of the mature Leibniz can agree with (a) and (b); see e.g. Phemister 2005: 243.

²² Perhaps most famously, Aquinas understands matter as pure potentiality (e.g. *Summa Theologiae* I, qu. 115, art. 1, ad 2).

²³ This is what the balance of textual evidence suggests. Admittedly, in at least one text, Leibniz describes primary matter as a substratum. There, he talks of “primary matter or primary passive power, primary substratum, that is, primitive passive power or the principle of resistance” (letter to Des Bosses, March 11, 1706, LDB 35). Interestingly, Leibniz is here using the Greek terms for ‘primary passive power’ and ‘primary substratum.’

²⁴ Maria Rosa Antognazza convincingly argues for this (2014), as does Shane Duarte (2015). See also Cover and O’Leary-Hawthorne 1999: 226, who appear to agree with Antognazza and Duarte.

First, there are passages that describe finite substances as consisting of an original perfection and an original imperfection, or of positive attributes and limitations. For instance, Leibniz writes to Andreas Morell that God is the primitive unity and that other spirits express God’s attributes to different degrees. In fact, he goes on, creatures are “varied according to the different combinations of unity and zero [*l’unity avec le zero*]; or rather of the positive with the privative, for the privative is nothing other than limits” (May 14, 1698, A 1.15.560/SLT 39). This very Platonic-sounding text suggests that what Leibniz elsewhere calls ‘primitive passive force’ is merely a privation or limitation of further perfections.²⁵ Leibniz confirms this elsewhere by closely associating activity with perfection and passivity with imperfection: he writes to Johann Bernoulli that “God is pure act [*purus actus*], since he is most perfect. But imperfect things are passive” (December 17, 1698, A 3.7.966/AG 170). On what I take to be the most straightforward reading of this letter, Leibniz is claiming that if something is perfect, it lacks passivity, and if something is not perfect, it possesses passivity. In other words, imperfection is a necessary and sufficient condition for passivity. Combined with the evidence from the letter to Morell, this indicates that passivity just is imperfection or limitation.

There are also passages that provide more overt support for the limitation reading by directly associating primary matter with limitations or privations. One of these passages is from Leibniz’s notes on William Twisse, which he appears to have composed in 1695. There, when discussing the way in which created things are represented in the divine intellect, Leibniz says:

He who knows all positive things also knows perfectly all relations and indeed all limitations. In fact, God’s knowledge of created things consists in this. ... Positioning [*positio*] or actuality [*actus*], and restriction or privation, are in things as metaphysical form and metaphysical matter.²⁶ And thus, the matter of things is nothing, it is

²⁵ Similarly, Leibniz says in an appendix to the *Theodicy*: “every purely positive or absolute reality is a perfection, and ... every imperfection comes from limitation, that is, from the privative. ... Now God is the cause of all perfections, and consequently of all realities, when they are regarded as purely positive. But limitations or privation result from the original imperfections of creatures” (G 6:383/H 384).

²⁶ With the term ‘metaphysical matter,’ Leibniz appears to be referring to primary matter, that is, matter as a metaphysical constituent of substances, as opposed to physical (or secondary) matter. A text from the mid-1680s confirms this: “Substances have metaphysical matter or passive power to the extent that they express something confusedly” (A 6.4.1504/L 365).

limitation; form is perfection. Indeed, any perfection that can constitute something complete, together with the exclusion of further perfection, is a creature. (Gr 355f.)

This passage is quite clear: a creature consists simply of a limited amount of perfection, that is, of a limited amount of activity or active power. Primary matter is not a genuine, additional constituent of substances; it is a mere nothing or limitation.²⁷

A final text in which Leibniz describes created things as consisting of active force and limitations of active force—that is, of limited active force and nothing else—is a letter to Johann Christian Schulenburg:

boundaries or limits are of the essence of creatures, but limits are something privative and consist in the denial of further progress. At the same time it must be acknowledged that a creature ... also contains something positive or something beyond boundaries. ... And this value, since it must consist of a positive, is a certain degree of created perfection, to which the power of action also belongs, which in my view constitutes the nature of substance. So much so that this value bestowed by God is in fact the energy or power [*vigor, seu vis*] imparted to things. ... And this is the origin of things from God and nothing, positive and privative, perfection and imperfection, value and limits, active and passive, form (i.e., entelechy, endeavor, energy) and matter or mass. (March 29, 1698, A 2.3.426f./SLT 38f.)

We could hardly have asked for more direct evidence in favor of the limitation reading. Leibniz states plainly that matter and passivity are mere privations, imperfections, or limitations; they are nothings. What is real in a creature is activity or the power of action; this positive constituent is limited, which means that there is passivity, but this passivity is merely “the denial of further progress.”

Next, let us briefly turn to derivative passive powers. As we saw earlier, Leibniz associates them with secondary matter—that is, with mass or, according to one text, “matter as it actually occurs, invested with its derivative qualities” (NE 222).²⁸ This type of matter plays a central part in Leibniz’s physics because it is the subject of motive forces and

²⁷ Further support for the limitation reading comes from a letter to Des Bosses: “God ... cannot deprive [a substance] of primary matter, for from this he would produce pure act such as he himself alone is” (October 16, 1706, LDB 79).

²⁸ Sometimes, Leibniz describes secondary matter as “the organic machine, for which innumerable subordinate monads come together” (letter to de Volder, June 20, 1703, LDV 265; similarly in a letter to Bernoulli, September 1, 1698, LDV 9). He also describes it as “the mass which makes up our body” (“Supplement to the Explanation of the New System,” G 4:572f./WF 138).

motions (letter to de Volder, April 2, 1699, LDV 77). As mentioned earlier, I will not be able to discuss physical forces in detail. Yet, there are reasons to interpret Leibniz as positing derivative passive powers at the metaphysical level of description as well. To see why, note that Leibnizian primitive forces are unchanging, though they have modifications that constantly change.²⁹ I will argue later that these changing modifications just are derivative forces. If that is correct, it is plausible that there are changing modifications of primitive passive force at the metaphysical level. In accordance with the limitation reading, these changing modifications are the specific limitations or imperfections that are exhibited by monads at particular times. For instance, suppose that at time t_1 , you are ten miles away from your house and thus perceive it very confusedly. At a later time t_2 , you are standing right in front of your house, perceiving it much less confusedly. I propose that this change in the confusion of your perceptions between t_1 and t_2 is best understood as a change in your derivative passive power. It is not, after all, a change in your original limitation, or in your primitive passive power. The primitive power always remains constant, though it grounds the changing modifications, or the derivative powers. More specifically, your primitive passive power, or original imperfection, grounds the confusion or imperfection in your perceptions at particular times.³⁰

ACTIVE POWER

Even though there is more to say about passive powers, what I have said so far is enough for present purposes. Let us now go where the real action is: active powers. The classification passage distinguishes between two types of active power: simple faculties and forces. In that passage, Leibniz does not explain the difference between these two types; he merely says that forces are powers in a fuller sense than simple faculties. Luckily, he elaborates on this in other places. And the distinction turns out to be extremely important because it marks a difference between Leibnizian powers and Scholastic powers.

²⁹ See e.g. a letter to Masham, June 30, 1704, G 3:356/WF 214; letter to de Volder, June 30, 1704, LDV 307. I will return to this topic below when discussing derivative active forces.

³⁰ See Rutherford, who argues that Leibniz identifies primary matter, or primitive passive power, “with a monad’s propensity for confused perceptions, or its representation of material things” (2009: 36). That fits well with my interpretation.

One helpful passage about the distinction between simple faculties and forces occurs in the *Theodicy*: “the notion ‘entelechy’ is not altogether to be scorned, and ... it carries with it not only a simple active faculty [*une simple faculté active*], but also that which one can call ‘force,’ ‘effort,’ or ‘conatus,’ from which the action itself must follow if nothing prevents it” (T 87; translation altered). In a very similar vein, immediately after saying that we need to ascribe force to material things, Leibniz writes in a 1694 draft of his essay ‘New System’:

By ‘force’ or ‘power’ [*la Force ou Puissance*] I do not mean the ability or the simple faculty [*simple faculté*] that is only a bare possibility for action and that, being itself dead as it were, never produces an action without being excited from outside. Rather, I mean something midway between ability and action [*un milieu entre le pouvoir et l’action*], something which involves an effort, an act, an entelechy—for force passes into action by itself so long as nothing prevents it. (G 4:472/WF 22; translation altered)

In other words, the difference between simple faculties and forces proper is that the former require an external stimulus in order to manifest, while the latter manifest without a stimulus. Forces in the fuller sense manifest whenever they are not masked, or prevented from manifesting.

In a Latin text probably written in the same year—that is, 1694—Leibniz reiterates the distinction between bare possibilities and active forces: bare possibilities need to be stimulated from the outside, while active forces lead to an action without external stimulation, requiring merely the removal of an impediment. As a matter of fact, Leibniz associates the former with Scholastic philosophy: “Active force [*vis activa*] differs from the bare power [*potentia nuda*] familiar to the Schools, for the active power or faculty [*potentia activa ... seu facultas*] of the Scholastics is nothing but a near possibility of acting [*propinqua agendi possibilitas*], which needs an external excitation or stimulus, as it were, to be transferred into action” (‘On the Improvement of First Philosophy,’ G 4:469/L 433; translation altered). He associates the simple faculties or bare possibilities with Scholastic philosophy in a few other texts as well, and he contrasts that understanding with his own account, according to which no external stimulus is needed.³¹

³¹ See e.g. ‘On Body and Force’ [1702], G 4:395/AG 252; ‘Reflections on the Advancement of True Metaphysics’ [1694], UL 6:526/WF 32f.; ‘Reply to Objections’ [1694], UL 6:530/WF 35.

What Leibniz probably has in mind when discussing simple faculties is the Scholastic doctrine that in order for something with an active power to start acting, it must be moved or acted upon by something that is already in act.³² Thomas Aquinas endorses this principle explicitly in several places. In one passage, he says that “everything that is at one time an agent actually, and at another time an agent in potentiality, needs to be moved by a mover.”³³ Leibniz appears to be rejecting that understanding of powers. As he says in the *New Essays*, “[t]rue powers are never simple possibilities; there is always some tendency and action” (NE 112).³⁴ This means that the third level of my diagram represents not the distinction between two different *kinds* of active power but rather the distinction between two different *accounts* of active power. Leibniz ultimately embraces only one of these accounts; he denies that a simple faculty is a genuine kind of power.

Why would Leibniz think that genuine powers must be something stronger than simple faculties? One reason might be that for him, substances do not interact. When a substance actualizes a power, nothing outside of the substance can be required as a stimulus.³⁵ But why could not something inside of that same substance serve as the stimulus? After all, that is how medieval philosophers typically understand immanent causation in the human mind: one faculty acts on another, moving the other from potency to act. Leibniz does not say explicitly, in any text that I have encountered, why he rejects that picture. One possible explanation is his skepticism about treating mental faculties like separate entities that can act on one another. As he puts it in one place, “Faculties [of the soul] ... do not act; rather, substances act through faculties” (NE 174).³⁶ If talking about a faculty’s action is merely

³² Leibniz appears to be partially wrong about Scholastic powers. Medieval Aristotelians typically acknowledge some types of powers that do not need stimuli; these powers manifest whenever they are in suitable conditions. These include an acorn’s power to grow into an oak tree, for instance. However, Leibniz was also partially correct: the most perfect kinds of powers, such as the powers of rational souls, do indeed need stimuli, according to many medieval Aristotelian views. (I thank Stephan Schmid for pointing this out.) For references to texts by Thomas Aquinas in which he endorses that doctrine about the powers of rational souls, see footnote 33.

³³ See e.g. *Summa Theologiae* I-II qu. 9 art. 4, corp.; art. 1, corp.; *In Physic.*, lib. 8 l. 10 n. 4; *In Physic.*, lib. 2 l. 10 n. 15; *De Principiis Naturae*, ch. 3.

³⁴ See also NE 110: “faculties without some act—in short, the pure powers [*pures puissances*] of the Schoolmen—are also mere fictions, unknown to nature and obtainable only by abstraction. For where will one ever find in the world a faculty consisting in sheer power [*seule puissance*] without performing any act?”

³⁵ God’s concurrence is of course required, but presumably that should not be considered a stimulus.

³⁶ In fact, there are good reasons to interpret Leibniz as holding that strictly speaking, only substances can act. For instance, he says in ‘On Nature Itself’ that “everything that acts is an

shorthand for talking about the substance's action, it may become problematic to talk of one faculty being moved by another. What activates a power of the soul would, ultimately, be the soul itself; the soul would be moving itself from potency to act. In effect, that would mean that the soul has the power to act without a stimulus.

Another possible reason why Leibniz denies the need for stimuli is his concern about intelligibility: invoking merely a “near possibility,” as he thinks the Scholastics do, does not genuinely explain change. As he puts it in one of the texts in which he contrasts his own understanding of force with Scholastic powers: “Possibility alone produces nothing, unless it is put into action; but force produces everything” (Reply to Objections [1694], UL 6:530/WF 35). There is of course nothing new about the complaint that Scholastic faculties are unintelligible, or do not genuinely explain anything; early modern philosophers are remarkably fond of complaining that Scholastic faculties are occult.³⁷ What is interesting about Leibniz is that, unlike some of his most prominent contemporaries, he does not want to banish powers altogether; he warns against throwing out the baby with the occult bathwater. Clearly, he believes that his own account of powers avoids the problems that he attributes to Scholastic accounts.

Unfortunately, Leibniz does not appear to tell us explicitly why he thinks that Scholastic powers are unintelligible while his own are intelligible. Some amount of speculation seems necessary here. Perhaps his worry about Scholastic powers is the following: saying that x had the power to ϕ in the Scholastic sense does not fully explain why it ϕ -ed. Instead, we additionally need to invoke some other thing that caused or stimulated x to ϕ . In fact, a regress appears to be looming here: the thing that stimulated x to ϕ presumably must have had the power to stimulate x . Why did it exercise this power? We need to invoke another thing that stimulated it, and so on. This might be problematic even if the stimulation comes from inside the substance at every step. If this is correct, Leibniz may have thought that in order for forces to genuinely explain change, they must lead to an action without a stimulus.

We have arrived, then, at a rough preliminary understanding of Leibnizian active forces: they are entities that lead to a change unless there is an impediment. Leibniz himself puts it this way in a French letter to Jacques Lelong: “By the Force that I bestow on substances, I

individual substance” (ONI 9). Bobro and Clatterbaugh argue for this interpretation at length (1996: 416, see also Bobro 2008: 329, as well as Schmid 2011: 326f. and 340f.).

³⁷ For a helpful discussion, see Ott 2009: 10f., 39ff., 170f.

do not understand anything other than a state from which another state follows, if nothing prevents it” (February 5, 1712, Robinet 421).³⁸ A similar definition occurs in Leibniz’s notes on Aloys Temmik’s *Philosophia vera*, composed some time after 1706: he there talks of “*conatus*, or a state from which an effect follows, unless something prevents it” (in Mugnai 1992: 157).³⁹

PRIMITIVE ACTIVE FORCE

Last but not least, consider the final distinction in the classification passage: the distinction between primitive and derivative active force. Discussing derivative active forces will allow me to address the question how we can reconcile Leibniz’s talk of appetitions and perceptions with his force ontology. But let us start with primitive active forces. Understanding what they are and how they relate to monads is crucial for my argument that Leibniz endorses a force ontology: it will reinforce my claim that Leibniz identifies monads with forces. Or, more precisely, it is strong evidence that Leibniz identifies monads either with primitive active forces or with a combination of primitive active and primitive passive force. This means that there is nothing at the fundamental metaphysical level except forces.

I already presented some textual evidence that Leibniz identifies primitive active forces with substantial forms and entelechies. In case there are still lingering doubts, here is some additional evidence. Leibniz writes in a letter to Joachim Bouvet—a Jesuit missionary who travelled to China—that “the forms of the Ancients or *Entelechies* are nothing but forces” (December 2, 1697, A 1.14.833).⁴⁰ Similarly, he tells us in ‘New System of Nature’ in 1695:

it was necessary to restore, and, as it were, to rehabilitate the *substantial forms* which are in such disrepute today, but in a way that would render them intelligible. ... I found then that their nature consists in force. ... Aristotle called them *first entelechies*; I call them, perhaps more intelligibly, *primitive forces*. (G 4:478f./AG 139)

³⁸ See also a reply to Bayle, where he says that by ‘forces,’ he means “the *source of modifications* within a created thing, or a state of that thing from which it can be seen that there will be a change of modifications” (G 4:568/PT 252).

³⁹ An almost identical definition occurs in one of Leibniz’s tables of definitions from the mature period (C 474); see also a letter to de Volder, April 3, 1699, LDV 73. For another French definition of ‘force’ along similar lines, see a letter to Remond, November 4, 1715, G 3:657.

⁴⁰ See also a letter to Remond, November 4, 1715: “the *entelechy* of Aristotle ... is nothing but force or activity” (G 3:657/W 554).

Hence, Leibniz wants force to play a role analogous to that of Aristotelian entelechies and substantial forms.

As already seen, Leibniz sometimes ascribes the role of substantial forms to active forces and the role of primary matter to passive forces. Together, these two types of forces constitute a complete substance. Hence, it makes sense that Leibniz occasionally identifies substances with passive and active forces. For example, Leibniz says in ‘On Nature Itself’ that “the very substance of things consists in a force for acting and being acted upon” (ONI §8).⁴¹ Similarly, in a text from the mid-1690s, Leibniz writes that “since everything that can be understood in substances reduces to their actions and passions, and to the dispositions that they have for that effect, I do not see that it is possible to find in substances anything more basic [*primitif*] than the principle of all of that—that is, than force” (reply to Objections [1694], UL 6:529/WF 35, translation modified). Leibnizian simple substances or monads, then, just are combinations of passive and active force; this is clear evidence that forces are the sole occupants of the metaphysical ground floor.⁴²

Yet, I argued earlier that passive force is best interpreted not as a genuine constituent of substances but rather as a way of referring to the limitation in active force. Saying that a substance consists of primitive passive and active force just means that it consists of a primitive active force that is limited or imperfect to some extent. When God creates a monad, he just creates a finite—and hence limited—active force; he does not need to create anything additional. If that is correct, Leibniz identifies monads with active forces.⁴³ In fact, there are texts in which he does this explicitly, which is further evidence for the limitation reading. First, consider the last sentence of the *New Essays* paragraph from which I took the classification passage: “Entelechies, that is, primitive or substantial tendencies when they are accompanied by perception, are Souls” (NE 170, my translation). Here, Leibniz is claiming that souls are at bottom entelechies, that is, primitive active forces.⁴⁴ Other passages are

⁴¹ The original Latin reads: “ipsam rerum substantiam in agendi patiendique vi consistere” (G 4:508).

⁴² In fact, Leibniz says in several places that the nature or essence of substances is force. See e.g. a letter to Jaquelot, February 9, 1704, G 3:464/WF 175 and a letter to Masham, June 30, 1704, G 3:356/WF 214.

⁴³ Of course, if this were incorrect—that is, if primitive passive force were a further constituent of substances—it would not undermine my argument that Leibniz is a force ontologist. Monads would still be grounded exclusively in forces.

⁴⁴ The fact that this text adds ‘when they are accompanied by perception’ should not bother us; other passages make it clear that all entelechies are accompanied by perception (see e.g. NE 210). Indeed, we will see later that perceptions result from active force.

even more direct about the identification of entelechies with monads. In the *Monadology*, for instance, Leibniz says, “[o]ne can call all simple substances or created monads ‘entelechies’” (M 18). And we could scarcely hope for a more explicit text than a passage from the *Theodicy*, in which Leibniz refers to “the Souls, Entelechies or primitive forces, substantial forms, simple substances, or Monads, whatever name one may apply to them” (T 396).⁴⁵ At bottom, monads just are forces—more precisely, they are the kinds of forces that do not require stimuli but pass into action all by themselves as long as there are no impediments.

It is interesting to note that in some ways, Leibniz’s claim that substantial forms are simply powers is in the spirit of medieval Aristotelianism. For many Aristotelians, having a substantial form principally means having a particular set of powers or potentialities.⁴⁶ Further, these Aristotelians explain the typical activities of a substance by reference to those powers. The following passage from Aquinas’s *Summa Theologiae* captures this nicely: “from the form follows an inclination to an end, or to an action, or to something of this kind. For any thing, insofar as it is in act, acts and tends towards that which is suitable for it, in accordance with its form” (I qu. 5 art. 5, corp.). For instance, possessing the substantial form of a human being means, in part, possessing the power for rational thought; possessing the substantial form of fire means, in part, possessing the power to ignite things and to move upward.⁴⁷ Leibniz agrees: like medieval Aristotelians, he thinks that each substance has an essence or nature that specifies the ways in which that substance is naturally inclined or disposed to act; essences come with potentialities for action. Leibnizian primitive forces are of course far more specific than the substantial forms described by traditional Aristotelians: a primitive force specifies everything that will ever happen in the substance. Yet, in a way, his account is simply an extension of the Scholastic account.⁴⁸

⁴⁵ See also a draft of ‘New System,’ where Leibniz says that force is that which “constitutes substance” (*comme le constitutive de la substance*; G 4:472/WF 22), as well as a letter to Jaquelot: “God gave the soul the power of producing its own thoughts. ... Indeed, according to me, the nature of each substance consists in this force” (February 9, 1704, G 3:464/WF 175).

⁴⁶ To be sure, Aristotelians do not typically appear to identify substantial forms with powers. Yet, according to Dennis Des Chene, “the only ‘analysis’ [of substantial forms] Aristotelianism was willing to provide was to describe the active powers associated with a form and the dispositions required for its reception” (1996: 75). Powers are, it appears, the only aspects of substantial forms to which we have access. As a result, it would make sense for someone like Leibniz to identify them with powers.

⁴⁷ See e.g. *Summa Theologiae* I qu. 80 art. 1, corp. and *Summa Contra Gentiles* 4.36.2f. See also Stump 2003: 66f.

⁴⁸ For a more detailed discussion of the similarities and differences between Leibniz and Aquinas, see Jorati 2013: 59ff.

A few further features of primitive active force are worth mentioning, at least in passing. Some of these features constitute additional similarities with certain Scholastic accounts of substantial forms. First, each primitive active force remains qualitatively the same over time.⁴⁹ This is important to Leibniz because it is supposed to ground the diachronic identity of substances.⁵⁰ Moreover, each primitive force is mereologically simple,⁵¹ which is supposed to ground the substance's synchronic unity.⁵² Furthermore, each substance is individuated by the unique infinite complexity of its primitive force.⁵³ These features provide Leibniz with additional philosophical reasons to deny the existence of a substratum that is not force-like: primitive force makes such a substratum superfluous. Primitive force is itself the unchanging, unifying, underlying entity in which all changing states inhere; it also individuates substances, which is one role attributed to the substratum in some Scholastic theories.

Let me just mention one final aspect of primitive active force, namely, its relation to what Leibniz sometimes calls the 'law of the series.' One might wonder whether this law is a further ingredient in substances and whether it is at least as fundamental as primitive force. Leibniz discusses the law of the series most extensively in his letters to Burcher de Volder. Some of his descriptions of that law do indeed make it sound like an additional, fundamental ingredient of monads. For instance, here is how he explains the persistence conditions of monads to de Volder:

The substance that succeeds is taken to be the same as long as the same law of the series, i.e., of the continual simple transition, persists that gives rise to our belief in the same subject of change, i.e., the monad. I say that the fact that there is a certain persisting law, which involves the future states of that which we conceive of as the same, is the very thing that constitutes the same substance. (January 21, 1704, LDV 291)⁵⁴

⁴⁹ I will provide textual evidence for this below, when discussing derivative active force.

⁵⁰ See e.g. ONI 8; NE 231f.; letter to de Volder, January 21, 1704, LDV 291.

⁵¹ See e.g. T 396; 'Philarete and Ariste,' G 6:588/AG 264.

⁵² In a letter to de Volder, Leibniz says that his substantial forms are "the sources of action and unity" (June 20, 1703, LDV 257). This is a further parallel with Aristotelian substantial forms: according to Des Chene, medieval Aristotelians typically understand substantial forms as the "ground of the unity of active powers" (1996: 179); demonstrations of the existence of substantial forms were typically based on "the necessity of a unifying ground" of powers whose effects we observe (1996: 158).

⁵³ See e.g. T 291; letter to de Volder, June 20, 1703, LDV 263; reply to Bayle [1698], G 4:518/PT 203.

⁵⁴ See also 'On Nature Itself,' where Leibniz talks of an enduring and "inherent law" in all substances "from which both actions and passions follow" (ONI 5).

Here, the law of the series plays one of the roles that I have so far attributed to primitive force: it is a persisting, unchanging entity that accounts for the identity of substances over time. In fact, Leibniz tells de Volder earlier in the same letter that “nothing is permanent in [substances] except the very law that involves the continued succession” (LDV 289). In a prior letter, Leibniz even says to de Volder that the nature of the soul “consists in a certain perpetual law of the same series of change, which it runs through unhindered step by step” (April 3, 1699, LDV 75). Moreover, Leibniz claims in a reply to Pierre Bayle that “this law of order ... constitutes the individuality of each particular substance” (G 4:518/PT 203). According to these passages, the law of the series sounds like an excellent candidate for a fundamental entity. Indeed, it threatens to usurp many of the roles that I have so far ascribed to primitive force. What, then, is the relationship between the law of the series and primitive force?

Leibniz’s answer is a simple one: the law of the series just is the primitive force.⁵⁵ This becomes clear in a number of texts. He tells de Volder that “primitive force is like [*velut*] the law of the series” (January 21, 1704, LDV 287; similarly on April 3, 1699, LDV 75). Moreover, in ‘On Nature Itself’ he argues for the existence of “a soul or a form analogous to a soul, or a first entelechy, that is, a certain urge [*visus*] or primitive force of acting, which itself is an inherent law, impressed by divine decree” (ONI 12; similarly in ONI 6).⁵⁶ According to these passages, the “law” that Leibniz occasionally invokes is just another name for the primitive force (or vice versa). Sometimes Leibniz appears to find it helpful to describe the fundamental nature of substances as force-like; at other times, he appears to find it helpful to describe it as law-like. This should not be surprising: one important aspect of Leibnizian primitive force is that it makes it possible in principle to predict the entire series of changes that will occur in a monad. Changing states arise from the primitive force in a deterministic, lawful fashion. Talking about a law of the series is a helpful way to emphasize this aspect of primitive force. Yet, that is not the only central aspect of primitive force: its active nature is at least as important, and that aspect is not captured very well by

⁵⁵ Several other Leibniz scholars endorse this interpretation as well; see e.g. Whipple 2010: 391ff., Rutherford 1995: 154, Cover and O’Leary-Hawthorne 1999: 227.

⁵⁶ Interestingly, Leibniz says something very similar in some notes on a reply of Foucher from 1676: “The essence of substances consists in the primitive force of action, or in the law of the sequence of changes” (A 6.3.326/L 155).

calling it a law. Hence, ‘primitive force’ is the more accurate label for the entities at the fundamental level.

DERIVATIVE ACTIVE FORCE

What I have said so far allows us already to make sense of some of the ways in which Leibniz talks about monads. He identifies them with primitive forces because they are, at bottom, forces. Likewise, he calls primitive active forces ‘substantial forms’ because they do the work that Scholastic writers assigned to substantial forms: they specify the activities that are characteristic of a substance and endow the substance with powers to perform those activities. Primitive forces also serve as the principles of the substance’s synchronic and diachronic identity.

My next task in this paper is to explore the status of derivative active forces. The results of this exploration will enable us, in the final section, to reconcile the claim that monads are fundamentally forces with one additional way in which Leibniz often describes monads: as perceivers with appetitions. The first thing to note—which I already mentioned briefly when discussing derivative passive force—is that derivative forces change, while primitive forces do not. Leibniz writes to de Volder that unlike primitive forces, derivative forces are “continually found to be one way and then another” (June 20, 1703, LDV 263). That is one important difference between primitive and derivative force.

In fact, in several passages Leibniz argues from the observation that derivative forces change to the existence of an underlying, unchanging primitive force. In yet another letter to de Volder, Leibniz says that “[u]nless there is something in us that is primitive and active, there cannot be derivative forces and actions in us” (June 30, 1704, LDV 307).⁵⁷ Changeable forces, he insists, require some underlying unchanging force—that is, they require primitive force. The reason that Leibniz typically cites for this is the following: “everything accidental, i.e., mutable, must be a modification of something essential, i.e., perpetual” (*ibid.*). Or, as he puts it elsewhere, derivative force must be “something modal, since it admits of change. But every mode consists of a certain modification of something that persists, that is, of

⁵⁷ See also an earlier letter to de Volder: “corporeal substances cannot be constituted from derivative forces alone joined with resistance, i.e., from vanishing modifications. Every modification presupposes something lasting” (June 20, 1703, LDV 263). See also NE 65; T 369; ‘On Body and Force,’ G 4:397/AG 254.

something more absolute” (‘On Body and Force,’ G 4:397/AG 254). That underlying, persisting thing must itself be active, Leibniz often points out, because there cannot be more reality or perfection in a modification than in that which it modifies.⁵⁸ After all, for Leibniz, modifications are limitations (letter to Bernoulli, November 18, 1698, A 3.7.944/AG 169; letter to Jaquelot March 22, 1703, G 3:457/WF 201; ‘On Body and Force,’ G 4:396/AG 253; letter to de Volder, June 30, 1704, LDV 307). He sometimes uses shape as an analogy: derivative force is a limitation of primitive force just as shape is a limitation of extension.⁵⁹

What precisely are derivative forces, then? Saying that they are limitations of some unchanging, underlying force—that is, of primitive force—is somewhat helpful but needs to be spelled out further. The analogy with shape might suggest that derivative force is a limited portion or proper part of primitive force. Yet, that cannot be entirely correct—primitive force is supposed to be mereologically simple. But perhaps something in the vicinity is true. Consider the following passage from a letter to de Volder:

derivative force is the present state itself insofar as it tends toward a following state, i.e., preinvolves a following state. ... But the persisting thing itself, insofar as it involves [*involvit*] all cases, has primitive force, so that primitive force is like the law of a series, and derivative force is like a determination that designates some term in the series. (January 21, 1704, LDV 287)

In this context, thinking of primitive force as law-like is helpful: primitive force is the ultimate ground of the entire series of changing states and makes it possible, in principle, to predict all changes that will happen in the substance. It “involves all cases.” The primitive force is like a law or function that dictates (and even generates) the entire series of states. Now consider a substance at some particular time. The substance’s primitive force specifies not only the state in which the substance is at that time but also the states to which it is about to transition. Some aspect of its primitive force determines it to change in a particular way at that particular time. This aspect or determinate tendency, Leibniz appears to be saying,

⁵⁸ If he is endorsing the more general principle that active entities cannot inhere in something that lacks activity, it is an additional reason for him to deny that there is a substratum that is not force-like. For Leibniz, after all, the substratum or subject of change which persists through changes must itself be a type of force.

⁵⁹ Texts in which he uses shape as an analogy include a letter to Bernoulli (November 18, 1698, A 3.7.944/AG 169), a letter to de Volder (June 30, 1704, LDV 307), a letter to Jaquelot (March 22, 1703, G 3:457/WF 201), and ‘On Body and Force’ (G 4:397/AG 254).

is the substance's derivative force at that time.⁶⁰ This fits well with what Leibniz says about derivative forces in other places. For instance, he tells us in 'On Body and Force' that "Derivative force is what certain people call impetus, conatus, or a striving [*tendentia*], so to speak, toward some determinate motion" (G 4:396/AG 253). Even though this passage is about physical derivative forces, these forces seem to be structurally similar to their metaphysical cousins: both are tendencies that a thing possesses at some particular time to change in some specific way.

Understanding derivative forces as aspects of primitive force is compatible with the mereological simplicity of primitive force. Consider the following analogy: a computer has been programmed to display a series of numbers, one number at a time, starting with the number one and then generating new numbers by always adding two to the preceding number. In this analogy, the primitive force is the general disposition to display numbers in accordance with the rule that any new number equals the old number plus two. Arguably, this general disposition is mereologically simple: it does not have proper parts. Moreover, derivative force is analogous to the computer's disposition to display a specific number. An example of such a disposition is the disposition to display the number nine. This specific disposition is one aspect of the general disposition to follow the rule. My suggestion is that Leibnizian derivative forces are limitations or aspects of primitive force just as the computer's disposition to display the number nine is a limitation or aspect of its general disposition to apply the rule.

At this point, there is clearly an elephant in the room: If derivative, changing forces are nothing but aspects of the underlying, unchanging force, does this mean that change (or succession, or time) is not real for Leibniz? Are monads, at bottom, static or timeless? After all, it may seem that the aspects of an unchanging thing cannot change. It is important to acknowledge the presence of this elephant. Unfortunately, I will not be able to do much more than that here. Getting to the bottom of Leibniz's views on time and change would

⁶⁰ This appears to be Donald Rutherford's interpretation as well: "From the perspective of metaphysics, derivative forces are nothing more than the primitive force of substance, *conceived as determined in some particular way*" (2008: 277). In a footnote, he gets even more precise: "derivative forces ... indicate a substance's tendency to change at a moment" (2008: 279n58).

require a far more thorough investigation than I am able to provide in the remainder of this paper.⁶¹ I can merely make a few brief and admittedly underdeveloped remarks.

First, an interpretation on which the fundamental entities are forces but on which there is no genuine change seems problematic, to say the least. As we saw, Leibniz defines forces in terms of change: genuine forces lead to a change unless something impedes them. They are dynamic entities. Hence, my interpretation provides strong philosophical reasons to view monadic change as real. Second, I believe that there are ways for Leibniz to hold that monadic change is real. The computer analogy illustrates how an unchanging force can give rise to real change: the program or rule is unchanging and explains the entire series of numbers that the computer displays. Yet, what the computer displays does genuinely change. At different times, different aspects of the computer's general disposition manifest. For example, the disposition to display the number 347 does not manifest until the computer has finished displaying the number 345. Perhaps monads function similarly. The primitive force is unchanging and explains the entire series of changes. Yet, different aspects of the primitive force manifest at different times. Leibniz's account of force requires that whenever some aspect of the primitive force (that is, some derivative force) does not manifest, it is masked or impeded by something—presumably by the currently manifesting aspect, because the manifestations of these two aspects are incompatible. For example, ten years ago you already had the disposition to represent the current state of the world. That is an aspect of your primitive force—it is always “pregnant with the future,” as Leibniz sometimes puts it (e.g. letter to des Bosses, August 19, 1715, LDB 349; letter to de Volder, January 21, 1704, LDV 287). Yet, your disposition to represent the current state of the world was masked until just now. It was masked, presumably, by all of the representations of the intervening states of the world, which are incompatible with it.

APPETITIONS AND PERCEPTIONS

Now that we have a better understanding of what derivative forces are and how they relate to primitive forces, let us investigate why Leibniz so often describes monads as mind-like substances that possess appetitions and perceptions. For Leibniz, perceptions are

⁶¹ The status of time in Leibniz is controversial; see e.g. Whipple 2010, and Futch 2008: 160ff., who argue that monads are, at the most fundamental level, atemporal.

representations of external things and appetitions are tendencies to change those representations. He insists repeatedly that these are the only types of internal modifications in monads; sometimes he even says that “the nature of a simple substance consists of perception and appetite” (‘Metaphysical Consequences of the Principle of Reason’ §8, C 14/MP 175). He also maintains that monadic perceptions change constantly, expressing everything that happens in the external world. Can we reconcile this description of monads with a force ontology—that is, can we translate Leibniz’s talk of appetitions and perceptions into talk of forces?

The relation between appetitions and forces is more straightforward than the relation between perceptions and forces. Hence, let us start with the former. Leibniz defines appetitions as a monad’s “tendencies to go from one perception to another” (PNG 2), or as the “action of the internal principle which brings about the change or passage from one perception to another” (M 15).⁶² In one way or another, then, appetitions are supposed to help explain the changes in monadic perceptions. When a soul goes naturally from pleasure to pain, for instance, this change can be explained—at least in part—by the appetitions of that soul. This of course makes sense, given that Leibniz denies the interaction of finite substances: any natural change in a monad arises from its own depth. Most plausibly, this means that all changes in a monad are explained by the forces that the monad possesses or to which it is identical.

It is worthwhile to pause here and note the terminology Leibniz employs to refer to appetitions. He often uses the terms ‘appetite’ (Latin: *appetitus*; French: *appetit*) or ‘appetition’ (Latin: *appetitio*; French: *appetition*), apparently interchangeably (‘Table of definitions,’ C 472). At other times, he reserves the term ‘appetition’ for imperfect, unconscious inclinations and contrasts it with ‘volition’ (NE 173; cf. NE 189, 194; revision note, A 6.1.286/L 92n18). Leibniz also uses other terms to refer to or describe appetitions, namely, the French and Latin counterparts of the terms ‘tendency’ (letter to Wolff, GLW 56; letter to Remond, G 3:622; letter to Bourguet, G 3:575/L 662f.), ‘inclination’ (reply to Bayle, G 4:550/WF 105; Gr 480/SLT 97; CD 138; NE 351), and ‘desire’ (NE 192; ‘Definitions,’ A 6.4.310; Beeley 11), as well as the French term *effort* (NE 173, 192) and the Latin terms *conatus* (‘Table of definitions,’ C 491) and *percepturatio* (letter to Wolff, GLW 56). Some of these terms are useful

⁶² In another text, Leibniz defines ‘appetite’ as “the endeavour of acting tending towards new perception” (G 7:330/SLT 66); similarly in a letter to Bourguet, August 5, 1715, G 3:581/L 664.

for understanding what precisely appetitions are and how they relate to forces. In particular, the terms ‘tendency,’ ‘inclination,’ ‘effort,’ and ‘conatus’ are useful because they strongly suggest that appetitions are forces of some kind.

What might be the relationship between appetitions and primitive forces? Because appetitions appear to be forces, one possibility is that a monad’s appetitions are identical to the primitive force that constitutes the monad’s nature.⁶³ If that is correct, a monad at bottom simply is the collection of all of its simultaneous inclinations to transition to new perceptions. That would make at least some sense, because Leibniz claims that a monad’s appetitions, like its fundamental nature, explain the changes that happen in that substance. Yet, it turns out that the relation between appetitions and primitive force cannot be straightforward identity; it is more complicated than that. One reason for this is Leibniz’s obsession with preserving the unity of substances. If at the most fundamental level, substances were collections of appetitions, it would be hard to see how he can ascribe substantial unity to them.⁶⁴ In order to possess unity, primitive forces must be simple; they cannot be collections of appetitions. Moreover, primitive forces remain the same over time, while appetitions are constantly changing: Leibniz holds that “there is in each soul a series of appetites and perceptions” (*Metaphysical Consequences of the Principle of Reason* §8, C 14/MP 175). Talking of a “series” of appetitions implies that appetitions, like perceptions, constantly change. Hence, appetitions cannot be identical to primitive force.⁶⁵

Hence, I propose that appetitions are not primitive but derivative active forces. After all, derivative forces are the changing modifications of primitive force and therefore a good place to fit appetitions—which are changing modifications—into Leibniz’s force ontology. The definition of ‘appetition’ from *Monadology* §15 supports this reading because it says that appetitions are the actions of the “internal principle”—that is, presumably, of the monad’s primitive force. Most plausibly, this means that appetitions are derivative active forces. They

⁶³ Nicholas Jolley appears to endorse this: he claims that “the physical forces in bodies ... are grounded in the primitive force of monads, namely appetite” (2005: 80).

⁶⁴ See John Whipple, who also discusses this problem (2010: 381).

⁶⁵ This becomes clear in Leibniz’s 1707 comments on Spinoza: “[Spinoza] improperly says that the striving [*conatus*] is the essence itself, although the essence is always the same and the striving [*conatus*] varies” (Beeley 12/AG 279). The type of striving Leibniz is talking about here seems to be the striving associated with the will—that is, a kind of appetite.

are limitations or modifications of primitive active force.⁶⁶ A number of other interpreters agree; Paul Lodge, for instance, defines appetitions as “the momentary dynamism grounded in the enduring dynamic nature of monads” (Introduction to LDV, xc).⁶⁷

How about perceptions—in what way could they be grounded in primitive force? This is less straightforward because perceptions are not obviously force-like. They are representational states, expressing the external world. Of course, perceptions are closely connected with appetitions—for instance, a mouse’s desire to run away from an approaching cat is closely related to its perceptions of that cat. Yet, perceptions are not themselves tendencies. Or, more cautiously—since some interpreters view appetitions as aspects of perceptions⁶⁸—they are more than tendencies toward an expression of a future state of the world because they are also representations of the current state. Hence, even if a perception and the corresponding appetite are ultimately one monadic state, that state possesses at least one aspect that is not obviously force-like.

There are indications that Leibniz takes perceptions to be grounded in forces—as he must, if he is indeed a force ontologist. In ‘New System of Nature,’ for instance, he claims that the nature of substantial forms “consists in force, and that from this there follows something analogous to sensation and appetite” (G 4:478f./AG 139). Entities that are analogous to sensations—that is, perceptions—are here described as following from the force that constitutes the nature of substantial forms. This text does not explain how exactly perceptions follow from force. Yet, here is one possibility, based on what we have learned

⁶⁶ One text that at least initially seems to suggest otherwise is a letter to de Volder, probably from January 1705: “I relegate derivative forces to the phenomena, but I think that it is clear that primitive forces can be nothing other than the internal strivings of simple substances, by which they pass from perception to perception by a certain law of their nature” (LDV 319). Here it does sound as if appetitions themselves are primitive forces rather than derivative ones. Yet, I do not think that this can be what Leibniz means. Perhaps when he is saying that monads pass from perception to perception by primitive forces, he does not mean to say that the primitive forces do this immediately, but rather that they do so through their modifications, that is, through derivative forces or appetitions.

⁶⁷ Rutherford 2005: 165, Adams 1994: 380, and Kulstad 1990: 136 also think that appetitions are best understood as derivative active forces. Phemister disagrees, however: she claims that even though perceptions and appetitions are modifications of primitive forces, they are not what Leibniz calls derivative forces; instead, she claims, Leibniz uses the terms ‘derivative force’ exclusively for the forces attributed to bodies (2005: 214, cf. 220). If that were true, it would not undermine my interpretation because appetitions are still modifications of primitive force—even if Leibniz never calls them ‘derivative forces.’ Yet, as McDonough shows, Leibniz does appear to use the term ‘derivative force’ for metaphysical forces in some texts (2016: 11). See e.g. LDV 286.

⁶⁸ See e.g. McRae 1976: 60, Whipple 2010: 407n56, Bolton 2011: 145.

about Leibnizian forces so far: perhaps perceptions are not themselves forces, but they are the states at which derivative forces aim. This would make sense, because when forces manifest, they must do something, that is, lead to some change. Moreover, we saw that Leibniz defines appetitions—which are derivative forces—as the tendencies toward new perceptions. On this interpretation, perceptions are not themselves force-like, but they are grounded in forces, or result from forces. Hence, forces are still the only fundamental entities. Derivative forces constantly lead to new perceptions, each of which is an internal variety in the monad that represents the current state of the external world.

Interestingly, one of Leibniz’s replies to Pierre Bayle suggests a more radical account of perceptions:

the atom (as it is assumed to be, although there is no such thing in nature), though it has parts, has nothing which causes some variety in its tendency, because we assume that its parts do not change their relations. The soul, on the other hand, though entirely indivisible, involves a composite tendency, that is to say, a multitude of present thoughts, each of which tends to a particular change according to what it involves and what is found in it at the time. (G 4:562/L 579)

This passage indicates that the complexity of a monad’s tendency is somehow identical to the monad’s perceptions: the text appears to identify the “multitude of present thoughts” with the “composite tendency.” (The term ‘thought’ is clearly used as a synonym for ‘perception’ in this text.) Hence, Leibniz appears to suggest that perceptions are themselves tendencies.

But how could perceptions be tendencies? One way to understand the passage from the reply to Bayle is the following. Recall that for Leibniz, perceptions are ultimately nothing but the variety in a simple thing that has a particular kind of correspondence—something like an isomorphism—to variety outside of the simple thing.⁶⁹ The passage from Leibniz’s reply to Bayle appears to say that this internal variety just is the variety inherent in the composite

⁶⁹ See e.g. ‘Metaphysical Consequences’ §11, C 15/MP 176f.; letter to Wagner, June 4, 1710, G 7:529/W 505; letter to Bourguet, August 5, 1715 G 3:581/L 664. See Simmons for a more detailed discussion of Leibnizian perception as an isomorphism (2001: 67ff.; see also Jorgensen 2015, Swoyer 1995: 84f., Kulstad 1977: 73f., 2006: 414ff.).

tendency or force.⁷⁰ If that is correct, the perception of a monad at some time just is the structure or complexity of its derivative force at that time. This structure constantly changes, always representing the present state of the external world. Because derivative force is an aspect of primitive force, this would mean that perceptions are ultimately aspects of primitive force as well.

If this interpretation is correct, appetitions and perceptions are not identical to each other. Rather, they are two different modifications of primitive force, or two different ways in which the primitive force presents itself. Saying that a monad at time t possesses an appetite for x would simply mean that the primitive force presents itself at t as striving toward x . In other words, the tendency toward x , which is an aspect of the monad's primitive force, is manifesting at t . Similarly, saying that at time t the monad perceives y simply means that the primitive force presents itself at t as structured in such a way that it represents y . In other words, the aspects of the primitive force that are manifesting at t are structured in a way that mirrors the structure of y . The structure of the derivative force, in virtue of which it represents y , is not identical to the derivative force in its entirety. Hence, perceptions are not identical to appetitions.

This interpretation is intriguing, but it raises a number of questions that would need to be addressed in order to assess its viability. Most importantly, we would need to explain in what precisely the manifestation of a force consists. To what do forces lead when they manifest—more forces, which are structured in such a way that they represent the external world? That sounds odd, but perhaps it is coherent; perhaps it is even what Leibniz had in mind. Yet, I currently find the other interpretation more appealing, on which perceptions are not force-like even though they are grounded in forces. Perceptions are the states toward which derivative forces tend—that is, the states that result from derivative forces when they manifest.

CONCLUSION

I have not answered nearly all of the important questions about Leibnizian forces in this paper. Yet, I provided a rough account of some intriguing features of these forces that

⁷⁰ It is important to note that 'composite' cannot mean that the force has proper parts or is literally composed. Primitive force cannot have parts because otherwise, it could not be a fundamental, unified, and real entity.

interpreters have largely neglected. First of all, Leibnizian forces pass into action, or manifest, without needing a stimulus. Second, forces are fundamental; they are the sole inhabitants of the ground floor of Leibniz's mature ontology. Monads do not have forces, strictly speaking—they are forces. At the most fundamental level, we find primitive forces, and each unified and simple primitive force is a monad. Moreover, primitive passive force is not a genuine constituent of substances but a mere privation or limitation. When Leibniz ascribes primitive passive force to a monad, he is merely referring to the limitation in the monad's primitive active force. Finally, derivative forces are the changing modifications of primitive force; they are aspects of the primitive force that manifest successively and therefore constitute a series of modifications.

Interpreting Leibniz as a force ontologist has far-reaching consequences. Among other things, it requires us to reconsider the status of time in Leibniz's system and to revise our understanding of appetitions and perceptions. While I was not able to explore those consequences fully, I sketched an interpretation on which it makes sense to talk of the changing modifications of an unchanging, primitive force. Likewise, I proposed to understand appetitions and perceptions as grounded in primitive force. Appetitions are derivative active forces—that is, they are tendencies toward a particular change; they are the aspects of primitive force that manifest at a particular time. In contrast, perceptions are the states toward which these derivative forces tend and to which the derivative forces lead when they manifest. Hence, we can translate Leibniz's talk about appetitions and perceptions into his talk about forces. That also enables us to understand why Leibniz sometimes finds it useful to describe monads as mind-like substances that perceive and strive: monads are indeed mind-like insofar as they are forces that produce representations of the external world and tend toward new representations. Because these forces also play many of the roles that Scholastic substantial forms were supposed to play, it furthermore makes sense for Leibniz to describe his ontology in hylomorphic terms. Each of Leibniz's three descriptions of monads—as mind-like substances, as hylomorphic compounds, and as forces—is helpful in its own way, even though the last one captures the fundamental nature of monads the best.⁷¹

⁷¹ I thank the participants of the workshop “Exploring Dispositions: Contemporary and Historical Perspectives” (Berlin, March 2016), the 2016 New England Colloquium in Early Modern Philosophy at Yale, and at the Ohio State Modern Philosophy Workshop for enormously helpful feedback on

ABBREVIATIONS OF LEIBNIZ TEXTS AND EDITIONS

Note: If an English edition is explicitly cited (or associated with an abbreviation), translations are taken from that English edition, unless otherwise specified. In all other cases, translations are mine. Quotations include all italics from the original text, unless otherwise specified.

- A *Sämtliche Schriften und Briefe*. Ed. Deutsche Akademie der Wissenschaften. Darmstadt, Leipzig, Berlin: Akademie Verlag, 1923–2015. Cited by series, volume, page.
- AG *Philosophical Essays*. Ed. and transl. Roger Ariew and Daniel Garber. Indianapolis: Hackett, 1989.
- Beeley Leibniz on Wachter’s *Elucidarius cabalisticus* (1706). Ed. Philip Beeley. *The Leibniz Review* 12 (2002), 1–11.
- C *Opuscules et fragments inédits de Leibniz*. Ed. Louis Couturat. Paris: F. Alcan, 1903.
- CD *Causa Dei*, appended to the *Theodicy* (1710). Cited by section number as in G 6:439–62.
- COE ‘Observations on the Book Concerning the Origin of Evil,’ appended to the *Theodicy* (1710). Cited by section number as in G 6:400–36.
- G *Die philosophischen Schriften von Gottfried Wilhelm Leibniz*. 7 vols. Ed. Carl Immanuel Gerhardt. Berlin: Weidmann, 1875–90. Reprinted Hildesheim: Georg Olms, 1978. Cited by volume and page.
- GLW *Briefwechsel zwischen Leibniz und Christian Wolff*. Ed. Carl Immanuel Gerhardt. Halle: Schmidt, 1860.
- GM *Leibnizens Mathematische Schriften*. 7 vols. Ed. Carl Immanuel Gerhardt. Berlin: Asher, 1849–63. Reprinted Hildesheim: Georg Olms, 1971. Cited by volume and page.

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- Gr *Textes inédits d'après des manuscrits de la Bibliothèque provinciale d'Hanovre*. 2 vols. Ed. Gaston Grua. Paris: Presses Universitaires de France, 1948.
- H *Theodicy*. Transl. E.M. Huggard. La Salle: Open Court, 1985.
- L *Philosophical Papers and Letters*. Ed. and transl. Leroy Loemker. Dordrecht: Reidel, 1969.
- LC 'The Leibniz-Clarke-Correspondence' (1715–16). G 7:352–440; cited by number of letter and number of paragraph [e.g. LC 5.2: letter 5, paragraph 2].
- LDB *The Leibniz-Des Bosses Correspondence*. Ed. and transl. Brandon Look and Donald Rutherford. New Haven: Yale University Press, 2007.
- LDV *The Leibniz-De Volder Correspondence*. Ed. and transl. Paul Lodge. New Haven: Yale University Press, 2013.
- M 'Monadology' (1714). Cited by section as in G 6:607–23; translation from AG 213–25.
- MP *Philosophical Writings*. Ed. and transl. Mary Morris and George H.R. Parkinson. London: J. M. Dent, 1973.
- NE *New Essays on Human Understanding* (1704). Cited by page numbers from A.6.6; translation from *New Essays on Human Understanding*, transl. Peter Remnant and Jonathan Bennett. New York: Cambridge University Press, 1996.
- ONI 'On Nature Itself' (1698). Cited by section as in G 4:504–16; translation from AG 155–67.
- PNG 'Principles of Nature and Grace, Based on Reason' (1714). Cited by section as in G 6:598–606; translation from AG 206–13.
- PT *Philosophical Texts*. Ed. Roger Woolhouse and Richard Francks. New York: Oxford University Press, 1998.
- Robinet *Malebranche et Leibniz: relations personnelles*. Ed. A. Robinet. Paris: Vrin, 1955.
- SLT *The Shorter Leibniz Texts: A Collection of New Translations*. Ed. and transl. Lloyd Strickland. New York: Continuum, 2006.

- T *Theodicy* (1710). Cited by section number as in G 6:102–365; translation from H.
- UL *Correspondance de Bossuet*. Ed. C. Urbain and E. Levesque. Paris: Hachette, 1909. Cited by volume and page.
- W *Leibniz Selections*. Ed. and transl. Philip Wiener. New York: Scribner, 1951.
- WF *Leibniz's 'New System' and Associated Texts*. Ed. and transl. Roger Woolhouse and Richard Francks. New York: Oxford University Press, 1997.

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